

May 31, 1932.

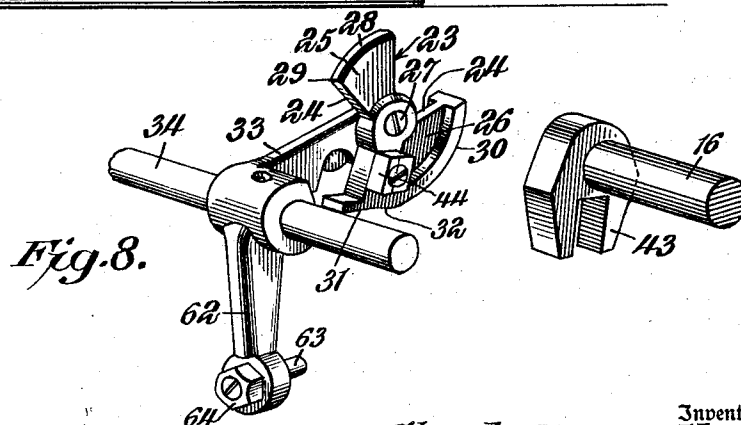
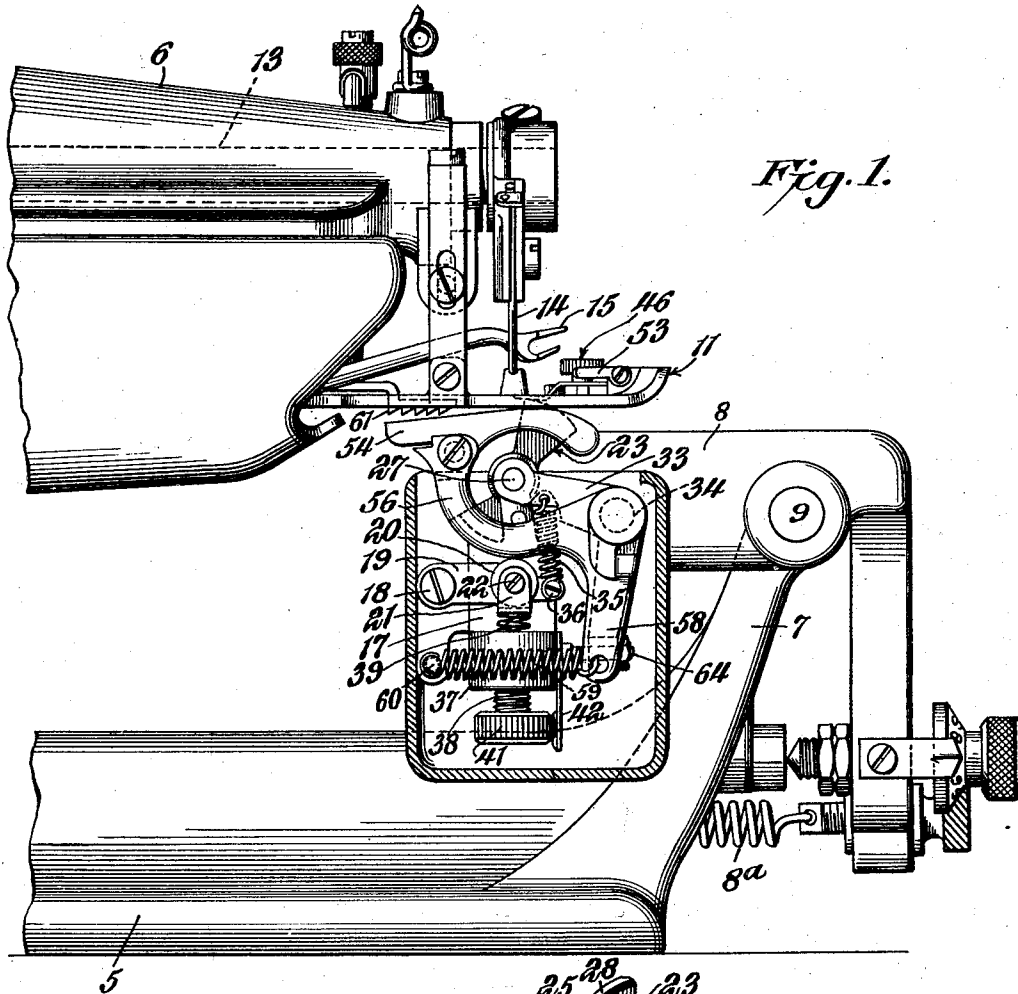
C. W. MUELLER

1,860,902

BLIND STITCH SEWING MACHINE

Filed Sept. 21, 1929

3 Sheets-Sheet 1



Inventor,
Charles W. Mueller;

J. George Tate

Attorney

May 31, 1932.

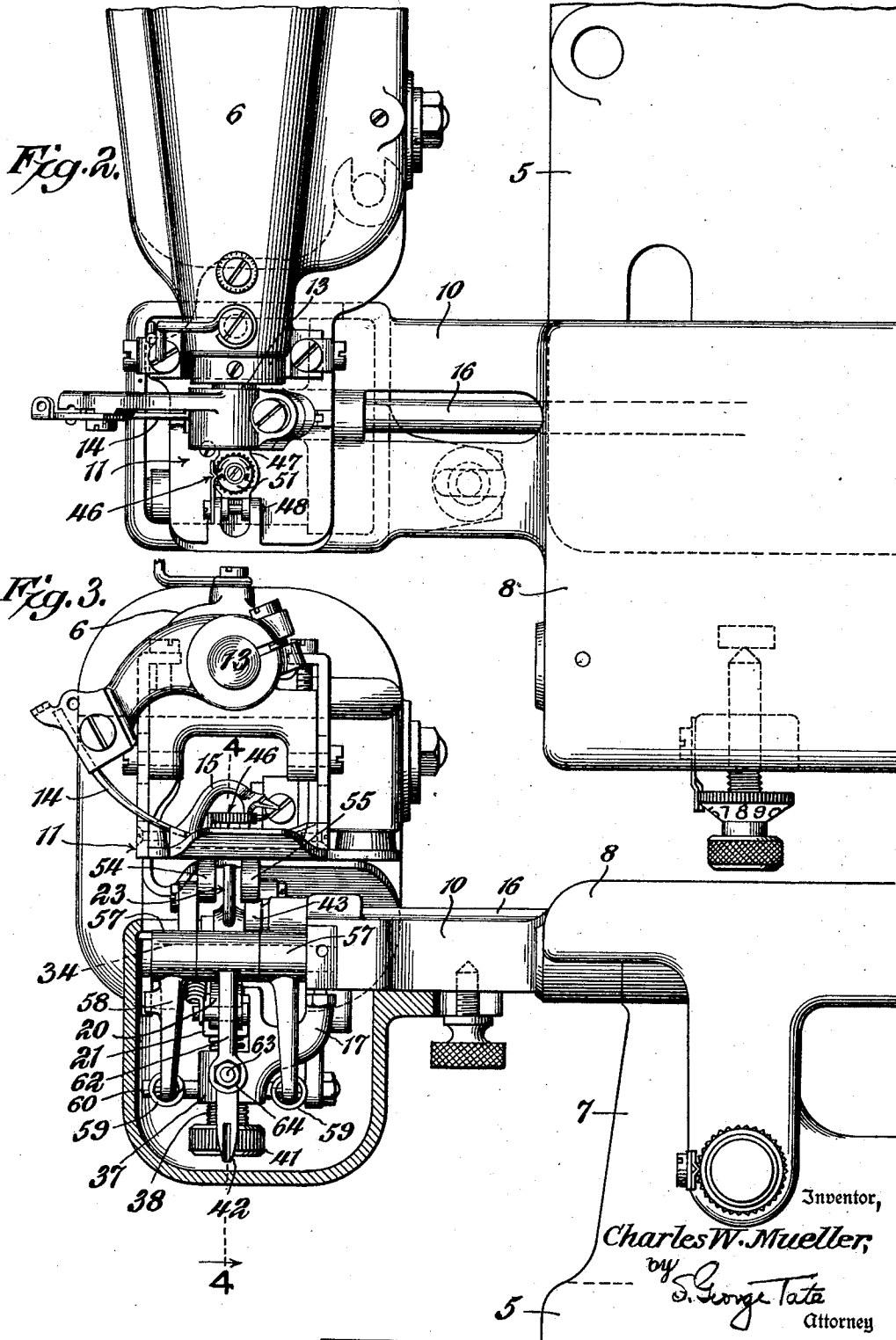
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BLIND STITCH SEWING MACHINE

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Fig. 6.

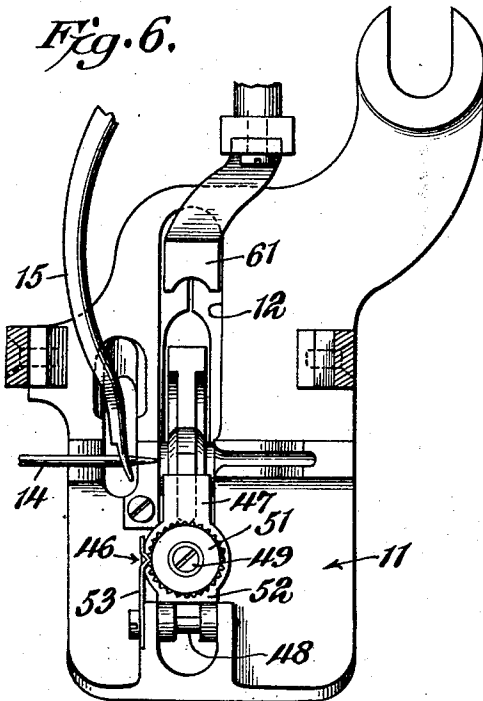


Fig. 5.

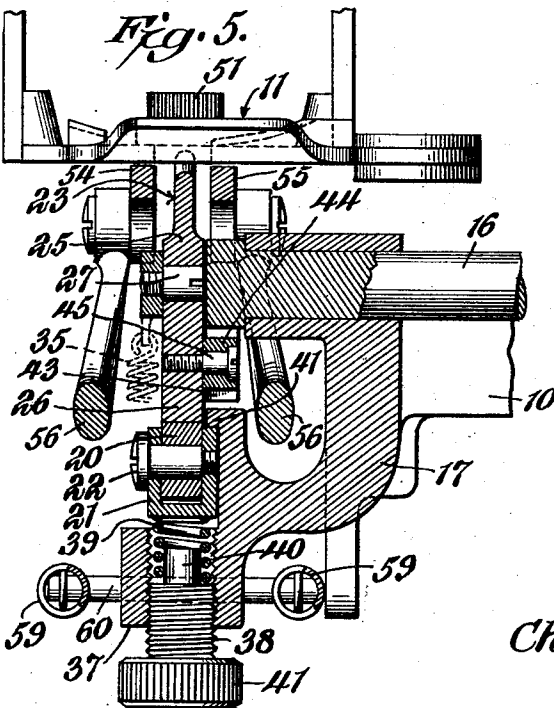


Fig. 4.

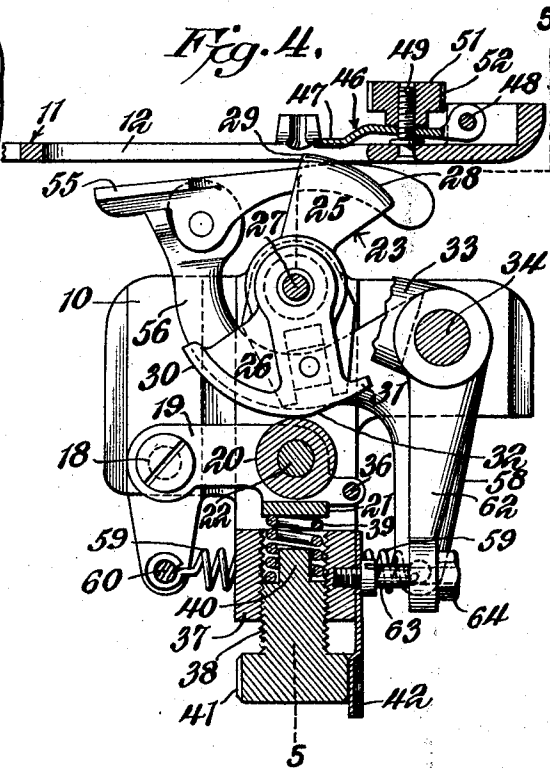
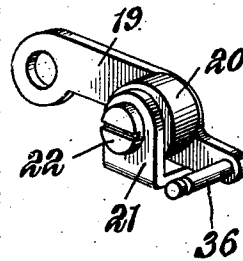


Fig. 7.



Charles W. Mueller, Inventor,

By S. George Tate

Attorney

UNITED STATES PATENT OFFICE

CHARLES W. MUELLER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO LEWIS INVISIBLE STITCH MACHINE COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF MAINE

BLIND STITCH SEWING MACHINE

Application filed September 21, 1929. Serial No. 394,230.

This invention relates to new and useful improvements in blind stitch sewing machines of that type which are especially adapted for staying operations on fur coats, although the invention is adapted for use in connection with other sewing operations.

This invention embodies improvements on the construction shown in my Patent 1,739,081, Dec. 10, 1929.

In performing a staying operation on a fur coat, the hair side is the under side and consequently the flesh side is the upper side. In some of these skins there are spots which are either without any hair or are with a very small portion of hair, and still in other places the hair is very heavy thus forming a very uneven or wavy under surface to the skin. In the machine shown in my patent above referred to, the ridge forming disc is not yieldably supported for vertical movements and consequently if this construction was employed in staying operations on fur coats, the depth of needle penetration would vary depending on the varied amount or thickness of the hair on the under side of the skin.

It is, therefore, the principal object of this invention to provide a vertically adjustable fixed stop disposed above the disc and to provide the roller on which the disc bears with a yieldable support which tends to urge the disc upwardly toward the fixed stop whereby the flesh side of the skin or work will be retained in a fixed position relative to the needle penetration and a uniform depth of needle penetration will be maintained, the vertically yieldable disc serving to automatically position itself relative to the wavy under side of the skin which, as above noted, is the result of variations in the thickness of the hair.

When the machine is used on padding operations or on pants bottom operations, the vertically adjustable fixed stop is elevated to an ineffective or non-operating position be-

cause the use of this top stop is unnecessary owing to the fact that the material or work is heavy and is of uniform thickness. Furthermore, when it is desired to perform the above operations, the yieldable support for the disc is entirely taken up, because the uniformity of thickness of the work renders unnecessary and undesirable the employment of a vertically yieldable disc.

Therefore, another object of the invention lies in the provision of means for taking up the yieldable support for the disc supporting roller whereby the present invention, when the adjustable stop is elevated above the work, may be employed for other blind stitch operations wherein the work is of uniform thickness.

It has been found in practice, when the machine was being used for stitching work having heavy cross seams, that the disc would move upwardly into the path of the needle and break the same. This condition was brought about immediately following the heavy seam being fed past the needle. During the time the seam was directly under the path of needle penetration, the seam, acting as a resistance, caused the work arm together with the disc to be lowered a distance substantially equal to the thickness of the seam. Thus immediately after the seam was fed past the needle, but while the work arm was still in its lowered position, the resistance to the upward movement of the disc which floats on its supporting roller was removed and consequently the disc would be bodily moved or projected upwardly away from its supporting roller and into the path of the needle, as the body fabric immediately in front of the seam would not offer the necessary resistance to said upward bodily movement of the disc.

Therefore, another object of my invention is to provide an adjustable stop which co-operates with the pivoted work arm to limit the upward movement of the disc relative to

its supporting roller whereby the breaking of the needle when stitching across seams will be eliminated.

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 an elevation of the left hand side of a sewing machine embodying my invention,

Figure 2 is a top plan view thereof,

Figure 3 is a front elevation thereof,

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 3,

Figure 5 is a vertical sectional view taken on the line 5—5 of Figure 4,

Figure 6 is a plan view of the presser foot, fixed upper stop, ridge-forming disc, top feed, needle, and looper, in cooperative relation,

Figure 7 is a perspective view of the disc-supporting roller and arm on which the roller is mounted, and

Figure 8 is a perspective view showing the driving connection between the rock shaft and the disc.

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

Referring to the accompanying drawings, my improved sewing machine includes a frame which comprises a base 5 which supports a forwardly extending overhanging arm 6, a standard 7 which extends along the front edge of the base, and a horizontal work support 8 which is pivotally mounted as at 9 to the upper end of the standard 7 and yieldingly held in operative position by a spring 8a. The work support 8 is provided at its left rear corner with a reduced extension 10 which projects toward and under a presser foot 11 which is rigidly secured to the forward end of the overhanging arm 6. Formed in the presser foot 11 is a slot 12 having its longitudinal axis extending parallel to a rock shaft 13 which is journaled in the overhanging arm 6. Fixed to an arm secured to the rock shaft 13 is a needle 14 which has its path of oscillation across the slot 12 of the presser foot, and cooperating with the needle to form a series of single thread chain stitches is a looper 15, said looper being operated from the rock shaft 13 by a connection shown in my patent referred to above.

Journaled on the under side of the work support 8 and extension 10 thereof, and located in rear of and in spaced relation to the axis 9 of said work support, is a rock shaft 16. The rock shaft 16 is oscillated from the main shaft by the mechanism shown in my patent referred to above, the left hand

end of the rock shaft being journaled in a lug 17 which depends from the extension 10.

Pivoted to the left hand face or end of the work arm extension 10 as at 18 is one end of a roller supporting arm 19. A roller 20 is journaled on the arm 19 at a point adjacent the free end thereof through the medium of a bearing arm 21 and a pivot pin 22.

Supported by the roller 20 is a ridge-forming disc 23. The axis of the roller 20 is directly below and in the same vertical plane in which the needle reciprocates. The disc 23 is preferably cut-away as at 24, 24 to form two quadrant shaped sections 25 and 26 respectively, the former constituting a ridge forming and work feeding section and the latter forming a supporting section. The disc 23 is formed with an axial bore having a pivot pin 27 journaled therein. The ridge-forming section 25 of the disc is formed with a concentric periphery 28 having a tooth 29 formed at its feeding end. The supporting section 26 of said disc is provided with a peripheral cam comprising two spaced concentric portions 30 and 31 of different radii, and a connecting eccentric portion 32. The cam thus formed has rolling contact with the roller 20. The ridge forming section 25 of the disc is disposed in alinement with the slot 12 of the presser foot 11 and is adapted to project a ridge or node of material upwardly into needle penetrating position, and to feed the material rearwardly a stitch length after the needle has withdrawn from the material. It is, therefore, desirable to maintain the axis 27 of the disc in the vertical plane containing the axis of the roller 20 and the path of needle reciprocation. To this end, I have provided an arm 33 having one end fixed to the fulcrum pin 27 of the disc and the other end journaled on a bearing pin 34 fixed in the extension 10 of the work support and located in advance of the rock shaft 16. A coil spring 35 has its lower end connected to a pin 36 fixed to the outer end of the roller supporting arm 19 and its upper end fixed to the disc supporting arm 33. Thus the spring 35 functions to yieldably retain the disc in engagement with the supporting roller 20.

In order to yieldably support the roller 20 and thereby yieldably support the disc 23, I have provided the lug 17, at a point below the arm 19, with a vertically disposed threaded socket 37 and have mounted in said socket an adjusting screw 38, and have positioned a coil spring 39 between the arm 19 and said screw 38. The upper end of the screw 38 is provided with a reduced extension or pilot 40 which is adapted upon upward adjustment of said screw to engage the roller supporting arm 19 and thereby take up the spring 39 or the yieldable support for the disc. The upward movement of the roller supporting

arm 19 is limited by its engagement with a shoulder or stop 41 formed on the lug 17, the spring 39 normally tending to yieldably retain the arm 19 against said stop. When, however, the pilot 40 is disposed below and in spaced relation to the arm 19, the latter may be moved downwardly against the tension of the spring. The adjusting screw 38 is provided with a knurled edge 41 and a spring finger 42 which is fixed to the lug 17 cooperates with said knurled edge to retain the adjusting screw in any set position.

In order to oscillate the disc 23, the rock shaft 16 is provided with a forked rocker arm 43 which has sliding engagement with a shoe 44 which is pivotally connected by a screw 45 to the supporting section 26 of the disc 23.

Supported on the presser foot 11 for co-operation with the disc 23 is a vertically adjustable fixed stop which I have indicated as a whole by the reference numeral 46. This stop includes a stop plate 47 which extends longitudinally of the presser foot, the front end of the plate 47 being pivoted on a horizontal axis 48 attached to the front end of the presser foot in front of the slot 12 and the rear or free end of the plate projecting into the slot 12 and terminating directly above the disc 23 and immediately in front of the path of needle travel. A vertically disposed screw 49 is fixed to and extends upwardly from the presser foot 11 at a point directly in front of the slot 12. This screw projects upwardly through an opening formed in the stop plate 47 and a nut 51 which constitutes a stop to limit the upward movement of the plate 47 is threaded onto the screw 49. The nut 51 is provided with a knurled edge 52 and a spring finger 53 which is fixed to the foot, cooperates with said knurled edge to retain the stop 46 in any position of vertical adjustment.

Cooperating with the under surface of the presser foot 11 is a clamp which includes spaced clamping arms 54 and 55 between which the ridge forming section 25 of the disc 23 projects. The clamp arms are pivoted to arms 56, 56 of supporting levers having hubs 57 which are mounted on the bearing pin 34 on opposite sides of the disc supporting arm 33. Each of the levers includes a downwardly extending arm 58 and to the lower end of each arm is connected one end of a coil spring 59, the other end of the spring being connected to a pin 60 which is fixed to the lug 17. By means of the springs 59 the work clamp is held yieldingly against the presser foot 11, or when the work is positioned between the presser foot and the clamp, the latter will cooperate with the foot to clamp the work against the presser foot while the ridge is being formed in the material and while the needle is penetrating said ridge.

Cooperating with the work clamp in rear of the needle 14 is a top feed mechanism which

includes a feed dog 61, said feed dog being operated from the rock shaft 13 by a mechanism shown in my patent referred to above.

In order to prevent the floating disc 23 from being projected upwardly away from its supporting roller 20, I have provided an adjustable stop to limit the free or upward movement of said disc. To this end, the disc supporting arm 33 is provided with a depending arm 62 which is positioned between the downwardly extending arms 58, 58 of the work clamp. Threaded into the lower end of the arm 62 is a stop screw 63 which is adapted to abut the outer face of the socket 37 when the disc is elevated by the cooperation of the eccentric portion 32 and the roller 20 and thereby prevent further upward movement of the disc. A lock nut 64 is associated with the screw to retain the latter in an adjusted position.

In operation, assuming that the machine is to be used in staying operations on fur coats, the skin is placed between the presser foot 11 and the work clamp 54 with the hair side under. In the Figure 4 position, the concentric peripheral portion 30 of the supporting portion 26 of the disc is resting on and is in direct contact with the roller 20. The disc therefore is in its higher position and has formed a ridge or node in the material. The disc is then oscillated to the right, as viewed in Figure 4, and the eccentric or cam stop 32 permits the disc to be moved bodily downward until the cam portion 31 engages the roller. As the disc is again oscillated, the same is elevated and the material is fed a stitch length distance. At the same time, a ridge is formed in the material and the needle immediately enters this ridge. In order to maintain uniform depth of needle penetration, the upper stop 46 is vertically adjusted to suit conditions, and the spring 39 functions to yieldably retain or urge the disc against the fixed upper stop. Thus any wavy or uneven under surface to the material will be automatically compensated for by the yieldably supported disc, and by reason of the fixed stop 46 the needle will maintain uniform depth of penetration in the material.

If it is desired to employ this mechanism in blind stitching operations on materials of uniform thickness, such as padding operations, or pants bottom operations, the adjusting screw 38 is elevated until the pilot 40 engages the bearing arm 21, and the stop 46 is elevated by adjusting the nut 51 so that said stop will have no effect on the material.

When the machine is used for stitching work having heavy seams, the adjusting screw 38 is elevated to eliminate the yieldable support for the disc, and the top stop 46 is elevated to ineffective position. As previously stated, practice has shown that immediately after the seam passed beyond the

needle, the disc would be thrust upwardly away from its supporting roller 20 and be projected into the path of the needle with the result that the needle would be broken.

5 Therefore, before beginning work of this character, the lock nut 64 is loosened, and the stop screw 63 is adjusted to engage the socket 37 when the disc has been elevated through the cooperation of the eccentric 32 and the
10 roller 20, whereby the disc will be prevented from being projected into the path of the needle.

It is of course to be understood that the details of structure and arrangements of
15 parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim:

1. In a sewing machine, the combination
20 of an oscillatory ridge-forming disc, a work support, and spring means for yieldably supporting said disc on said work support for bodily vertical movements.

2. In a sewing machine, the combination
25 of an oscillatory ridge-forming disc, a work support, means for yieldably supporting said disc on said work support for bodily vertical movements, and a fixed stop disposed above and cooperating with said disc.

3. In a sewing machine, the combination
30 of an oscillatory ridge-forming disc, a work support, means for yieldably supporting said disc on said work support for bodily vertical movements, and a vertically adjustable fixed stop disposed above and cooperating with
35 said disc.

4. In a sewing machine, the combination
40 of an oscillatory ridge-forming disc, a work support, means for yieldably supporting said disc on said work support for bodily vertical movements, and means for varying the tension of said yieldable support.

5. In a sewing machine, the combination
45 of an oscillatory ridge-forming disc, a work support, means for yieldably supporting said disc on said work support for bodily vertical movements, and means for changing said vertically yieldable support to a non-yieldable support.

6. In a sewing machine, the combination
50 of an oscillatory ridge-forming disc, a work support, means for yieldably supporting said disc on said work support for bodily vertical movements, a vertically adjustable fixed stop disposed above and cooperating with said
55 disc, and means for changing said vertically yieldable support to a non-yieldable support.

7. In a sewing machine, the combination
60 of an oscillatory ridge-forming disc, a work support, means for yieldably supporting said disc on said work support for bodily vertical movements, and a fixed stop disposed above and cooperating with said disc, said stop
65 including a pivoted stop plate disposed above

the disc, and a vertically adjustable stop disposed above and cooperating with the plate to limit the upward movement thereof.

8. In a sewing machine, the combination
70 with a stitch forming mechanism, including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc located in the plane of the slot of the presser foot, means for yieldably supporting said
75 disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, and means including a rock shaft separate from the disc support for oscillating said
80 disc.

9. In a sewing machine, the combination
with a stitch forming mechanism, including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc located in the plane of the slot of the presser
85 foot, means for yieldably supporting said disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, means including a rock shaft separate
90 from the disc support for oscillating said disc, and means for changing the vertically yieldable support of the disc to a non-yieldable support.

10. In a sewing machine, the combination
95 with a stitching forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc located in the plane of the slot of the presser foot, means for yieldably supporting said
100 disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, means including a rock shaft separate from the disc support for oscillating
105 said disc, and a fixed stop disposed above and cooperating with the disc to maintain uniform depths of needle penetration.

11. In a sewing machine, the combination
110 with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc located in the plane of the slot of the presser foot, means for yieldably supporting said
115 disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, means including a rock shaft separate from the disc support for oscillating
120 said disc, and a vertically adjustable fixed stop disposed above and cooperating with the disc to maintain uniform depths of needle penetration.

12. In a sewing machine, the combination
125 with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc located in the plane of the slot of the presser foot, means for yieldably supporting said
130 disc on said work support for bodily vertical

movements, the path of needle reciprocations being in a plane crossing the plane of the disc, means including a rock shaft separate from the disc support for oscillating said disc, a fixed stop disposed above and cooperating with the disc to maintain uniform depths of needle penetration, and means for changing the vertically yieldable support of the disc to a non-yieldable support.

13. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted pressed foot, a work support, a ridge-forming disc located in the plane of the slot of the presser foot, means for yieldably supporting said disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, means including a rock shaft separate from the disc support for oscillating said disc, said disc support including a disc-supporting roller journaled on the work support and vertically movable relative thereto, and means mounted on the work support for yieldably supporting said roller.

14. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc located in the plane of the slot of the presser foot, means for yieldably supporting said disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, means including a rock shaft separate from the disc support for oscillating said disc, said disc support including an arm pivoted on the work support, a disc-supporting roller journaled on the arm, a stop on the work support to limit the upward movement of said arm, and a spring interposed between the work support and the arm for yieldably retaining the arm against the stop.

15. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc located in the plane of the slot of the presser foot, means for yieldably supporting said disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, means including a rock shaft separate from the disc support for oscillating said disc, said disc support including an arm pivoted on the work support, a disc-supporting roller journaled on the arm, a stop on the work support to limit the upward movement of said arm, a spring interposed between the work support and the arm for yieldably retaining the arm against the stop, and a vertically adjustable screw mounted on the work support for cooperation with the spring to vary the tension thereof.

16. In a sewing machine, the combination

with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc located in the plane of the slot of the presser foot, means for yieldably supporting said disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, means including a rock shaft separate from the disc support for oscillating said disc, said disc support including an arm pivoted on the work support, a disc-supporting roller journaled on the arm, a stop on the work support to limit the upward movement of said arm, a spring interposed between the work support and the arm for yieldably retaining the arm against the stop, and a vertically adjustable screw mounted on the work support for cooperation with the spring to vary the tension thereof, the screw being movable upwardly to take up the spring and to abut the roller supporting arm and thereby retain the arm against downward yielding action.

17. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support disposed below said foot, a ridge-forming disc located in the plane of the slot of the foot, means below the foot for yieldably supporting said disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, and a fixed stop mounted on the foot in front of the needle and disposed above and cooperating with the disc to maintain uniform depths of needle penetration.

18. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support disposed below said foot, a ridge-forming disc located in the plane of the slot of the foot, means below the foot for yieldably supporting said disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, and a vertically adjustable fixed stop mounted on the foot in front of the needle and disposed above and cooperating with the disc to maintain uniform depths of needle penetration.

19. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support disposed below said foot, a ridge-forming disc located in the plane of the slot of the foot, means below the foot for yieldably supporting said disc on said work support for bodily vertical movements, the path of needle reciprocations being in a plane crossing the plane of the disc, a vertically adjustable fixed stop mounted on the foot in front of the needle and disposed above and cooperating with the disc to main-

tain uniform depths of needle penetration, said stop including a stop plate extending over the disc and having its front end pivoted on a horizontal axis on the foot, and a vertically adjustable stop supported on the foot and disposed above and cooperating with the plate to limit the upward movement thereof.

20. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc supported for oscillations on said work support and located in the plane of the slot in the foot, the path of needle reciprocations being in a plane crossing the plane of the disc, means for imparting forward and backward oscillating movements to the disc and for imparting an upward bodily movement and a downward bodily movement to the disc during the respective oscillating movements thereof, and means for yieldably supporting said disc during said upward and downward movements thereof.

21. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc supported for oscillations on said work support and located in the plane of the slot in the foot, the path of needle reciprocations being in a plane crossing the plane of the disc, means for imparting forward and backward oscillating movements to the disc and for imparting an upward bodily movement and a downward bodily movement to the disc during the respective oscillating movements thereof, means for yieldably supporting said disc during said upward and downward movements thereof, and a fixed stop disposed above and cooperating with said disc.

22. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc supported for oscillations on said work support and located in the plane of the slot in the foot, the path of needle reciprocations being in a plane crossing the plane of the disc, means for imparting forward and backward oscillating movements to the disc and for imparting an upward bodily movement and a downward bodily movement to the disc during the respective oscillating movements thereof, means for yieldably supporting said disc during said upward and downward movements thereof, and a vertically adjustable fixed stop disposed above and cooperating with said disc.

23. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc supported for oscillations on said work support and located in the plane of the slot in the foot, the path of needle reciprocations

being in a plane crossing the plane of the disc, said disc support including a peripheral cam on the lower edge of the disc, a roller journaled on the work support and in direct contact with the disc, means for oscillating said disc whereby the same will be bodily raised and lowered through said cam and roller during the respective forward and backward oscillating movements thereof, and means for yieldably supporting said roller during the upward and downward movements of the disc.

24. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc supported for oscillations on said work support and located in the plane of the slot in the foot, the path of needle reciprocations being in a plane crossing the plane of the disc, said disc support including a peripheral cam on the lower edge of the disc, a roller journaled on the work support and in direct contact with the disc, means for oscillating said disc whereby the same will be bodily raised and lowered through said cam and roller during the respective forward and backward oscillating movements thereof, means for yieldably supporting said roller during the upward and downward movements of the disc, and a fixed stop disposed above and cooperating with said disc.

25. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc supported for oscillations on said work support and located in the plane of the slot in the foot, the path of needle reciprocations being in a plane crossing the plane of the disc, said disc support including a peripheral cam on the lower edge of the disc, a roller journaled on the work support and in direct contact with the disc, means for oscillating said disc whereby the same will be bodily raised and lowered through said cam and roller during the respective forward and backward oscillating movements thereof, means for yieldably supporting said roller during the upward and downward movements of the disc, and a vertically adjustable fixed stop disposed above and cooperating with said disc.

26. In a sewing machine, the combination with a stitch forming mechanism including a reciprocatory needle, of a slotted presser foot, a work support, a ridge-forming disc supported for oscillations on said work support and located in the plane of the slot in the foot, the path of needle reciprocations being in a plane crossing the plane of the disc, said disc support including a peripheral cam on the lower edge of the disc, a roller journaled on the work support and in direct contact with the disc, an arm pivotally connected at one end to the disc and at the other end to

the work support, means for oscillating said disc whereby the same will be bodily raised and lowered through said cam and roller during the respective forward and backward oscillating movements thereof, and stop means connected to the disc supporting arm and cooperable with the work support to limit the upward movement of the disc.

In testimony whereof I hereunto affix my signature.

CHARLES W. MUELLER.