Oct. 26, 1926. 1,604,710

C. W. MUELLER

NEEDLE MECHANISM FOR BLINDSTITCH SEWING MACHINES

Filed Oct. 21, 1924 4 Sheets-Sheet 1

Fig. 1.

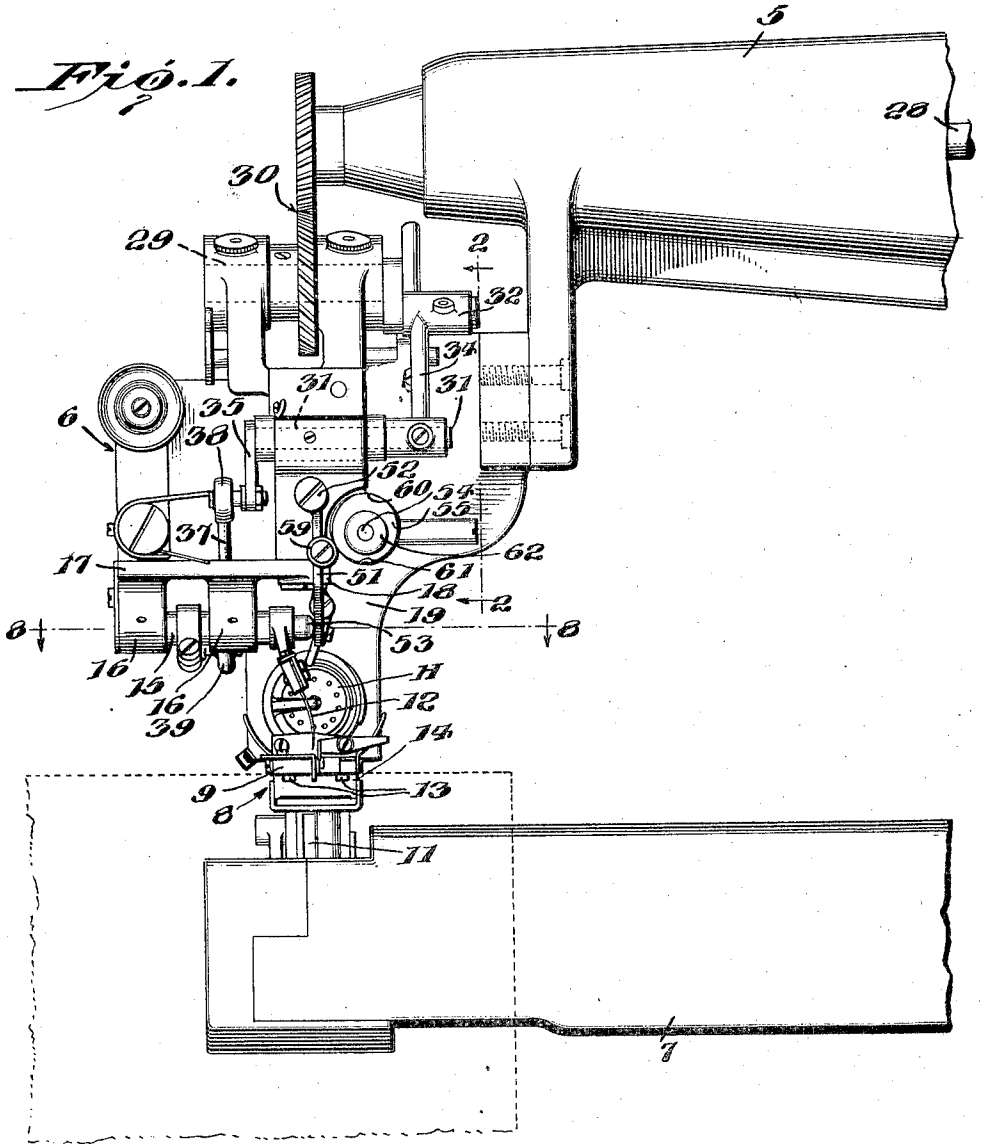
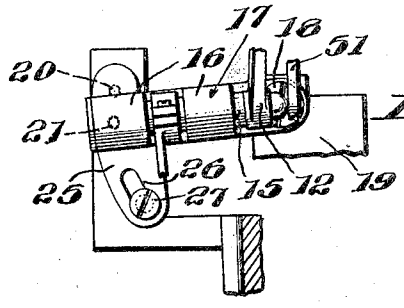


Fig. 5.



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Fig. 2.

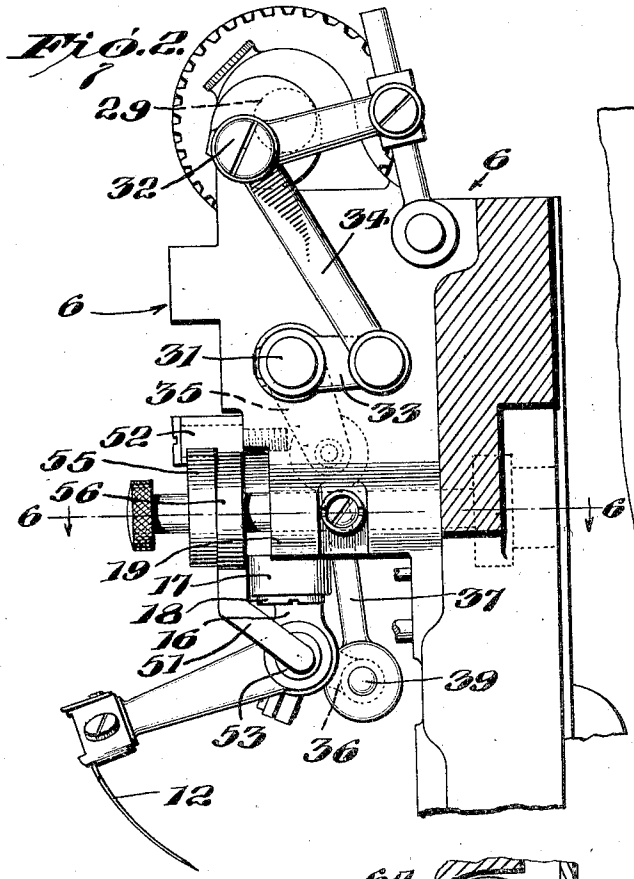


Fig. 7.

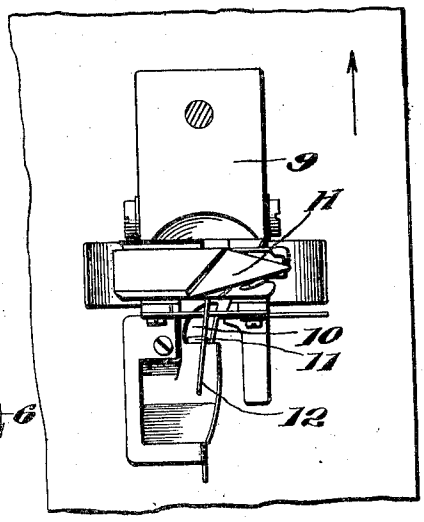
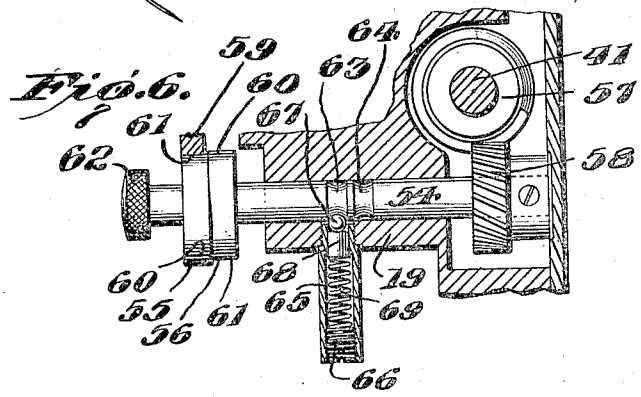


Fig. 6.



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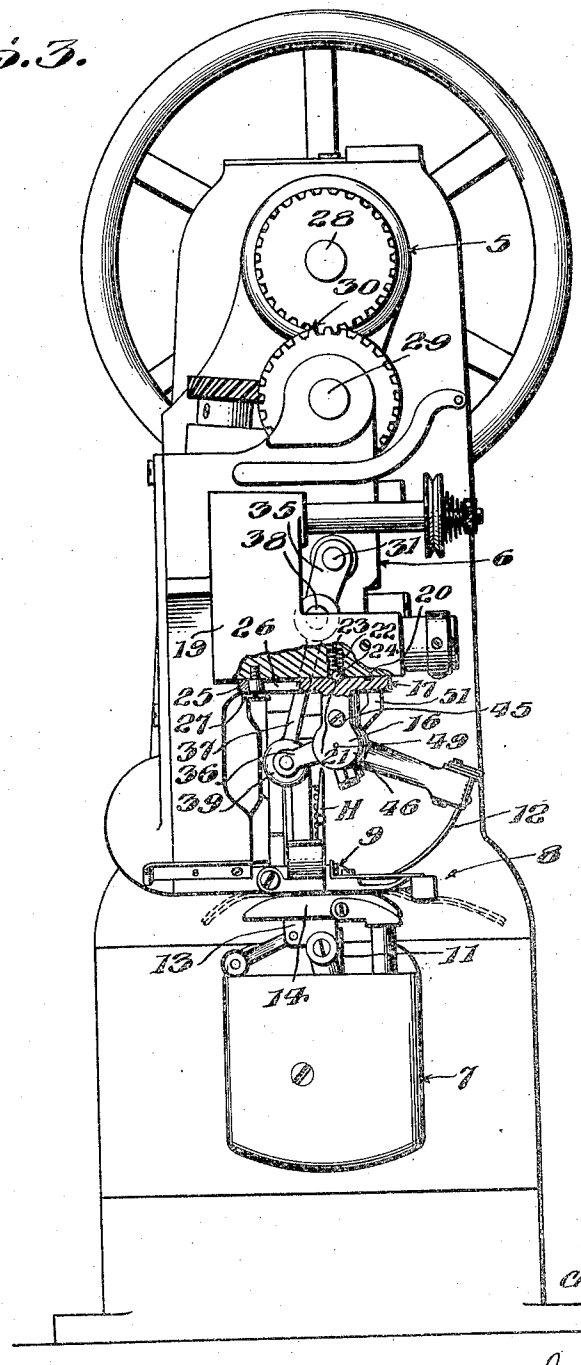
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NEEDLE MECHANISM FOR BLINDSTITCH SEWING MACHINES

Filed Oct. 21, 1924 4 Sheets-Sheet 3

Fig. 3.



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NEEDLE MECHANISM FOR BLINDSTITCH SEWING MACHINES

Filed Oct. 21, 1924 4 Sheets-Sheet 4

Fig. 4.

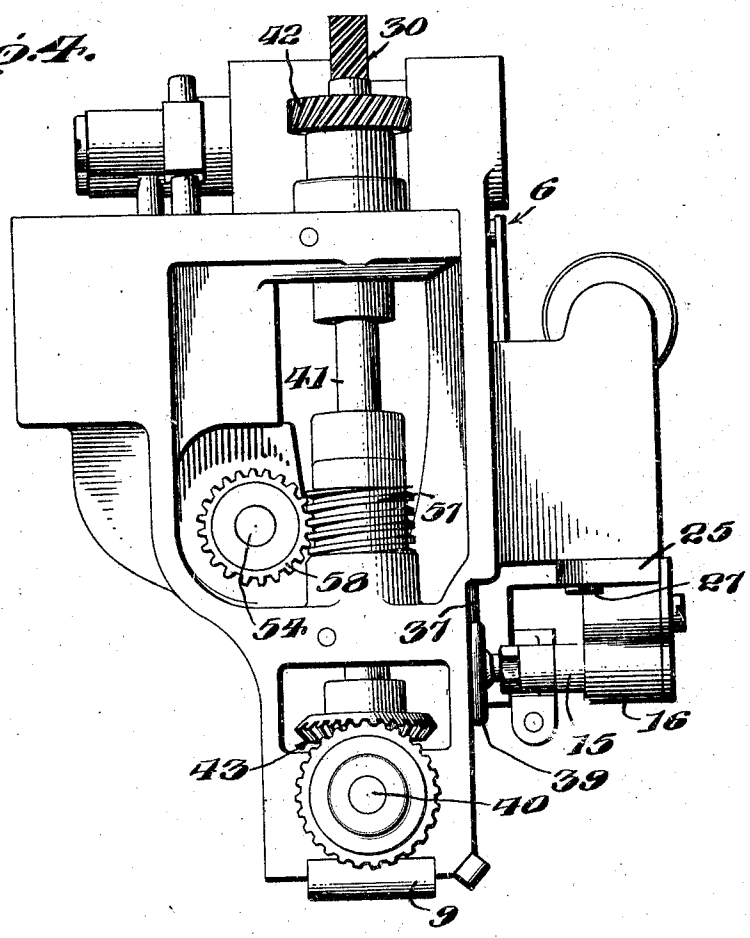
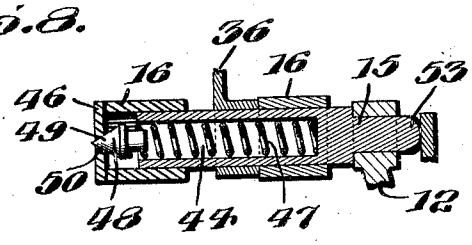


Fig. 8.



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Patented Oct. 26, 1926. 1,604,710

UNITED STATES PATENT OFFICE.

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NEEDLE MECHANISM FOR BLINDSTITCH SEWING MACHINES.

Application filed October 21, 1924. Serial No. 744,984.

This invention relates to blind stitch sewing machines generally, although more particularly to the needle mechanism thereof.

In felling operations, such as the felling of the bottom of trousers, coats, etc., it is desirable to employ a curved needle having its plane of oscillation at an angle relative to the line of feed whereby the needle will enter not only the body fabric but also the fell at a point adjacent the folded edge thereof. In some felling operations it is desirable to have the plane of needle oscillation at a greater angle relative to the line of feed. It is also desirable to give to the needle a shogging or lateral movement, and in some operations it is desirable to have a greater shogging or lateral movement than in others, in order to increase the width of the line of stitching.

One of the principal objects of my invention is to provide a needle mechanism in which the plane of needle oscillation relative to the line of feed may be readily varied within certain limits whereby the same sewing head may be employed to meet the different demands.

Another object of the invention is to provide such a needle mechanism in which the needle is given a shogging or lateral movement, and in which the needle actuating means remains unaffected when the plane of needle oscillation relative to the line of feed is varied.

A further object of the invention is to provide a needle mechanism of the type described in which the amount of the needle shogging or lateral movement may be varied within certain limits and without affecting the needle actuating means.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

The invention is disclosed in the accompanying drawing as applied to a sewing machine for felling operations of the Lewis type which comprises a curved oscillating needle and a complemental stitch forming mechanism located above the presser foot, but it will be understood that the embodiment of the invention in this type is illustrative and is not restrictive of its use in other types of machines to which it may be applied.

In the drawings:

Figure 1 is a front elevation of the left hand end of a Lewis machine showing the application of my invention.

Figure 2 is a sectional view taken on the line 2—2 of Fig. 1.

Figure 3 is an elevation of the left hand end of the machine, parts thereof being shown in section.

Figure 4 is a rear elevation of the stitching head, the cover plate being removed to disclose the driving parts.

Figure 5 is a detail bottom plan view showing the pivotal support for the needle.

Figure 6 is a detail sectional view showing the means for locking the needle vibrating means in a predetermined position of adjustment.

Figure 7 is a detail plan view, of the presser foot showing the cooperative positions of the needle and the hook.

Figure 8 is a detail longitudinal sectional view through the needle supporting rock shaft and the supporting bracket therefor.

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

The sewing machine in general includes an overhanging arm 5 which supports a stitching head 6, and a lower arm 7 which supports the work presenting mechanism 8.

Fixed to the lower portion of the head 6 is a presser foot 9 having an opening 10 formed therein through which a vertically reciprocatory plunger 11 operates to project a "node" of material into the path of the shogging needle 12 just prior to alternate oscillations thereof, the plunger 11 forming part of the work presenting mechanism 8. Thus, in felling work, the shogging needle will not on its right hand penetrating stroke, engage the body fabric but will engage only the fell because of the plunger being in its lowermost position of reciprocation, whereas on its left hand penetrating stroke the needle will engage only the body fabric by reason of the plunger elevating a "node" of the body fabric into the path of the needle. This work presenting mechanism includes an intermittently actuated or 4-motion feed dog 13 and a vertically reciprocatory work

clamp 14, the feed dog cooperating with the foot to intermittently feed the material rearwardly for a stitch length distance while the needle and the work clamp are free from the material, and the work clamp serving to clamp the material against the foot while the needle is in the material and while the feed dog is idle. Inasmuch as the work presenting mechanism may be of the usual Lewis type it is thought unnecessary to describe the same in detail.

The needle 12 is fixed to a rock arm which is carried by a horizontally disposed rock shaft 15. This shaft is journaled in spaced depending bearings 16—16 carried by a horizontal supporting bracket 17. The bracket 17 is pivoted at its right hand end as at 18 to the frame work 19 of the stitching head 6. The pivot 18 is disposed in the vertical plane containing the needle 12 and is also disposed directly above the penetrating position of the needle. The bracket 17 is normally positioned so that the needle 12 will oscillate in a plane of approximately 5 degrees relative to the line of feed. The bracket however may be swung rearwardly about the pivot 18 so as to position the path of needle oscillation at a greater angle relative to the line of feed, such an adjusted position being shown in the accompanying drawings as at 15 degrees. A complemental stitch forming mechanism such as a rotary threaded hook H, is supported by the stitching head and by reason of the position of the pivot 18, the needle 12 will cooperate with said hook in any adjusted position of the bracket 17.

In order to retain the bracket 17 in a predetermined position of adjustment, I have provided an automatic latching device which will retain the bracket in either position of adjustment, yet permit of said bracket being readily adjusted from one position to the other. To this end I have provided the upper face of the bracket, opposite the pivot 18, with a plurality of seats 20 and 21, which are arranged in an arc having the pivot 18 for its center, Extending upwardly into the frame 19 and arranged in alignment with the arc containing the seats 20 and 21, is a vertically disposed bore 22. Disposed within the bore 22 is a coil spring 23 and arranged between this spring 23 and the bracket 17 is a ball 24. The ball 24 is normally urged downwardly by the spring 23 into engagement with the upper face of the bracket 17 and consequently when the bracket is adjusted to either of its positions the ball will become automatically projected into the corresponding seat 20 or 21 depending, of course, upon the direction the bracket is moved. The seats 20 and 21 are of sufficient depth to permit the ball 24 to cooperate with the lower end of the bore 22 and thereby latch the bracket 17 in its adjusted position. This latching engagement between the bracket and the frame is such as may be readily and automatically disengaged upon the application of sufficient lateral pull or push upon the outer end of the bracket.

In order to limit the extent of lateral movement of the bracket 17, I have provided the outer end thereof with a rearwardly extending arm 25 which is formed with an arcuate slot 26 having for its center the pivot 18. A screw 27 extends through the slot 26 and has threaded engagement with the frame 19 of the stitching head. Thus the swinging movements of the bracket 17 is limited by the screw 27 being engaged by the end walls of the slot 26. It will, of course, be understood that the length of the slot 26 is greater than the distance between the seats 20 and 21.

Disposed directly in rear of the needle 12 and cooperating therewith is a complemental stitch forming mechanism which in this instance is shown as a rotary threaded hook H. the needle and the hook cooperating to form a series of lock stitches.

The needle 12 is driven from the main shaft 28, which is journaled in the overhanging arm 5, through the medium of a driving mechanism which causes said needle to make one complete oscillation for each rotation of said driving shaft. This needle driving mechanism includes a jack shaft 29 journaled in the frame 19 of the stitching head and a 1—to—1 gear coupling 30 which connects the driving shaft with said jack shaft. Journaled in the frame 19 below the jack shaft 29 is a rock shaft 31. Carried by the jack shaft 29 is an eccentric pin 32 and carried by the rock shaft 31 is a rock arm 33. A link 34 is pivotally connected at its ends to the eccentric pin 32 and to the rock arm 33. A second rock arm 35 is fixed to the rock shaft 31 and fixed to the rock shaft 15 which supports the needle 12, is a rock arm 36. A link 37 is connected at its upper end by a ball joint 38 to the rock arm 35 and at its lower end by a ball joint 39 to the rock arm 36. Thus by means of the ball joints 38 and 39, the supporting rock shaft 15 may be adjusted about the pivot 18 without disconnecting the needle driving mechanism and consequently without affecting the operativeness of the needle driving mechanism.

The rotary hook H is fixed to a rearwardly extending horizontal shaft 40 journaled in the frame 19 of the stitching head. This shaft is driven through the medium of a vertically disposed shaft 41 also journaled in the frame 19. The upper end of the shaft 41 carries a worm gear 42 which meshes with the gear coupling 30, the gear 42 having a 2—to—1 relation with said gear coupling so that the vertical shaft 41 will be rotated twice for each revolution of the main shaft 28. The vertical shaft 41 drives the hook

shaft 40 through the medium of a 1—to—1 gear coupling 43. As a result the hook H is rotated twice during each revolution of the main shaft. In other words the hook is rotated twice during each complete oscillation of the needle 12. This timing per se of the hook relative to the needle forms no part of the present invention.

My invention also aims to provide means for vibrating the needle laterally, that is, to impart what is known as a "shogging" movement to the needle. Means are provided for adjusting the amount of the lateral or shogging movement of the needle, and the shogging mechanism remains operable regardless of the angular position of adjustment of the needle supporting rock shaft 15. To this end, the outer end of the needle supporting rock shaft 15 is formed with a bore 44, and secured to the free end of the bracket 17 by means of a screw is a closure plate 46 for the bore 44. The rock shaft 15 is mounted in the bearings 16—16 for longitudinal sliding movements relative thereto. Disposed within the bore 44 is an elongated coil spring 47, the inner end thereof bearing against the inner end of the bore 44 and the outer end thereof carrying a cone 48 having an outwardly projecting apex 49 which engages an opening 50 formed in the closure plate 46, said opening being disposed in alinement with the longitudinal axis of the bore so as to maintain said spring in proper concentric relation within said bore whereby said spring will exert its maximum force against the rock shaft 15 in an effort to yieldably retain the latter in its right-hand position.

In order to shift the rock shaft 15 longitudinally against the tension of the spring 46 I have provided a vertically disposed lever 51, the upper end thereof being pivoted as at 52 upon the frame 19 and the lower end thereof being engageable with the inner end of the rock shaft 15. Preferably the inner end 53 of said rock shaft 15 is rounded for engagement with said lever. This inner end 53 of the rock shaft 15 is disposed directly under the pivot 18 of the needle supporting bracket 17 and consequently said end 53 has no substantial bodily movement when the bracket 17 is swung about the pivot 18.

Journaled in the frame 19 is a cam shaft 54 which carries at its front end two cams 55 and 56 respectively. The cam shaft 54 is driven from the vertical shaft 41 through a 1—to—4 gear coupling consisting of worm gears 57 and 58 which are respectively mounted on the shafts 41 and 54. The cam shaft 54 is adapted to be shifted longitudinally into either one of two predetermined positions whereby either cam 55 or 56 will engage a cam roller 59 carried by the vertically disposed lever 51. Each cam has a high cam surface 60 and a low cam surface 61, each cam surface extending approximately 90°. The eccentricity of the cam 55 is greater than the eccentricity of the cam 56.

In order to shift the cam shaft 54 longitudinally so as to position either of the cams 55 or 56 into engagement with the cam roller 59 I have provided said cam shaft 54 on its forward end with a thumb piece 62. It is, of course, necessary to latch the cam shaft 54 in either position of adjustment and to this end I have provided the shaft with a pair of spaced annular recesses 63 and 64 which are spaced apart equal to the distance between the centers of the cams 55 and 56. A tubular housing 65 has one end threaded into the frame 19 at a point in register with the annular recess 63 when the cam shaft 54 is in its rear-most position. The outer end of the housing 65 is adjustably closed by a threaded plug 66. A ball 67 is disposed partly in the inner end of the housing 65. This ball is normally retained in this position by means of a follower 68 and this follower is yieldably urged against the ball by means of a coil spring 69 which is disposed within the housing between the closure plug 66 and the follower 68. It will be observed that the cam shaft 54 is locked in an adjusted position by reason of the ball becoming wedged between the corresponding seat and the inner end of the housing 65. The tension of the spring 69 may be regulated by the adjustable plug 66 so as to disengage the latch automatically upon sufficient longitudinal pull or push upon the cam shaft.

Thus it will be observed that by reason of the 1 to 1 coupling 30 the needle will make one complete oscillation during each rotation of the main shaft 28; that by reason of the worm gear 42 having connection with the gear coupling 30, the vertical hook shaft 41 will be rotated twice during each rotation of the main shaft 28, and that by reason of the gear coupling 57, 58, the cam shaft 54 will be rotated once during every four revolutions of the hook shaft 41 and once during every two revolutions of the main shaft 28. Thus the needle will be completely vibrated during every two complete oscillations of said needle.

From the foregoing, it will be observed that the coil spring 47 yieldably retains the rock shaft 15 in engagement with the vertical lever 51 and the cam roller 59 is therefore retained in engagement with one of the cams 55 or 56. It will also be noted that the amount of lateral vibration or shogging of the needle is dependent upon which cam is positioned for cooperation with the cam roller 59, and that either cam may be so positioned to vary the amount of needle vibration or shogging movement without disconnecting any of the needle driving mechanism

and irrespective of the adjusted angular posotion of the needle relative to the line of feed. It is also to be noted that the needle will positively cooperate with the hook H regardless of its adjusted angular position of oscillation or regardless of the amount of lateral vibration or shogging movement imparted thereto.

Without further description it is thought that the many features and advantages of the invention will be readily apparent and it will, of course, be understood that changes in the form, proportion and minor details of construction may be resorted to without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. In a blind stitch sewing machine, the combination with a curved needle, of a feeding mechanism, means for supporting said needle on a substantially horizontal axis, actuating means for said needle, said supporting means being adjustable to any one of a plurality of fixed positions to vary the path of needle oscillation relatively to the direction of feed, and means for retaining said needle supporting means in a predetermined position of adjustment, said retaining means being released automatically upon adjustment of said supporting means and automatically functioning to retain said supporting means when the latter has been moved to its predetermined position of adjustment.

2. In a blind stitch sewing machine, the combination with a curved needle, of a feeding mechanism, means for supporting said needle on a substantially horizontal axis, actuating means for said needle, said supporting means being adjustable to any one of a plurality of fixed positions to vary the path of needle oscillation relatively to the direction of feed without disconnecting said needle actuating means, and means for retaining said needle supporting means in a predetermined position of adjustment, said retaining means being released automatically upon adjustment of said supporting means and automatically functioning to retain said supporting means when the latter has been moved to its predetermined position of adjustment.

3. In a blind stitch sewing machine, the combination with a curved needle, of a feeding mechanism, means for supporting said needle on a substantially horizontal axis. a complemental stitch forming mechanism, said supporting means being adjustable to any one of a plurality of fixed positions to vary the path of needle oscillation relatively to the direction of feed without disturbing the cooperative relation between the needle and the complemental stitch forming mechanism, and means for retaining said needle supporting means in a predetermined position of adjustment, said retaining means being released automatically upon adjustment of said supporting means and automatically functioning to retain said supporting means when the latter has been moved to its predetermined position of adjustment.

4. In a blind stitch sewing machine, the combination with a curved needle, of a feeding mechanism, means for supporting said needle on a substantially horizontal axis, actuating means for said needle, a complemental stitch forming mechanism, said supporting means being adjustable to any one of a plurality of fixed positions to vary the path of needle oscillation relatively to the direction of feed without disconnecting said needle actuating means and without disturbing the cooperative relation between the needle and the complemental stitch forming mechanism, and means for retaining said needle supporting means in a predetermined position of adjustment, said retaining means being released automatically upon adjustment of said supporting means and automatically functioning to retain said supporting means when the latter has been moved to its predetermined position of adjustment.

5. In a blind stitch sewing machine, the combination with a frame, of a curved needle, means for supporting said needle on a horizontal axis, said supporting means comprising a bracket pivoted to the frame for horizontal swinging movements, a rock shaft journaled in said bracket for supporting said needle, and means to latch said bracket cooperating with the frame and bracket to retain the latter in a predetermined position of adjustment about its pivot, said retaining means comprising a plurality of seats formed in the bracket and arranged in an arc about the pivot of the bracket and a spring pressed ball carried by the frame and engageable with any one of said seats.

6. In a blind stitch sewing machine, the combination with a frame, of a horizontal rock shaft journaled in said frame, a curved needle fixed to said rock shaft, a spring for normally urging the rock shaft longitudinally in one direction, and interchangeable cams directly engageable with the shaft for variably moving said rock shaft longitudinally in the opposite direction to effect different amounts of shogging movements to the needle.

7. In a blind stitch sewing machine the combination with a frame, of a horizontal rock shaft journaled in said frame, a curved needle fixed to said rock shaft, a vertically disposed lever fulcrumed on the frame and directly engageable with one end of said rock shaft, a spring for normally urging the rock shaft longitudinally towards said lever, and a cam engageable with said lever to move said rock shaft longitudinally against the tension of said spring.

8. In a blind stitch sewing machine the

combination with a frame, of a horizontal rock shaft journaled in said frame, a curved needle fixed to said rock shaft, a vertically disposed lever fulcrumed on the frame and engageable with one end of said rock shaft, a spring for normally urging the rock shaft longitudinally towards said lever, a cam shaft journaled in the frame and movable longitudinally relative thereto, and a plurality of differential cams fixed on said cam shaft and adapted to respectively engage said lever upon longitudinal adjustment of the cam shaft.

9. In a blind stitch sewing machine the combination with a frame, of a horizontal rock shaft journaled in said frame, a curved needle fixed to said rock shaft, a vertically disposed lever fulcrumed on the frame and engageable with one end of said rock shaft, a spring for normally urging the rock shaft longitudinally towards said lever, a cam shaft journaled in the frame and movable longitudinally relative thereto, a plurality of differential cams fixed on said cam shaft and adapted to respectively engage said lever upon longitudinal adjustment of the cam shaft, and means for automatically latching the cam shaft in a predetermined position of adjustment.

10. In a blind stitch sewing machine the combination with a frame, of a horizontal rock shaft journaled in said frame, said rock shaft having a bore extending inwardly from one end thereof, a curved needle fixed to the opposite end of said rock shaft, a coil spring disposed within said bore for urging the rock shaft longitudinally in one direction, a cone disposed between the frame and the outer end of the coil spring, the base of the cone being disposed within the end of the spring to maintain the latter in concentric relation within said bore and the apex of the cone engaging an opening in the frame, and means for moving the rock shaft longitudinally against the tension of said spring to effect shogging movements to the needle.

In testimony whereof I hereunto affix my signature.

CHARLES W. MUELLER.