

March 19, 1940.

C. W. MUELLER

2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 1

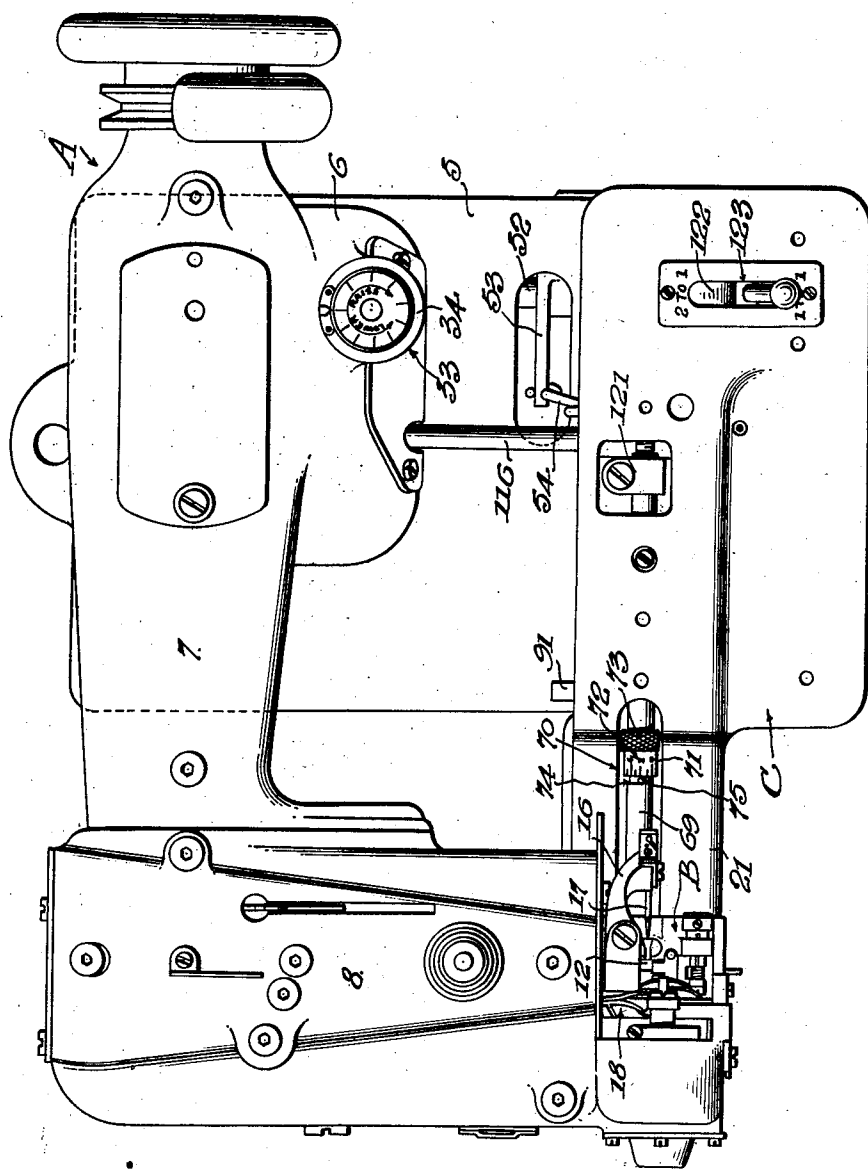


Fig. 1.

Inventor

Charles W. Mueller

By S. George Tate

Attorney

March 19, 1940.

C. W. MUELLER

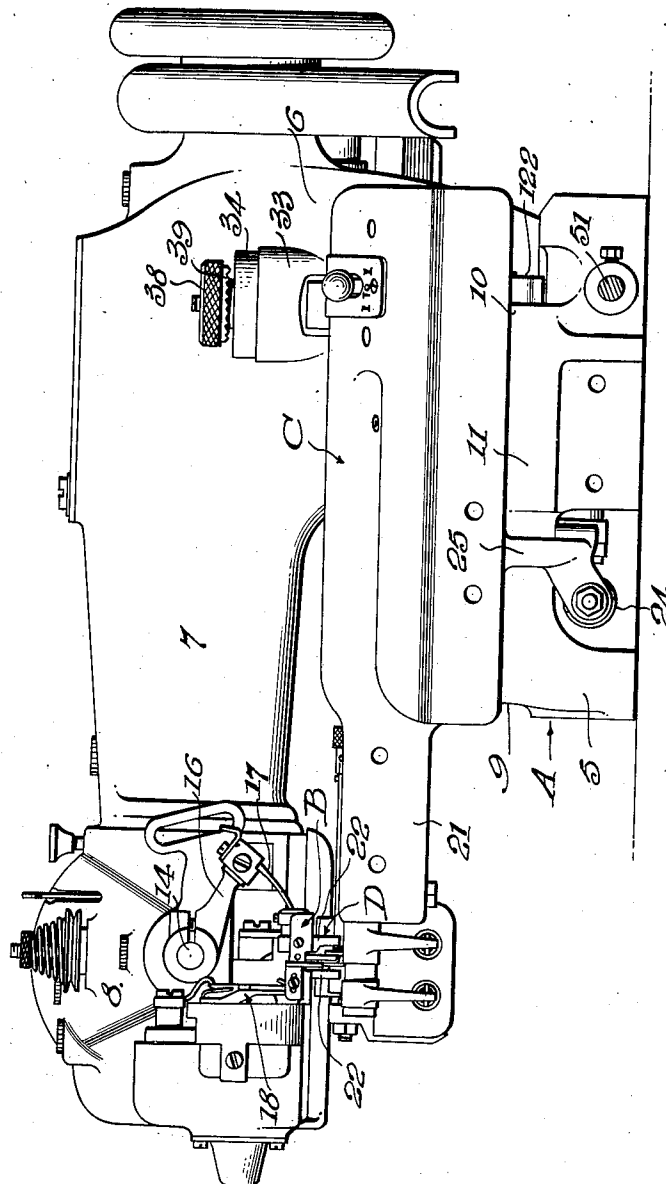
2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 2

Fig. 2.



Inventor

Charles W. Mueller

By S. George Tate

Attorney

March 19, 1940.

C. W. MUELLER

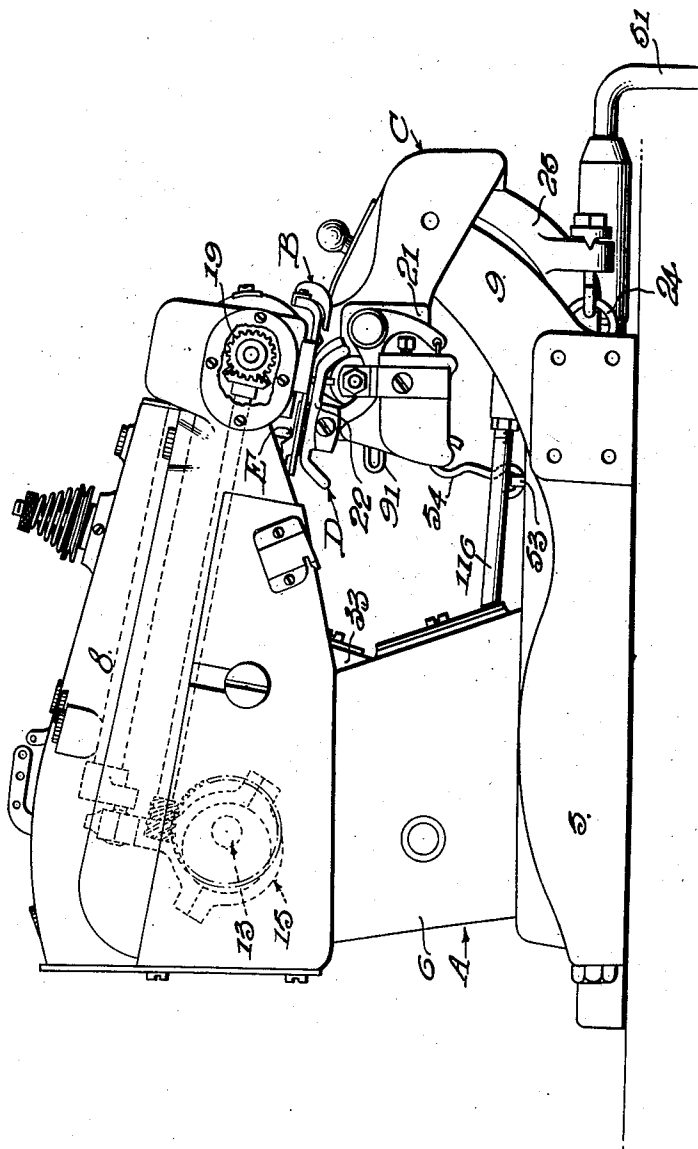
2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 3

Fig. 3.



Inventor

Charles W. Mueller

By *S. George Tate*

Attorney

March 19, 1940.

C. W. MUELLER

2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 4

Fig. 4.

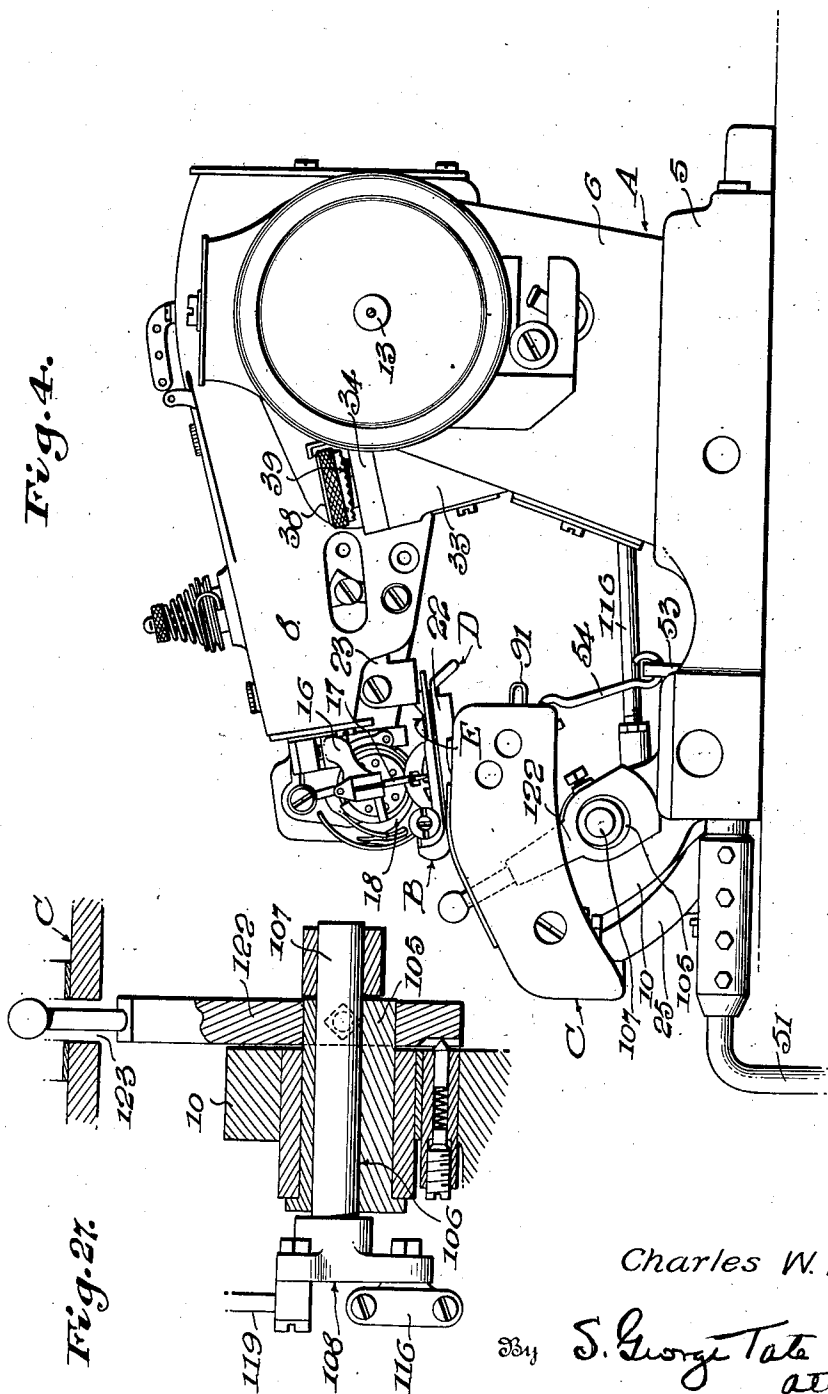


Fig. 2.

Inventor

Charles W. Mueller

S. George Tate
attorney

March 19, 1940.

C. W. MUELLER

2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 5

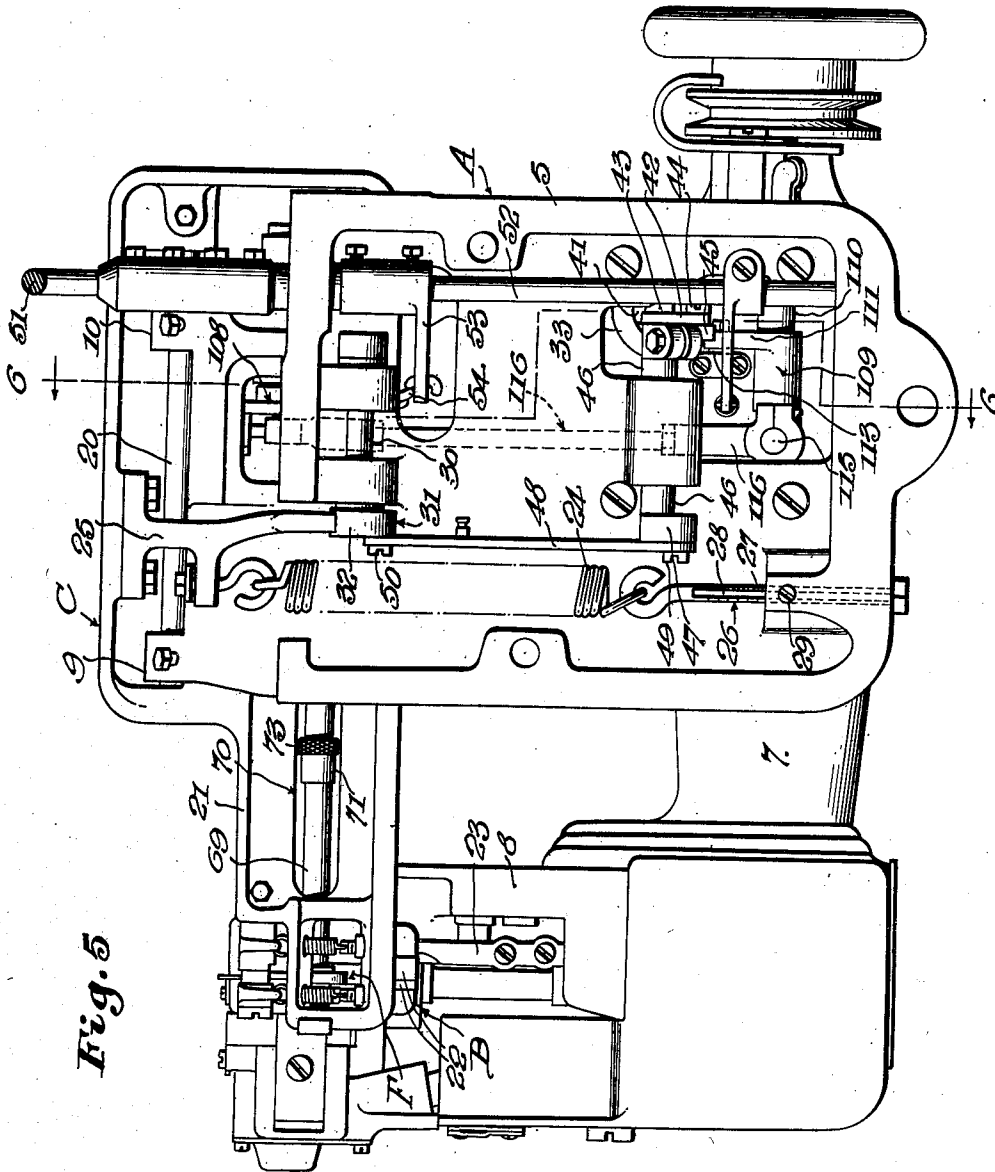


Fig. 5

Inventor

Charles W. Mueller

334 J. George Tate
attorney

March 19, 1940.

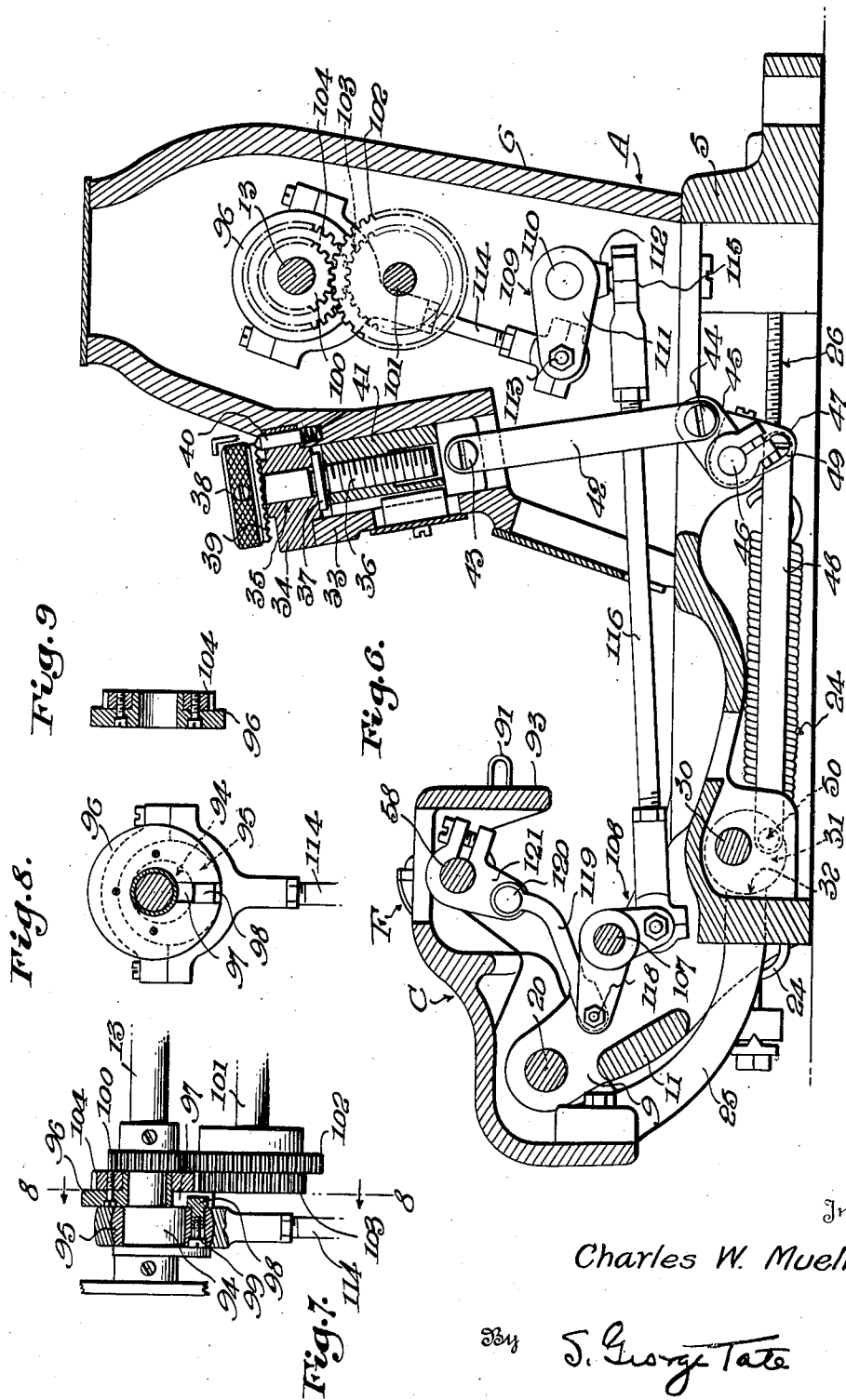
C. W. MUELLER

2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 6



Inventor

Charles W. Mueller

By

S. George Tate

Attorney

March 19, 1940.

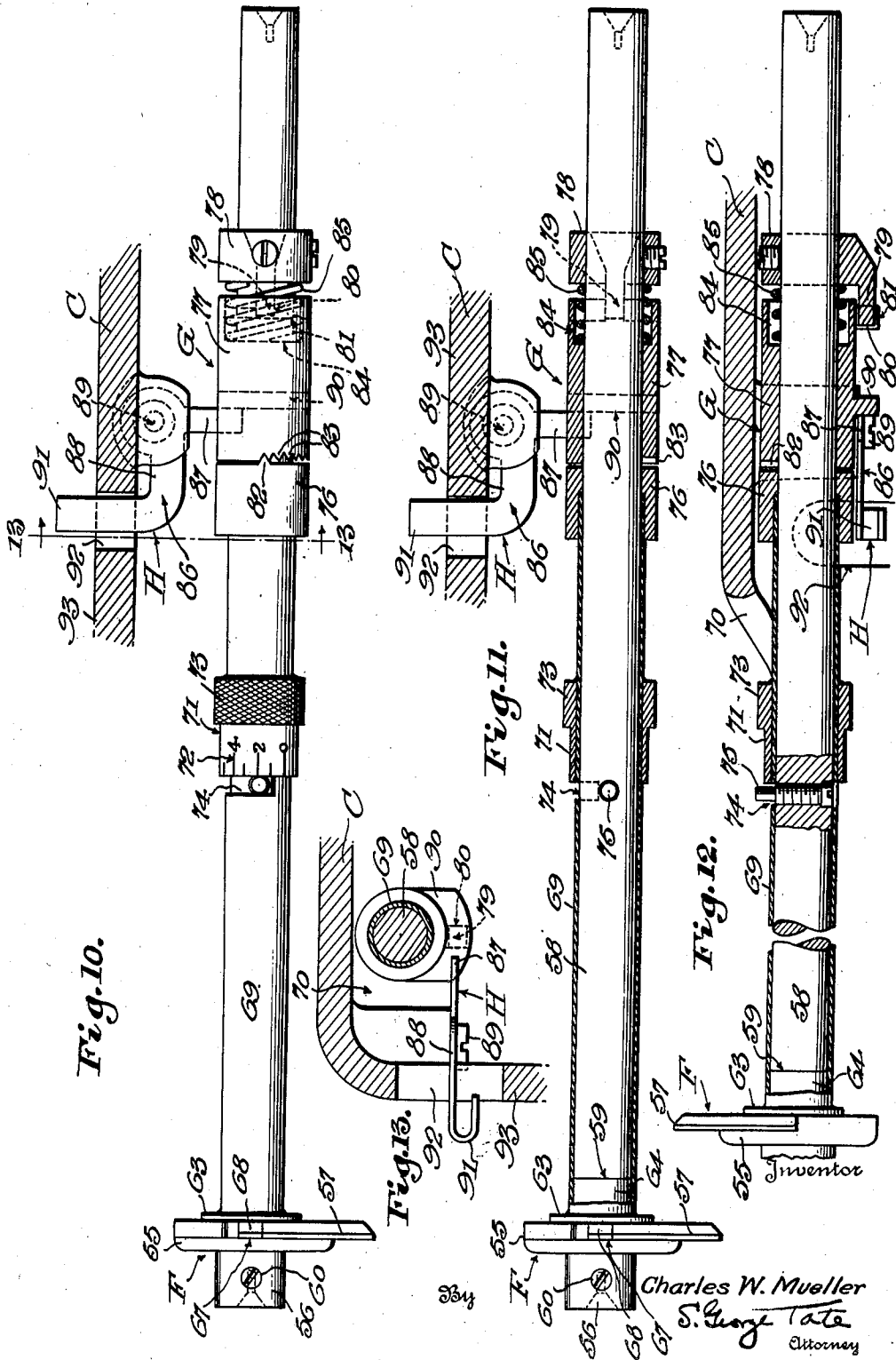
C. W. MUELLER

2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 7



March 19, 1940.

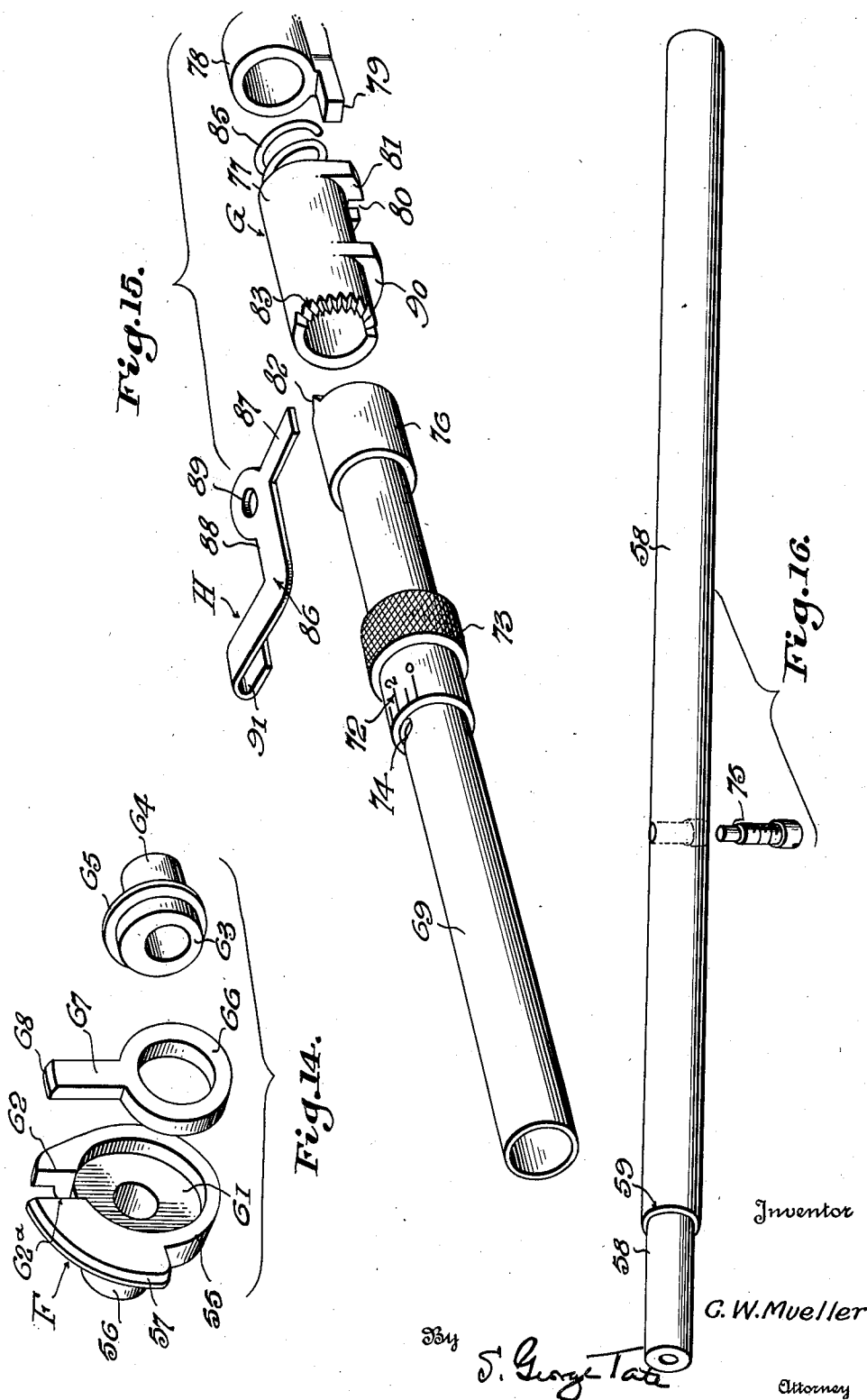
C. W. MUELLER

2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 8



Inventor

C. W. Mueller

Attorney

334 S. Gray-Tan

March 19, 1940.

C. W. MUELLER

2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 9

Fig.17.

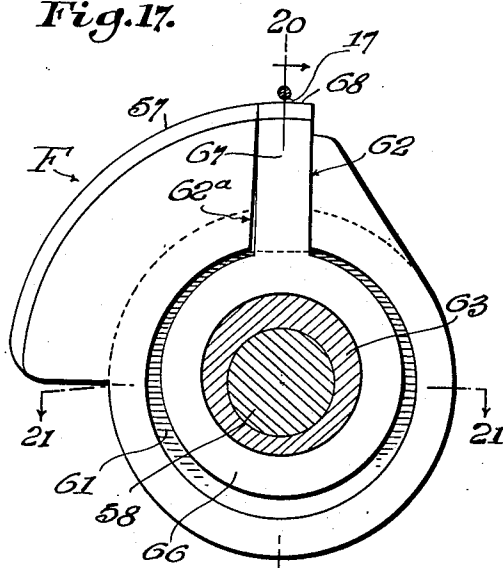


Fig.18.

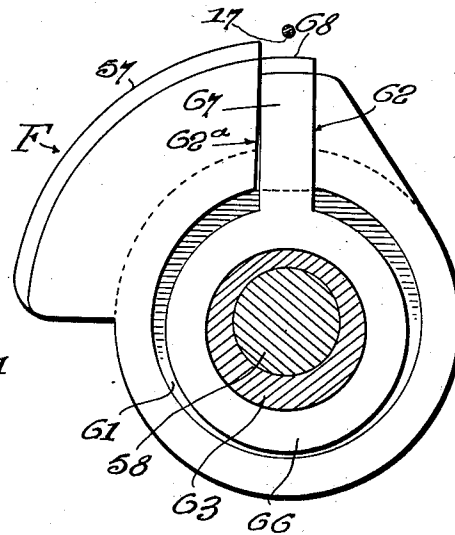


Fig.19.

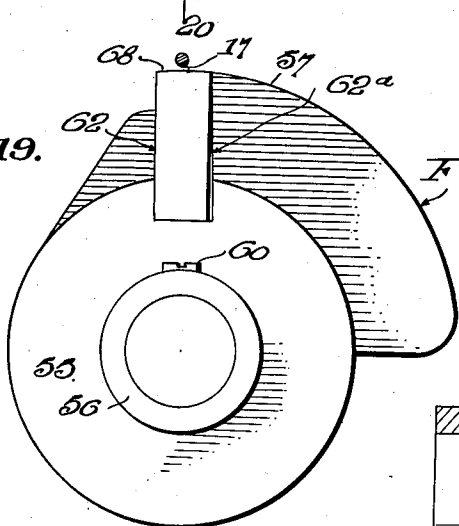


Fig.20.

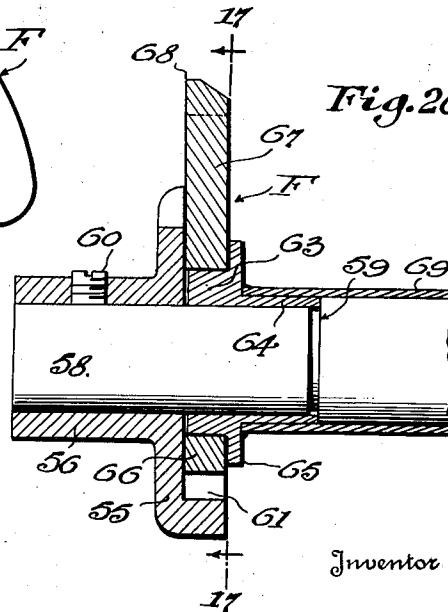
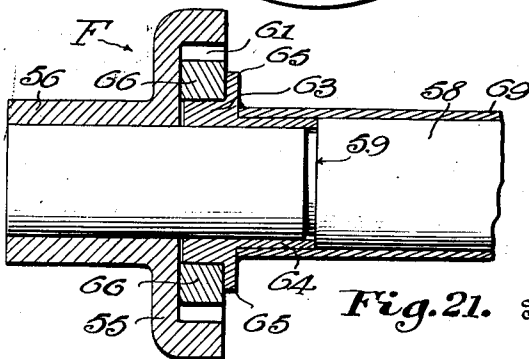


Fig.21.

Inventor

Charles W. Mueller

S. George Tate

Attorney

March 19, 1940.

C. W. MUELLER

2,194,149

BLIND STITCH SEWING MACHINE

Filed Aug. 18, 1937

10 Sheets-Sheet 10

Fig. 24.

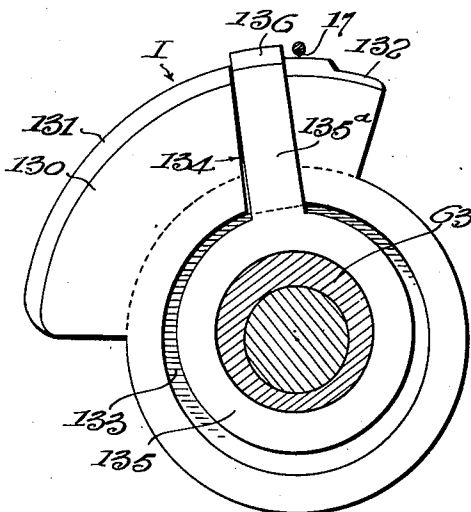


Fig. 25.

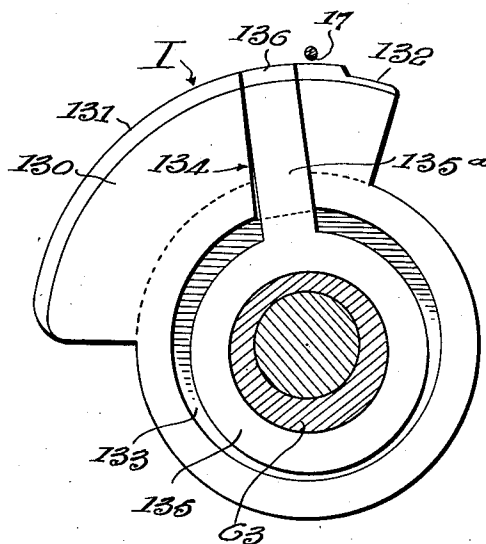


Fig. 22.

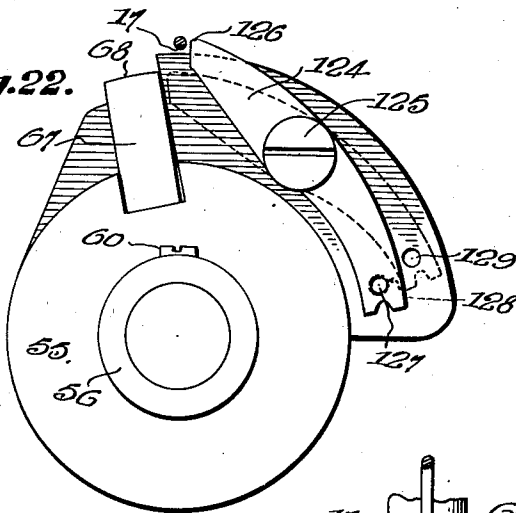


Fig. 23.

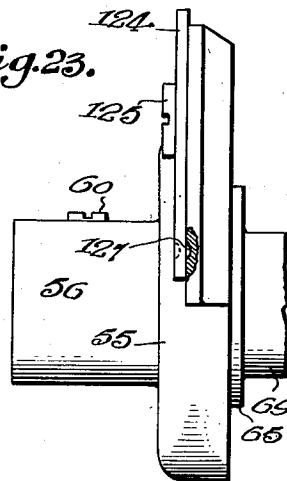
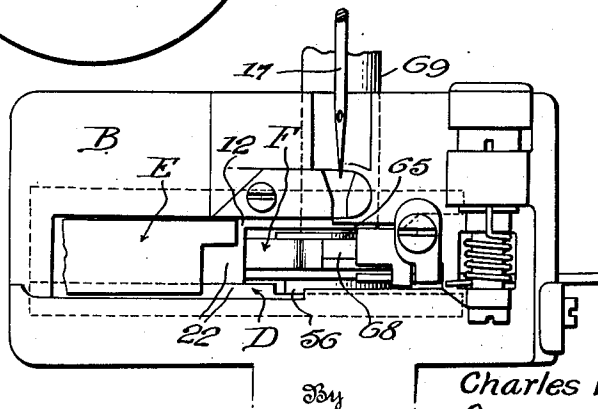


Fig. 26.



Inventor

Charles W. Mueller
S. George Tate Attorneys

UNITED STATES PATENT OFFICE

2,194,149

BLIND STITCH SEWING MACHINE

Charles W. Mueller, St. Louis, Mo., assignor to
Lewis Invisible Stitch Machine Company, St.
Louis, Mo., a corporation of Maine

Application August 18, 1937, Serial No. 159,785

48 Claims. (Cl. 112—178)

This invention relates to sewing machines generally although more particularly to blind stitch sewing machines for joining a superposed fabric layer to a base layer by a line of "anchor" and "skip" stitches such as is illustrated generally in my prior Patents 1,989,602, January 29, 1935 and 2,018,186, October 22, 1935.

In each of said patents, a reciprocatory ridge-forming element is provided for projecting alternately a ridge of both superposed fabrics into needle penetration whereby the needle will enter both layers to thereby form resultant "anchor" stitches, and for projecting intermediately the superposed layer only into needle penetrating position whereby the needle will enter said superposed layer only to thereby form resultant "skip" stitches. In each patent there is disclosed a ridge-forming element which consists of a segmental disc fixed to an oscillatory shaft, and the disc is provided with a high peripheral portion and a low peripheral portion which are arranged in tandem. Driving connections are disposed between the main shaft and the oscillatory shaft whereby the high and low portions of the disc will be presented alternately to the needle to effect the formation of alternate "anchor" and "skip" stitches. In Patent 2,018,186 the driving connections include a fulcrumed movement transmitting lever connected with the oscillatory disc actuating shaft, and there is included a manually operable control lever for shifting the fulcrum of the lever so as to cause the high point of the disc to be successively presented whereby all "anchor" stitches will be formed, or alternately presented and held removed whereby a series of alternate "anchor" and "skip" stitches will be formed. In Patent 1,989,602 the low portion of the disc is adjustable radially with respect to the high portion, but there is no means provided for positively effecting the adjustment.

This type of machine is employed in garment factories and is used largely in hemming operations on dresses. In some operations, plain cotton fabrics are employed and the body fabric is turned over to form the hem fold which is joined to the base layer by a line of alternate "anchor" and "skip" stitches. In other operations, a silk ribbon is first joined to the edge of the body fabric by a line of plain stitching, and then the body fabric, together with the ribbon, is turned over to form the hem fold and the projecting portion of the ribbon is joined to the base layer by a line of alternate "anchor" and "skip" stitches. Another operation consists in hemming very stiff materials such as organdies or the like. These

garments are delivered to the sewing machine operators in bundles, and each bundle usually contains one dozen garments of the same material. It therefore follows that an operator may hem a dozen cotton garments, or hem a dozen garments having a previously stitched ribbon along the hem fold, or hem a dozen garments of stiff material such as organdy or the like.

The principal object of the present invention is to provide a manually operable means which is readily accessible to the operator for quickly and accurately adjusting the effective height of the ridge-forming element to meet the changing working conditions incident to garments of different characters or materials, or both, which are to be hemmed or otherwise seamed.

Another object of the invention is to provide a manually operable means of simple construction for initially setting the ridge-forming element with respect to the height of the needle.

With these and other objects in view which will more fully appear, the nature of the invention will be more clearly understood by following the description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a top plan view of a machine constructed in accordance with my invention,

Figure 2 is a front elevation thereof,

Figure 3 is a left elevation thereof,

Figure 4 is a right hand elevation thereof,

Figure 5 is a bottom plan view of the machine,

Figure 6 is a vertical section taken on the line 6—6 of Figure 5,

Figure 7 is a detail view, partly in section, of the reduction gear coupling between the main shaft and the disc operating shaft,

Figure 8 is a section taken on the line 8—8 of Figure 7,

Figure 9 is a section of the driven gear,

Figure 10 is an enlarged plan view of the means for adjusting the step of the disc,

Figure 11 is a view similar to Figure 10, the disc adjusting means being shown in horizontal section,

Figure 12 is a detail view illustrating the disc in side elevation and the adjusting means in vertical longitudinal section,

Figure 13 is a cross section taken on the line 13—13 of Figure 10,

Figure 14 is a view of the disc unit showing the parts in separated perspectives,

Figure 15 is a view of the disc step adjusting

means showing the parts in separated perspectives,

Figure 16 is a perspective view of the disc operating shaft,

5 Figure 17 is an enlarged side elevation of the disc assembly, showing the adjustable step in its high position,

Figure 18 is a similar view but showing the step in its low position,

10 Figure 19 is an elevation of the opposite side of the disc assembly,

Figure 20 is a section taken on the line 20—20 of Figure 17,

15 of Figure 17,

Figures 22 and 23 are side and front elevations of a modified construction of disc assembly,

20 Figure 24 is a side elevation of another form of disc assembly, the view showing the adjustable step in its high position of adjustment,

Figure 25 is a similar view but showing the step in its low position of adjustment,

25 Figure 26 is a plan view of the presser foot, and showing the feed dog, the work clamp, the ridge-forming element, and the needle in their cooperating positions, and

Figure 27 is a vertical sectional view showing the mounting for the manually operable control lever.

30 Like reference numerals designate corresponding parts throughout the several figures of the drawings.

35 The machine which embodies my invention includes a main frame A having a base 5, a standard 6 rising from the rear right hand corner thereof, and an arm 7 which projects laterally from the upper end of the standard and terminates in a forwardly extending removable arm 8. A pair of spaced posts 9, 10 which are integral with the base 5 and project forwardly from the front edge thereof, are connected by a web 11. These posts 9, 10 are disposed in a general vertical plane in substantial parallelism with the arm 7.

45 A stationary and horizontal presser foot B is attached to the front end of the arm 8 and is provided with an opening 12. Journaled on the arm 7 and extending longitudinally thereof is a main shaft 13. Journaled in the arm 8 and extending longitudinally thereof is an oscillatory needle shaft 14 which is driven from the main shaft by connections indicated as a whole by the numeral 15. A needle arm 16 is fixed to the forward end of the needle shaft 14 and carried 50 by said arm is a threaded curved needle 17 which reciprocates in a fixed path across the opening 12 of the presser foot B, the driving connections being such that the penetrating stroke of the needle is from right to left. Cooperating with the needle to form a line of lock stitches, is a rotary hook 18 containing the usual bobbin thread, the hook being rotated from the main shaft through the medium of driving connections which are indicated generally by the numeral 19. 60 From the broad aspect of my invention, any other loop taker may be employed for cooperation with the needle.

70 A work support C is pivoted on the posts 9, 10 through the medium of a horizontal shaft 20 mounted in said posts, the longitudinal axis of the shaft being disposed in parallelism with the main shaft 13. The left hand end of the work support is provided with a reduced portion or 75 horn 21 which is disposed adjacent the presser

foot B and is located in rear of the pivot shaft 20.

Mounted on the end of the horn for cooperation with the under face of the foot B, is an upwardly spring pressed work clamp D consisting of sections 22, 22 arranged side by side and having portions disposed below the opening 12 of the foot. 5

An intermittent or 4-motion top feed dog E is disposed in rear of the needle path and operates in the presser foot opening 12 and against the 10 yieldable work clamp D for intermittently feeding the fabric rearwardly when the needle is out of the fabric, the work clamp functioning to clamp the fabric against the foot during the non-feeding movement of the feed dog and thereby 15 retain the fabric against the thrust of the needle during the penetrating stroke thereof. The feed dog E is attached to a feed lever 23 which extends longitudinally of the frame arm 8, the lever being fulcrumed on the arm and actuated by the main shaft 13 in the usual manner. 20

Mounted on the work support C and movable upwardly and downwardly therewith, is a reciprocatory ridge forming element F for intermittently projecting a ridge of hemmed fabric 25 upwardly through the presser foot opening 12 into needle penetrating position.

The term "front and rear," as applied to the feed dog E and the ridge forming element F, is 30 used in the same relation as the front and rear of the machine.

The work support C is yieldably held against depression by a strong coil spring 24 which is 35 located within the base 5, the spring being connected at its forward end to a bracket arm 25 which is rigidly connected to and depends from the front edge of the work support, the connection between the bracket and the work support being located in front of the pivot shaft 40 20. The rear end of the spring is anchored to the base 5 through the medium of a screw 26 whose shank 27 has threadable engagement in the base. The shank 27 is provided with a longitudinal groove 28 for receiving the inner end of a set screw 29 threadably mounted in the base to retain the anchor screw 26 against turning. Thus if it becomes desirable to adjust the tension of the spring 24, the latter is first disconnected from the anchor screw 26, the set screw 45 29 is then backed out from the groove 28 and the anchor screw is then rotated in the desired direction, after which the parts are reassembled. It will, therefore, be apparent that the spring 24 functions to normally urge the work support C and the ridge-forming element F in an upward direction, i. e., toward the needle path. It is, therefore, necessary to provide a stop for limiting the upward movement of the work support and the ridge forming element, otherwise the 60 element would be projected across the path of the needle. It is also desirable to provide a stop for this purpose which is adjustable whereby the initial setting of the ridge-forming element relative to the needle path may be readily accomplished. To this end, a horizontal shaft 30 is journaled in the base 5 and has its longitudinal axis disposed in parallelism with the pivot shaft 20 of the work support. Fixed to one end of this shaft 30 is a rock arm 31 having a cam periphery 32. The free end of the bracket arm 25 is normally held in yieldable contact with the cam periphery 32 of said rock arm 31 by the coil spring 24. It will, therefore, be apparent 75 that the rock arm 31 constitutes an adjustable

stop for limiting the upward movement of the work support C together with the ridge-forming element F. Manually operable means is provided for rocking the shaft 30 to thereby rock the arm 31 to either raise the work support and the ridge-forming element positively against the tension of the coil spring 24 or to permit the lowering thereof by the action of said spring. For this purpose the standard 6 of the main frame is provided in its front wall with a housing 33 having an exteriorly located upper end and an interiorly located lower end. The upper end of the housing is closed by a cap 34 having a centrally located vertical bore 35 in which is rotatably mounted the upper end of a manually operable screw 36. The screw 36 is provided intermediate its ends with a flange or stop collar 37 which is positioned between the under face of the cap 34 and the upper end of the housing to retain the screw against longitudinal movement with respect to said housing. The upper end of the screw projects above the cap 34 and secured thereon is a disc shaped head 38 having a knurled periphery and provided on its under face with a concentric line of teeth 39 engageable by a spring pin 40 mounted in the cap 34 for frictionally retaining the screw 36 in any position of angular adjustment. It will thus be seen that the screw 36 is capable of rotation in either direction but is retained by the flange 37 and head 38 against longitudinal movement. Slidably mounted within the housing 33 is a nut 41 having threaded engagement with the lower end of the screw 36 whereby upon rotation of the latter the nut will be moved upwardly and downwardly within said housing. A link 42 is pivotally connected at its upper end as at 43 to the nut 41 and has its lower end pivoted as at 44 to a rock arm 45 fixed to one end of a rock shaft 46 which is journaled in the base 5 and has its longitudinal axis disposed in parallelism with the shaft 30. A rock arm 47 is fixed to the other end of the shaft 46 and a link 48 is pivotally connected at one end as at 49 to said rock arm 47 and at its other end as at 50 to the rock arm 31. Thus upon rotation of the screw 36 in one direction the rock arm 31 will be angularly shifted and the cam periphery 32 thereof will move the bracket arm 25 forwardly and upwardly, thereby effecting a positive depression of the work support C together with the ridge-forming element F, and upon rotation of the screw 36 in the opposite direction the rock arm 31 will be oscillated and the coil spring 24 will effect the raising of the work support together with the ridge-forming element F.

When it is desired to insert a fabric into the machine preparatory to the seaming thereof, or to withdraw the seamed fabric from the machine, the work support is depressed a sufficient distance below the pressure foot. For this purpose, a knee-press lever 51 is provided. This lever is removably secured to one end of a horizontal rock shaft 52 which is journaled in the base 5 and has its longitudinal axis disposed in a plane at right angles to the pivot shaft 20 of the work support. A rock arm 53 is fixed to the shaft 52 and is connected by a link 54 to the work support C at a point in rear of said pivot shaft 20. Thus upon movement of the knee-press lever 51 to the right, the work support C will be swung downwardly against the tension of the coil spring 24, and upon release of said knee-press lever said spring will return the work support to its initial position.

The ridge-forming element F as illustrated in

Figs. 17 to 20 consists of a segmental disc 55 having an integral attaching hub 56 and a concentric peripheral edge portion or step 57. An oscillatory shaft 58 is journaled on the work support C and has its longitudinal axis disposed in parallelism with the main shaft 13. One end of the shaft 58 is disposed under the presser foot B and this end is reduced to form a resultant stop shoulder 59. The ridge forming element F is operatively connected to the shaft 58 by being rigidly attached to the reduced end thereof in spaced relation to said stop shoulder by a screw 60, the element being disposed between sections 22, 22 of the work clamp D and in register with the presser foot opening 12. The outer face of the disc 55 is provided with a concentric recess 61, and a radial slot or guide 62 which is formed in the disc is in open communication with the recess 61; the leading radial wall 62^a of the slot merging with the concentric peripheral edge portion 57 of the disc. A cam 63 in the form of an eccentric is located within the recess 61 and is provided with a hub 64 which is journaled on the reduced end of the shaft 58. An integral flange 65 is located between the cam 63 and the hub 64 and bears against the inner face of the disc to retain the cam against outward longitudinal movement, the inward longitudinal movement of the cam being prevented by the hub contacting the shoulder 59 of the shaft. Located within the recess 61 and surrounding the cam 63, is a ring shaped follower 66 having an outside diameter considerably less than the diameter of said recess. A radially projecting ridge forming arm 67 is integral with the follower 66 and is disposed within the slot 62 of the disc 55, the width of the arm being less than the width of the slot. The upper end or edge 68 of the arm is concentric with respect to the shaft 58 and constitutes a ridge forming portion or step. When the cam 63 is oscillated the arm 67 will be moved radially, whereby when the high point of the cam is directly above the shaft 58, the edge or step 68 of the arm will be in register with and form a continuation of the edge or step 57 of the disc 55, and when the high point of the cam is directly below the shaft the edge or step 68 will be below the edge or step 57 of the disc. It will, therefore, be seen that I have provided a segmental disc having a fixed concentric peripheral edge portion or step, and a radially adjustable concentric peripheral edge portion or step, said adjustable portion being arranged in tandem with the adjustable step in rear of the fixed step and immediately in rear of the leading radial wall of the disc, and said portions having either the same or different radii.

A manually operable and readily accessible means is provided for quickly adjusting the angular position of the cam 63 whereby the operator may adjust the ridge-forming element F to meet the varying working conditions. To this end, an actuating sleeve or hollow shaft 69 is rotatably mounted on the shaft 58 and has its left end rigidly connected to the hub 64 of the cam 63 by solder or other means. This sleeve is disposed within a slot 70 formed in the upper face of the horn 21 of the work support C and is therefore located immediately to the right of the presser foot B. Fixed to the sleeve 69 adjacent the inner end of the slot 70 is an indicator sleeve 71 having at one side a series of graduation marks forming a scale 72 and at the other side a knurled periphery 73. The actuating sleeve 69 is provided with a transverse slot 74

which is located immediately adjacent the scale 72, and a combined stop and indicator pin 75 is fixed to the shaft 58 and projects into said slot. The length of the slot 74 is such that the actuating sleeve 69 may be shifted angularly by the knurled periphery 73 for 180° to thereby adjust the arm 67 from its extreme high position to its extreme low position, or vice versa, or to any position therebetween, the position of adjustment being indicated to the operator by the position of the pin 75 with respect to the scale 72.

The actuating sleeve 69 is normally locked to the shaft 58 so as to oscillate therewith, and a manually operable and readily accessible means is provided for releasing said locking means whereby the sleeve 69 may be angularly moved about the shaft 58 to effect an adjustment of the arm 67. The locking means is indicated as a whole by the reference character G and comprises a clutch consisting of a tubular clutch element 76 which is fixed to the right hand end of the sleeve 69 and a tubular clutch element 77 which is mounted on the shaft 58 for relative longitudinal movements. The clutch element 77 is retained against angular movement with respect to the shaft 58 by means of a collar 78 which is fixed to the shaft and having a laterally extending guide arm 79 which projects into a groove 80 formed in a radially projecting lug 81 of the clutch element 77 and extending longitudinally thereof. The clutch elements 76 and 77 are formed with cooperating clutch teeth 82 and 83 respectively. The right hand end of the movable clutch element 77 is provided with a counter bore 84, and a coil spring 85 is disposed therein, one end of the spring abutting the inner end of the counter bore and the other end abutting the collar 78, the spring serving to maintain the clutch closed and the sleeve 69 locked to the shaft 58. The manually operable releasing means is indicated at H, and comprises a bell crank lever 86 having arms 87 and 88, the lever being fulcrumed on a vertical pivot 89 on the work support C at a point in rear of the movable clutch element 77. The arm 87 extends forwardly and has its free end disposed at the left of a lug 90 which projects from the movable clutch element 77. The arm 88 extends laterally towards the left and terminates in a rearwardly extending finger piece 91 which projects through a vertical slot 92 formed in the depending rear wall 93 of the work support C. Thus upon a forward pressure against the finger piece 91 by the operator's finger, the clutch will be opened against the tension of the spring 85 and the operator can with the other hand adjust the actuating sleeve 69. By means of the vertical slot 92, the work support C can be depressed by the knee press lever 51 without interfering with the release clutch lever 86.

It will be understood that when the high peripheral portion 57 of the disc 55 is positioned below the needle, an "anchor" stitch which joins the hem to the base layer will be formed, and when the low peripheral portion 68 of the disc is positioned below the needle, a "skip" stitch which is made in the hem only, will be formed.

Driving connections which include a manually operable control lever, are provided between the main shaft 13 and the ridge-forming element operating shaft 58 for differentially oscillating the latter in timed relation to the needle reciprocations. These driving connections are as follows:

A driving eccentric 94 is fixed to the main shaft 13 and surrounding this eccentric is an ec-

centric sleeve 95 which is positively rotated on the eccentric but at one-half the speed thereof. A disc 96 which is loosely mounted on the main shaft 13 is provided with a radial slot 97 for receiving a slide block 98 mounted on the eccentric sleeve 95 by a screw 99. A driving gear 100 is fixed to the main shaft 13, and freely rotatable on a stationary counter shaft 101 mounted in the frame standard 6, is a gear unit comprising a large gear 102 and a smaller gear 103, the former being in constant mesh with the driving gear 100, and the latter being in constant mesh with a gear 104 fixed to the disc 96. The gear coupling ratio is such that the eccentric sleeve 95 will be rotated once during every two revolutions of the main shaft. Journaled in the right hand post 10 of the main frame is a horizontal fulcrum shaft 105 whose longitudinal axis is in parallelism with the main shaft 13 and the oscillatory shaft 58. The fulcrum shaft 105 is provided with an eccentric bore or bearing 106 in which is journaled a pivot shaft 107. A substantially vertically disposed transmitting lever 108 is journaled intermediate its ends on the inner end of the fulcrum shaft 105.

A bell crank lever 109 is journaled on a horizontal axis 110 in the standard 6 below the main shaft 13. The bell crank lever 109 includes a horizontal arm 111 and a depending vertical arm 112. The horizontal arm 111 is pivotally connected as at 113 to the lower end of a strap link 114 whose upper end embraces the eccentric sleeve 95. The vertical arm 112 is pivotally connected as at 115 to the rear end of a link 116 whose forward end is pivotally connected as at 117 to the lower arm of the transmitting lever 108. The upper arm of the transmitting lever 108 is pivotally connected as at 118 to the forward end of a link 119, and the rear end of said link is pivotally connected as at 120 to a rock arm 121 which is fixed to and depends from the oscillatory shaft 58. Fixed to the outer end of the fulcrum shaft 105 is an upwardly extending manually operable control lever 122 which projects through an opening 123 formed in the work support C. Thus upon movement of the control lever 122, the fulcrum shaft 105 will be rocked and the pivot shaft 107 will be bodily shifted either forwardly or rearwardly which will in turn effect an angular shifting of the oscillatory shaft 58.

It will be apparent that if the strap link 114 were directly operated by the driving eccentric 94, the shaft 58 would be oscillated for the same angular amount during every rotation of the main shaft, but by reason of the interposition of the eccentric sleeve 95 and its reduction gear coupling with the main shaft, the driving connections will be modified whereby the shaft 58 will be differentially oscillated, or in other words, the shaft will partake of a greater angular movement on alternate oscillations and a lesser angular movement on intermediate oscillations. Consequently when the control lever 122 is in its rear position, the disc 55 will be oscillated to position the high step 57 thereof below the needle during alternate oscillations and to position the low step 68 below the needle during intermediate oscillations, whereby a series of alternate "anchor" and "skip" stitches will be formed in the fabric. When, however, the control lever 122 is moved forwardly the fulcrum shaft will be rocked and the pivot shaft 107 will be bodily shifted forwardly, causing the transmitting lever to swing forwardly about the pivot 117, thereby pulling the link 119 forwardly and effecting a rearward

angular shifting of the disc 55 whereby the high step 57 of said disc will be successively positioned below the needle and successive "anchor" stitches will be formed as a result.

5 In operation, the operator first adjusts the vertical height of the ridge forming element F with respect to the needle whereby the needle will just clear the high step 57 of the disc. This adjustment is accomplished by turning the hand
10 screw 36 which either raises or lowers the work support C together with the disc. One of the garments from a selected bundle, is then positioned in the machine and the hand screw is again actuated to minutely adjust the vertical
15 position of the ridge-forming element whereby the needle will penetrate the base fabric at the desired depth to thereby form an "anchor" stitch. If the control lever 122 is in its forward position, the garment will be hemmed by successively
20 formed "anchor" stitches. If, however, it is desired to form alternate "anchor" and "skip" stitches, the control lever 122 is moved rearwardly, the clutch 76, 77 is opened, and the low step 68 of the disc is radially adjusted to a position
25 whereby the needle will penetrate the hem only. The clutch is then closed and the machine is then ready to seam the garments.

It is to be understood that the ridge forming means is capable of use in a blind stitch machine.
30 of the single thread chain stitch type such as is shown in my prior Patent No. 2,018,186 referred to above, or of the two-thread lock stitch type such as is shown in the accompanying drawings. In the single thread chain stitch machine the penetrating stroke of the needle is from left to right, whereas in the lock stitch machine the
35 stroke is from right to left. Practice has demonstrated that the low step 68 must be set higher in lock stitch machines than in single thread chain stitch machines for the same character of fabric being stitched. Inasmuch as the forwardly extending arm is removable, it follows that another arm having a single thread stitch forming mechanism may be readily substituted. Hence, the
40 radially adjustable low step 68 is adaptable for either type of stitching mechanism.

It will be apparent that when the operator begins on a bundle of garments having a ribbon pre-seamed along the edge and forming the hem
50 fold, the low step 68 of the disc F may be readily adjusted radially to meet the changed condition.

Whenever, a garment of stiff material such as organdy is to be seamed, the needle during its penetrating stroke will occasionally break the threads of the base layer and thereby form a
55 "skip" stitch instead of an "anchor" stitch. It is therefore essential that the needle should penetrate entirely through the base layer. To this end, as shown in Figs. 22 and 23, I have provided the ridge-forming element F with a third step which is manually adjustable to raise the ridge of fabric above the peripheral or high step 57.
60 A spring lever 124 is pivoted intermediate its ends by a screw 125 to one side of the disc 55 in front of the radially adjustable step 68. This lever inclines upwardly and rearwardly and the upper end 126 thereof forms the third step. The lower end of the lever 124 is provided with a pin 127 which is adapted to be seated in either the
65 inner recess or seat 128 or in the outer recess or seat 129 formed in the adjacent side of the disc 55. Normally the pin 127 is engaged in the outer seat 129, but when it is desired to increase the depth of the needle penetration so as to project the needle entirely through the base layer, the
75

operator merely pushes the front end of the lever down so that the pin will be received in the seat 128 and in this position the third step 126 will be disposed above the peripheral high step 57 of the disc.

In Figures 24 and 25, I have illustrated another form of a ridge-forming element having three-steps. In these figures the ridge forming element I comprises a segmental disc 130 having a concentric peripheral edge portion 131 and a
10 concentric peripheral edge portion 132, said portions being integrally connected and arranged in tandem, the portion 132 being disposed in rear of the portion 131 and having a smaller radius than the latter. The disc 130 is provided with
15 a concentric recess 133, and a radial slot or guide 134 which is in open communication with said recess and with the peripheral edge portion 131. Located within the recess 133 is the cam 63 and surrounding this cam is a ring-shaped fol-
20 lower 135 having a radially projecting arm 135^a which is located within the radially extending guide 134, the outer end of the arm forming a high step 136 which is adapted to be projected above the step 131 upon adjustment of the cam
25 63. The cam 63 is adapted to be adjusted so as to register the high step 136 with said peripheral portion 131 whenever it is not desired to use the high step.

It will be apparent that I have disclosed a
30 ridge-forming element having three ridge forming steps arranged in tandem, that one of the steps is adjustable to vary the height thereof with respect to the needle path, and that in the forms disclosed the ridge-forming element com-
35 prises a segmental disc wherein the three steps have different radii.

It is of course to be understood that the details of structure and arrangement of parts may be variously changed and modified without de-
40 parting from the spirit and scope of my invention.

I claim:

1. In a blind stitch sewing machine, an oscillatable ridge forming element having relatively
45 high and low ridge forming portions, and positive means for varying the distance from the center of oscillation of one of said portions with respect to the other portion.

2. In a blind stitch sewing machine, an oscillatable ridge forming element having relatively
50 high and low ridge forming portions arranged in tandem, and positive means for varying the distance from the center of oscillation of one of said portions with respect to the other por-
55 tion.

3. In a blind stitch sewing machine, a ridge forming element having relatively high and low ridge forming portions, and positive means in-
60 cluding a manually operable cam for varying the height of one of said portions with respect to the other portion.

4. In a blind stitch sewing machine, a ridge forming element having a non-adjustable high ridge forming portion and an adjustable low ridge
65 forming portion located in rear of said high portion, and positive means for moving said adjustable portion in a radial direction for varying the height of the low portion with respect to the high portion.

5. In a blind stitch sewing machine, an oscillatable ridge forming element having relatively
70 high and low ridge forming portions, a shaft connected to said element, and means mounted on said shaft and operatively connected to one
75

of said ridge forming portions for adjusting the spaced relation of the said one portion thereof with respect to the center of oscillation.

6. In a blind stitch sewing machine, an oscillatable ridge forming element having relatively high and low ridge forming portions, a shaft connected to said element, and means including a manually rotatable sleeve mounted on said shaft and operatively connected to one of said ridge forming portions for adjusting the spaced relation of the said one portion thereof with respect to the center of oscillation.

7. In a blind stitch sewing machine, a ridge forming element having relatively high and low ridge forming portions, a shaft connected to said element, and means for adjusting the height of one of said portions with respect to the other portion including a manually shiftable element mounted on the shaft and operatively connected to said adjustable portion, and releasable means for normally locking said shiftable element to the shaft.

8. In a blind stitch sewing machine, a ridge forming element having relatively high and low ridge forming portions, a shaft connected to said element, and means for adjusting the height of one of said portions with respect to the other portion including a cam rotatably mounted on the shaft and operatively connected to said adjustable portion, manually operable means mounted on the shaft for angularly shifting said cam, and releasable means for normally locking said manually operable means against movement with respect to the shaft.

9. In a blind stitch sewing machine, a ridge forming element having relatively high and low ridge forming portions, a shaft connected to said element, and means for adjusting the height of one of said portions with respect to the other portion including a cam rotatably mounted on the shaft and operatively connected to said adjustable portion, manually operable means mounted on the shaft for angularly shifting said cam, and releasable clutch elements interposed between the manually operable means and the shaft for normally locking the former against movement with respect to the shaft.

10. In a blind stitch sewing machine, a ridge forming element having relatively high and low ridge forming portions, a shaft connected to said element, and means for adjusting the height of one of said portions with respect to the other portion including a cam rotatably mounted on the shaft and operatively connected to said adjustable portion, a manually rotatable sleeve journaled on the shaft and rigidly connected to said cam for varying the angular position of the latter, and releasable means for normally locking said sleeve to said shaft.

11. In a blind stitch sewing machine, an oscillatable ridge forming disc having relatively high and low peripheral ridge forming portions, and positive means for varying the distance from the center of oscillation of one of said portions.

12. In a blind stitch sewing machine, an oscillatable ridge forming disc having relatively high and low peripheral ridge forming portions arranged in tandem, and positive means for varying the distance from the center of oscillation of one of said portions.

13. In a blind stitch sewing machine, a ridge forming disc having relatively high and low peripheral ridge forming portions arranged in tandem, and positive means including a cam for

varying the height of one of said portions with respect to the other portion.

14. In a blind stitch sewing machine, a ridge forming disc having a non-adjustable peripheral edge portion and a radially adjustable peripheral edge portion forming high and low steps arranged in tandem, and positive means for shifting the adjustable step radially to vary the height thereof with respect to the other step.

15. In a blind stitch sewing machine, a ridge forming disc having a non-adjustable peripheral edge portion and a radially adjustable peripheral edge portion forming high and low steps arranged in tandem, and positive means including a manually operable cam for shifting the adjustable step radially to vary the height thereof with respect to the other step.

16. In a blind stitch sewing machine, a ridge forming disc having relatively high and low peripheral ridge forming portions, a shaft connected to said disc, and manually operable means for adjusting the height of one portion relative to the other portion including a cam mounted on the shaft and operatively connected to the adjustable portion.

17. In a blind stitch sewing machine, a ridge forming disc having relatively high and low peripheral ridge forming portions, a shaft connected to said disc, and manually operable means for adjusting the height of one portion relative to the other portion including a cam mounted on the shaft and operatively connected to the adjustable portion, a sleeve rotatably mounted on the shaft and rigidly connected to the cam, and releasable means for normally locking said sleeve to said shaft.

18. In a blind stitch sewing machine, a ridge forming disc having a relatively high peripheral ridge forming portion and provided with a radially disposed guide, a shaft rigidly connected to said disc, a cam rotatably mounted on said shaft, a cam ring surrounding the cam and provided with an arm located in said radial guide, the outer end of the arm forming a relatively low peripheral ridge forming portion, said peripheral portions being arranged in tandem, and releasable means for normally locking said cam to said shaft.

19. In a blind stitch sewing machine, a ridge forming disc having a relatively high peripheral ridge forming portion and provided with a radially disposed guide, a shaft rigidly connected to said disc, a cam rotatably mounted on said shaft, a cam ring surrounding the cam and provided with an arm located in said radial guide, the outer end of the arm forming a relatively low peripheral ridge forming portion, said peripheral portions being arranged in tandem, a sleeve rotatably mounted on the shaft and rigidly connected to said cam, a clutch element fixed to said sleeve, a clutch element mounted on the shaft for sliding movements longitudinally thereof, means for retaining the movable clutch element and the shaft against relative rotation, spring means for yieldably retaining the clutch elements in closed position, and manually operable means connected with the movable clutch element for opening said clutch elements.

20. In a blind stitch sewing machine, a ridge forming element having relatively high and low ridge forming portions, positive means for varying the height of one of said portions with respect to the other portion, and means associated with said positive means for indicating the extent of adjustment of the adjustable portion.

21. In a blind stitch sewing machine, a ridge

forming element having relatively high and low ridge forming portions, a shaft connected to said element, means mounted on said shaft and operatively connected to one of said ridge forming portions for adjusting the height thereof with respect to the other portion, and means associated with said adjusting means for indicating the extent of adjustment of the adjustable portion.

22. In a blind stitch sewing machine, a ridge forming element having relatively high and low ridge forming portions, a shaft connected to said element, means for adjusting the height of one of said portions with respect to the other portion including a cam rotatably mounted on the shaft and operatively connected to said adjustable portion, a manually rotatable sleeve journaled on the shaft and rigidly connected to said cam for varying the angular position of the latter, releasable means for normally locking said sleeve to said shaft, and cooperating means mounted on the shaft and sleeve respectively for indicating the extent of adjustment of the adjustable portion.

23. In a blind stitch sewing machine, a ridge forming element having relatively high and low ridge forming portions, a shaft connected to said element, means for adjusting the height of one of said portions with respect to the other portion including a cam rotatably mounted on the shaft and operatively connected to said adjustable portion, a manually rotatable sleeve journaled on the shaft and rigidly connected to said cam for varying the angular position of the latter, releasable means for normally locking said sleeve to said shaft, and cooperating means mounted on the shaft and sleeve respectively for indicating the extent of adjustment of the adjustable portion, said indicating means including a transverse slot formed in the sleeve, a pin fixed to the shaft and projecting through said slot, and a scale mounted on the sleeve in cooperative relation to said pin.

24. A ridge forming element for sewing machines comprising a disc having a fixed concentric peripheral ridge forming portion, and an arm supported for radial movements with respect to the disc and having its outer end forming a peripheral ridge forming portion, said portions forming relatively high and low steps.

25. A ridge forming element for sewing machines comprising a disc having a fixed concentric peripheral ridge forming portion, and a radially disposed guide, an arm mounted in said guide for radial movements and having its outer end forming a peripheral edge portion, a cam located concentrically with respect to the periphery of the disc, and a connection between the cam and the arm for adjusting the latter radially upon angular movement of the cam.

26. A ridge forming element for sewing machines having a relatively high ridge forming portion, a relatively low ridge forming portion, and an intermediate ridge forming portion.

27. A ridge forming element for sewing machines having a relatively high ridge forming portion, a relatively low ridge forming portion, and an intermediate ridge forming portion, all of said portions being arranged in tandem.

28. A ridge forming element for sewing machines having a relatively high ridge forming portion, a relatively low ridge forming portion, and an intermediate ridge forming portion, one of said portions being adjustable for varying the height thereof with respect to the other portions.

29. A ridge forming element for sewing machines having a relatively high ridge forming

portion, a relatively low ridge forming portion, and an intermediate ridge forming portion, one of said portions being adjustable for varying the height thereof with respect to the other portions, all of said portions being arranged in tandem.

30. A ridge forming element for sewing machines having a relatively high ridge forming portion, a relatively low ridge forming portion, and an intermediate ridge forming portion, one of said portions being adjustable for varying the height thereof with respect to the other portions, and positive means for moving said adjustable portion.

31. A ridge forming element for sewing machines having a relatively high ridge forming portion, a relatively low ridge forming portion, and an intermediate ridge forming portion, one of said portions being adjustable for varying the height thereof with respect to the other portions, all of said portions being arranged in tandem, and positive means for moving said adjustable portion.

32. A ridge forming element for sewing machines having relatively high and low ridge forming portions arranged in tandem, and a movable ridge forming portion disposed in rear of the high portion, said movable portion being adjustable to vary the height thereof relative to the other portions.

33. A ridge forming element for sewing machines having relatively high and low ridge forming portions arranged in tandem, and a movable ridge forming portion disposed in rear of the high portion, said movable portion comprising a lever arm fulcrumed on the element and movable to project one end above or below said high portion.

34. A ridge forming element for sewing machines having relatively high and low ridge forming portions arranged in tandem, and a movable ridge forming portion disposed in rear of the high portion, said movable portion comprising an arm movably mounted on the element, and positive means engageable with the arm to project one end thereof above said high portion.

35. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base, a shaft journaled on the work support, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, readily accessible means mounted on the work support at one side of the presser foot and operatively connected to one of said ridge forming portions for adjusting the height thereof with respect to the other portion and relative to the path of the needle, and driving connections between the main shaft and the ridge forming element operating shaft.

36. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path

across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base and having a slot at one side of the presser foot, a shaft journaled on the work support and having one end located within said slot, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, means mounted on the shaft and within the slot of the work support and operatively connected to one of said ridge forming portions for adjusting the height thereof with respect to the other portion and relative to the path of the needle, and driving connections between the main shaft and the ridge forming element operating shaft.

37. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base, a shaft journaled on the work support, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, one of said portions being radially adjustable with respect to the other portion and relative to the path of the needle, a cam operatively connected with the adjustable portion for adjusting the latter, and readily accessible means mounted on the work support at one side of the presser foot and operatively connected to said cam for actuating the latter, and driving connections between the main shaft and the ridge forming element operating shaft.

38. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base and having a slot at one side of the presser foot, a shaft journaled on the work support and having one end located within said slot, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, one of said portions being radially adjustable with respect to the other portion and relative to the path of the needle, a cam operatively connected with the adjustable portion for adjusting the latter, a sleeve rotatably mounted on the shaft and rigidly connected to said cam, said sleeve being located within the slot of the work support, releasable means normally locking the sleeve and shaft against relative rotation, and driving connections between the main shaft and the ridge forming element operating shaft.

39. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming

mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base and having a slot at one side of the presser foot, a shaft journaled on the work support and having one end located within said slot, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, one of said portions being radially adjustable with respect to the other portion and relative to the path of the needle, a cam operatively connected with the adjustable portion for adjusting the latter, a sleeve rotatably mounted on the shaft and rigidly connected to said cam, said sleeve being located within the slot of the work support, releasable means normally locking the sleeve and shaft against relative rotation, a manually operable release lever fulcrumed on the work support and operatively connected to said locking means, and driving connections between the main shaft and the ridge forming element operating shaft.

40. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base, a shaft journaled on the work support, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, readily accessible means mounted on the work support at one side of the presser foot and operatively connected to one of said ridge forming portions for adjusting the height thereof with respect to the other portion and relative to the path of the needle, means associated with said adjusting means for readily visualizing the extent of adjustment of the adjustable portion, and driving connections between the main shaft and the ridge forming element operating shaft.

41. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base, a shaft journaled on the work support, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, one of said portions being radially adjustable with respect to the other portion and relative to the path of the needle, a cam operatively connected with the adjustable portion for adjusting the latter, and readily accessible means mounted on the work support at one side of the presser foot and operatively connected to said cam for actuating the latter, and driving connections between the main shaft and the ridge forming element operating shaft.

42. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base and having a slot at one side of the presser foot, a shaft journaled on the work support and having one end located within said slot, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, one of said portions being radially adjustable with respect to the other portion and relative to the path of the needle, a cam operatively connected with the adjustable portion for adjusting the latter, a sleeve rotatably mounted on the shaft and rigidly connected to said cam, said sleeve being located within the slot of the work support, releasable means normally locking the sleeve and shaft against relative rotation, and driving connections between the main shaft and the ridge forming element operating shaft.

43. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base and having a slot at one side of the presser foot, a shaft journaled on the work support and having one end located within said slot, a ridge forming element located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, one of said portions being radially adjustable with respect to the other portion and relative to the path of the needle, a cam operatively connected with the adjustable portion for adjusting the latter, a sleeve rotatably mounted on the shaft and rigidly connected to said cam, said sleeve being located within the slot of the work support, releasable means normally locking the sleeve and shaft against relative rotation, a manually operable release lever fulcrumed on the work support and operatively connected to said locking means, and driving connections between the main shaft and the ridge forming element operating shaft.

44. In a blind stitch sewing machine, the combination with a main frame including a base, of a stationary horizontal presser foot mounted on the frame and provided with an opening, a main shaft journaled in the frame, a stitch forming mechanism mounted on the frame and including a needle reciprocal in a fixed path across said opening, driving connections between the stitch forming mechanism and the main shaft, a work support mounted on the base, a shaft journaled on the work support, a ridge forming element

located under the presser foot opening and having operative connection with said shaft, said element having relatively high and low ridge forming portions, readily accessible means mounted on the work support at one side of the presser foot and operatively connected to one of said ridge forming portions for adjusting the height thereof with respect to the other portion and relative to the path of the needle, means associated with said adjusting means for readily visualizing the extent of adjustment of the adjustable portion, and driving connections between the main shaft and the ridge forming element operating shaft.

45. In a blind stitch sewing machine, the combination with a horizontally reciprocatory needle, of a ridge forming element located below the needle for cooperation therewith, said element having high and low ridge forming portions, spring means for normally urging the element upwardly towards the needle path, a manually adjustable stop for variably limiting the upward movement of the element, and manually operable positive means for varying the height of one of said ridge forming portions relative to the other portion.

46. In a blind stitch sewing machine, the combination with a stationary presser foot having an opening, of a needle mounted for reciprocations in a fixed path across said opening, a reciprocatory ridge forming element for projecting a ridge of fabric upwardly through said opening into needle penetrating position, said element having a ridge forming portion adjustable towards or from the needle for altering the spaced relation of said adjustable portion and the needle during the formation of a stitch, and positive means for adjusting said portion.

47. In a blind stitch sewing machine, the combination with a stationary presser foot having an opening, of a needle mounted for reciprocations in a fixed path across said opening, a horizontal shaft supported below the foot for movements about a substantially fixed axis with respect to the needle, a disc fixed to said shaft for projecting a ridge of fabric upwardly through said opening into needle penetrating position and including a radially adjustable ridge forming portion, and positive means for adjusting said portion.

48. In a blind stitch sewing machine, the combination with a stationary presser foot having an opening, of a needle mounted for reciprocations in a fixed path across said opening, a horizontal shaft supported below the foot for movements about a substantially fixed axis with respect to the needle, a segmental disc fixed to said shaft for projecting a ridge of fabric upwardly through said opening into needle penetrating position, said disc having relatively high and low peripheral ridge forming portions arranged one in front of the other, positive means for varying the height of one of said portions with respect to the other portion, and means for imparting a differential oscillation to said shaft whereby said high and low ridge forming portions will be presented alternately to the needle.

CHARLES W. MUELLER.