H. C. MILLER.

SEWING MACHINE.

APPLICATION FILED FEB. 20, 1906.

1,159,523.

Patented Nov. 9, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

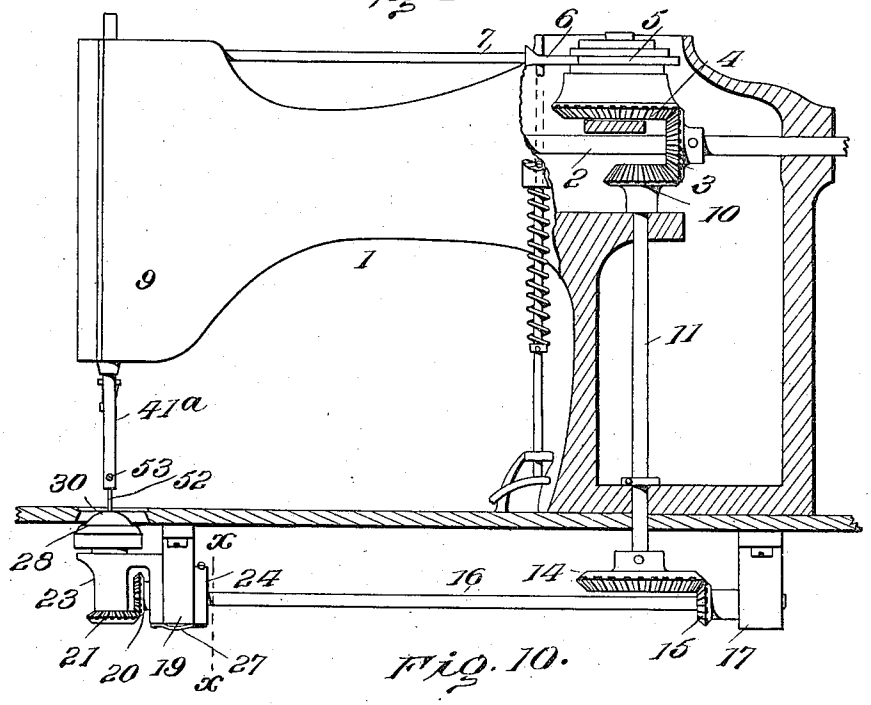
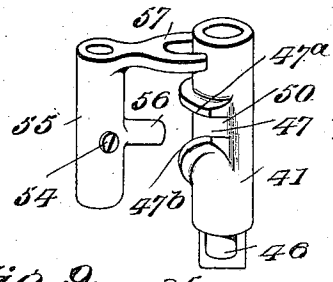


Fig. 10.

Fig. 6.



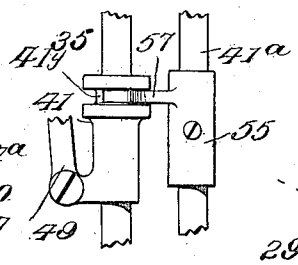


Fig. 7.

Fig. 8.

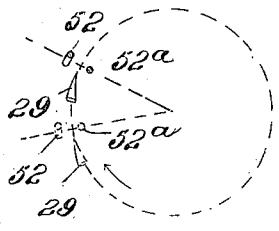
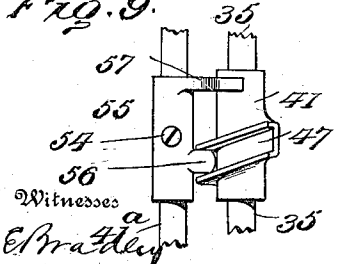
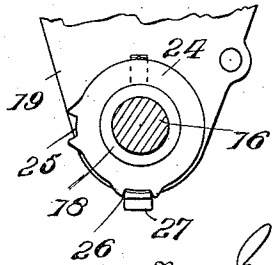


Fig. 9.





Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

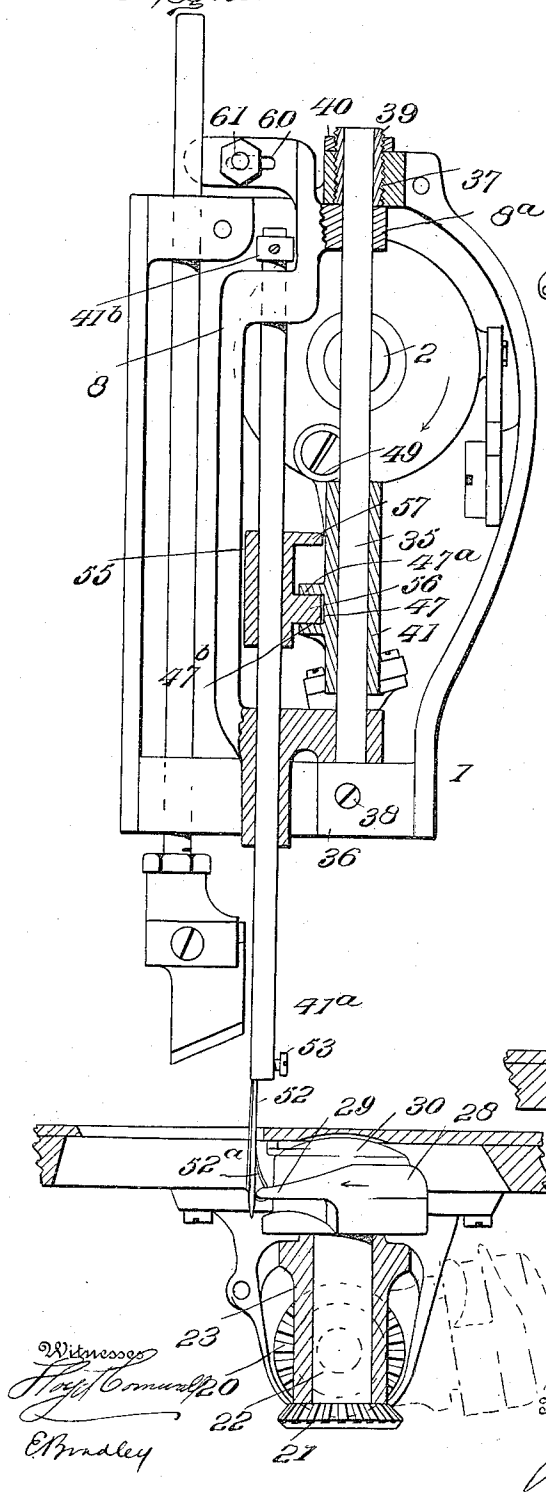
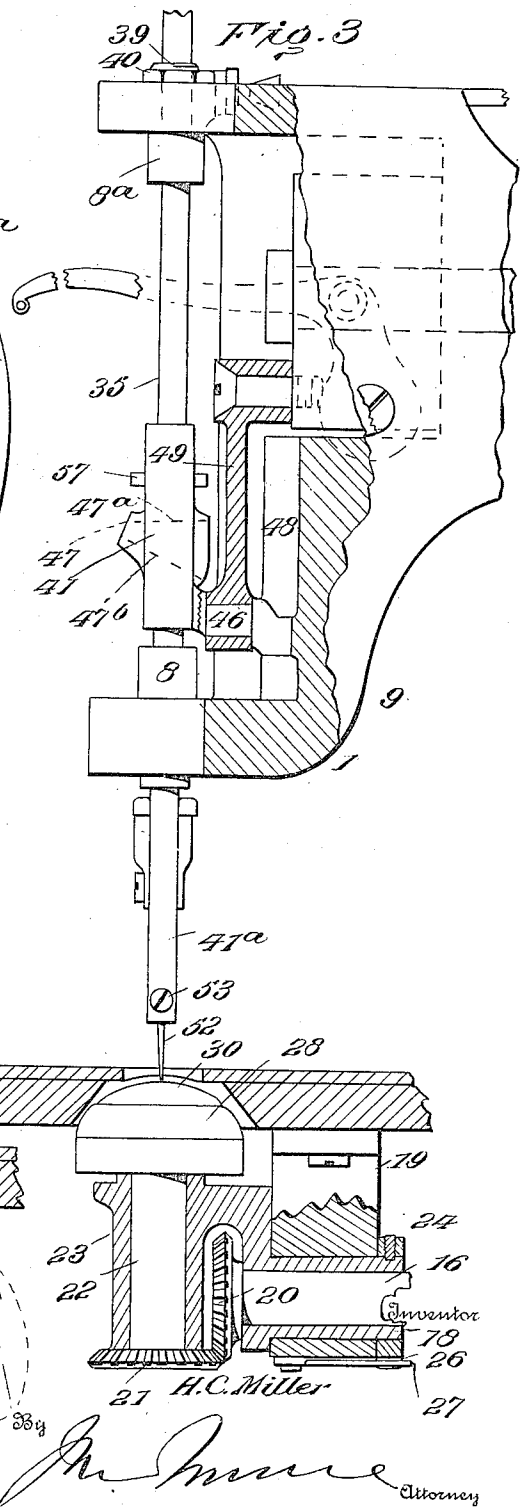


Fig. 3



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3 SHEETS—SHEET 3.

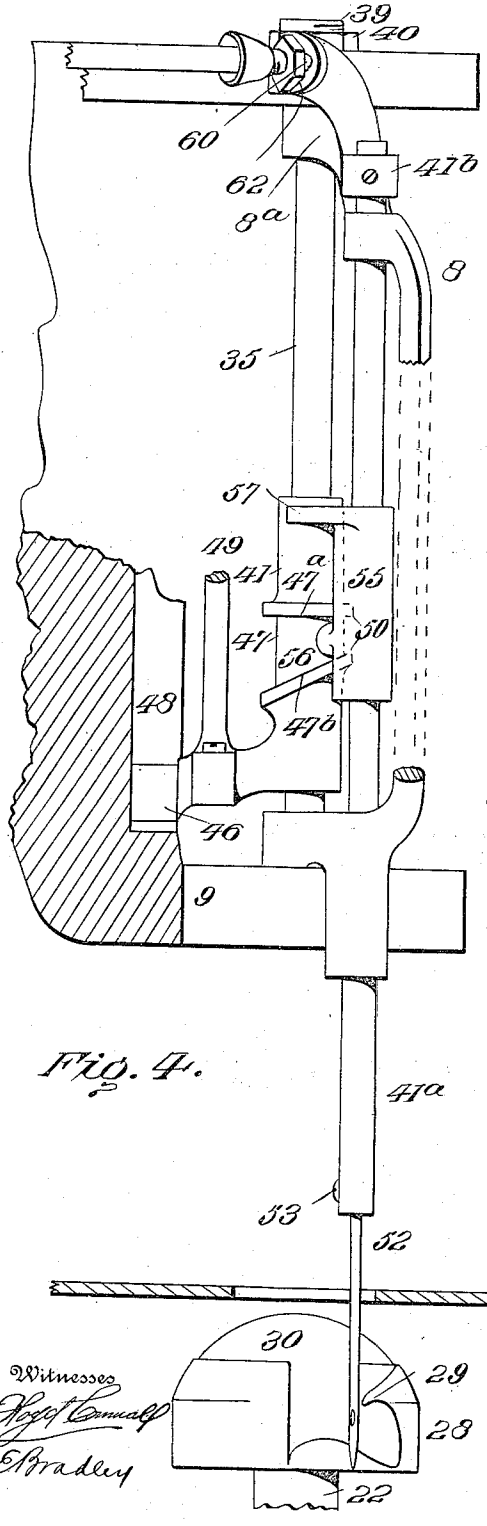


Fig. 4.

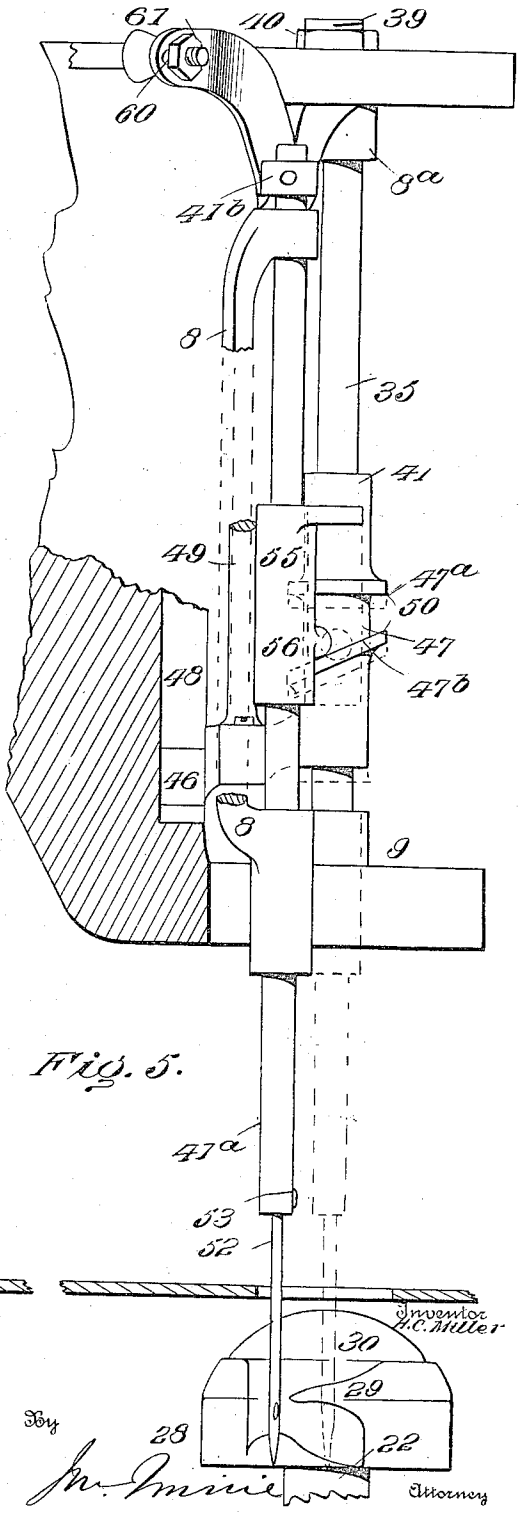


Fig. 5.

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SEWING-MACHINE.

1,159,523. Specification of Letters Patent. Patented Nov. 9, 1915.

Application filed February 20, 1906. Serial No. 302,090.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented new and useful Improvements in Sewing-Machines, of which the following is a specification.

This invention relates to improvements in sewing machines of the zig-zag stitch forming type, wherein the needle bar is horizontally reciprocated to cause it to operate in different vertical planes, in combination with a compensating device to accurately locate the needle with reference to the looper, to prevent skipping stitches.

Considerable difficulty is experienced in producing uniformity in stitching with high speed machines, due to the fact that the horizontal movement of the needle throws it out of time with the looper. According to my invention I propose to overcome this defect, by the introduction of mechanism which compensates for the horizontal movement of the needle, so that in any vertical position in its path of travel its eye will always be timed to meet the hook of the looper at the proper time and place.

The invention also relates to improvements in the specific details of construction, all of which will be hereinafter referred to, and particularly pointed out in the claims.

In the drawings: Figure 1 is a side elevation of a conventional buttonhole machine, parts being broken away. Fig. 2 is an enlarged end elevation of the same, parts being in section to more fully disclose the invention. Fig. 3 is a detail elevation of the head of a buttonhole machine, parts in section. Fig. 4 is a similar view looking from the opposite side of the machine. Fig. 5 is a view similar to Fig. 4, but showing the needle bar in its extreme left hand movement. Fig. 6 is a detail perspective view of the compensating mechanism. Fig. 7 is a detail section on the line *x*—*x*, Fig. 1. Fig. 8 is a diagrammatic view illustrating the movement of the needle and the looper. Fig. 9 is a detail view of a different form of my invention. Fig. 10 is a detail of a further modification.

1, indicates a buttonhole sewing machine, of the type shown and described in my Patent No. 1,033,721, dated July 23, 1912. However, I desire it distinctly understood that my present invention is not limited to buttonhole machines.

2, indicates a power shaft, carrying a gear 3, which meshes with a gear 4, on a shaft, carrying a nest of cams 5, opposite said cams is an arm 6, connected by a link 7, with a gate 8, mounted in the head 9. A gear 10, on a vertical shaft 11, meshes with gear 3, to communicate motion to the lower stitch forming mechanism. On the lower end of the shaft 11, is a gear 14, which meshes with a smaller gear 15, on shaft 16. This shaft is mounted at one end in a bearing 17, while its opposite end is supported in a sleeve 18, in a bearing 19. On the end of shaft 16, is a beveled gear 20, meshing with a beveled gear 21, on a looper shaft 22, having a bearing in a swinging support 23, from which sleeve 18, extends. On the end of the sleeve is fastened a collar 24, provided with notches 25 and 26, with which a latch 27, coöperates to lock the looper in position. The looper 28, having the usual hook 29, is mounted to revolve with shaft 22, and it also carries a bobbin 30. These parts are of well known construction and need no further detail description.

The upper stitch forming mechanism is controlled by my improved compensating mechanism which I will now proceed to describe.

The gate 8, is mounted on a rod 35, which is in line with the center of rotation of the looper, and is fitted in a bearing 36 and thimble 39. The lower end of rod 35, is secured in bearing 36 by a set screw 38, while its upper end fits in threaded thimble 39, screwed into an opening 37, in head 9. By releasing set screw 38, rod 35, may be removed, which will also permit removal of the gate 8, for repairs, etc., the lower end of thimble 39, bears on the bearing 8^a, of gate 8, and by adjusting said thimble, and locking it by a lock nut 40, lengthwise wear of the gate may be taken up.

Mounted to slide on rod 35, is a sleeve 41, having a lug 46, and a cam groove 47. Lug 46, fits in a guide way 48, on the inside of head 9, to maintain the sleeve in a determinate vertical path of movement. A connecting rod 49, has pivotal connection with the lug 46, and its opposite end is connected to a disk mounted on the power shaft, whereby reciprocal movement is imparted to the

sleeve. Cam groove 47, extends from a point 50 toward the left and is equal in length to the greatest horizontal movement of the needle bar; the upper edge 47[a] of the cam being on a horizontal line, while its lower edge 47[b], inclines downwardly from the point 50 as clearly shown in Figs. 4 and 5.

A needle bar 41[a], is carried by the gate, and in its lower end is a needle 52, secured in place by a set screw 53, the downward throw of said bar being limited by a stop 41[b], on the upper end. Adjustably mounted on the needle bar 41[a], as by a set screw 54, is a sleeve 55, provided with a lug 56, and a fork 57; lug 56, engages cam groove 47, while the fork 57, embraces the sleeve 41, to provide a bearing for sleeve 55 when the needle bar is operated. Because of the location of the fork 57, it keeps the eye of the needle presented to the hook 29 in the same relative position irrespective of the vertical plane of movement of the needle bar, and also retains lug 56 in proper position in groove 47.

In operation, the nest of cams, through the described connections horizontally vibrate the needle bar and gate, while the disk reciprocates sleeve 41, and through the cam groove 47, and lug 56, vertical movement is imparted to the needle bar. Assume the needle bar to be located at its extreme right hand movement, and also its downward limit of vertical movement as shown in Fig. 4; cam groove 47, caused the lug 56, to travel to the point 50, which necessarily raised the needle bar to time the eye with the hook 29, to take the loop 52[a]. The movement of the lug 56 to point 50, of the groove will cause the movement of the needle to be simultaneous with the movement of the sleeve 41. Now assume the needle bar to be at its extreme left hand position, and the sleeve 41, started on its up stroke as shown in Fig. 5. In this position, the widest portion of the cam groove occurs, and while the sleeve 41, has driven needle bar down just as far as when operating at the point 50, said needle bar dwells and is not therefore simultaneously raised with sleeve 41, (as in the previous position) giving the hook an opportunity to catch up to the needle eye. By the time hook 29, takes the loop the lower inclined edge 47[b], of the cam groove picks up the projection 56, and raises the needle bar, the loop having been taken by the hook at the same determinate point as when taken when the gate was thrown to the limit of its extreme right hand movement. This operation is due to the fact that the cam groove is of a greater width at the left of the vertical plane of movement of the needle bar, hence causing the needle bar to be retarded sufficiently until the hook catches up with it. The cam groove therefore acts as a compensating means between the hook and the eye of the needle, thus preventing skipping of stitches. It is evident if the looper were evolved in the opposite direction to the showing in the drawing, the widest portion of the cam would be to the right of the vertical plane of movement of the needle bar, and the narrowest point to the left.

While I have described the two extreme right and left hand positions of the needle, it is of course to be understood that the compensating movement of the parts in any position in the path of travel of the needle bar will be such as that the same determinate point of the needle will be met by the hook of the looper. But to more particularly emphasize the movement I will briefly describe the action of the parts when moving from the left hand position to the normal or central position. When the sleeve 41, is raised and the needle is up and out of the fabric the vibrating means moves the gate toward the right and the lug 56, travels in the cam groove until the central vertical plane of movement of the needle bar is reached, so that when the sleeve, after having been driven down to form a stitch, starts on its up stroke it will not pick up the projection 56, until edge 47[b], reaches it, or in other words the needle bar is retarded just half the time it was when in the left hand position, giving the hook time to catch up to the loop, as previously described.

It will be observed that the sleeve 41, acts as a bearing for the sleeve 55, in both its vertical and horizontal vibrating movements, which insures the needle being rotated on the same center as the looper. By arranging the compensating means as described, the same determinate point of the needle will always be met by the hook of the looper under precisely the same conditions and exactly the same horizontal alinement, as I provide for compensating for the horizontal vibrations of the needle, as well as means for compensating for the vertical reciprocations of the needle with relation to the looper.

The gate is provided with a slot 60, through which the threaded end of link 7, passes. On each side of the gate, and working on the threaded end of the link are two lock nuts 61 and 62, for connecting the link to the gate. The purpose of this construction is to permit the operator to alter the throw of the needle, should occasion require.

When it is necessary to remove the bobbin, latch 27, is disengaged from the notch 26, and the support 23, is turned in bearing 19, as shown in dotted lines in Fig. 2, thereby permitting access to the looper, without disturbing the upper stitch forming mechanism, or the feed clamps (not shown). This feature of construction is quite essential, as it permits of access to the bobbin of the

looper, without destroying the mesh of gears 20 and 21, and the time of meeting of the hook and needle.

In Fig. 9, the walls of the cam groove are inclined but parallel. This construction operates satisfactorily with a certain type of machines, in substantially the same manner as before described, except the time of movement of the projection is changed.

The structure shown in Fig. 10, is for use when the stitches are not unusually long, as for instance in a plain buttonhole. In this construction there is no compensating cam. The fork of arm 57, engages the flanges of the groove 41^y, and serve as a means for transferring the vertically reciprocating movement of sleeve 41, to the needle bar, the latter as in the preferred form of the invention swings on the same axis as the gate.

What I claim is:

1. In a sewing machine, the combination with a work support, a gate, means for vibrating the gate, a needle bar mounted in the gate, means for reciprocating the needle bar, a rotary looper arranged to remain in the same center of rotation, compensating mechanism including a reciprocating cam having intermittent engagement with the needle bar to cause the needle carried thereby to be projected beyond the work support and toward the looper the same distance in either lateral position of the needle bar, whereby all the loops of the needle thread will be of uniform size.

2. In a sewing machine, the combination with a work support, a vibrating gate, a reciprocating needle bar mounted in the vibrating gate, a needle, means for vibrating the gate, a revolving looper arranged to remain in the same center of rotation, means located adjacent to the needle bar for projecting the needle the same distance beyond the work support and toward the looper in either lateral position of said needle bar, and means for returning the needle bar at a different time in certain paths of its reciprocation than in others to permit the hook of the looper to at all times meet the eye of the needle in the same relative position, whereby all the loops of the needle thread will be of uniform size.

3. In a sewing machine, the combination with a work support, a looper arranged to remain in the same center of movement, a needle bar carrying a needle, means including a cam for reciprocating said bar to dispose the needle adjacent the looper, means to change the path of reciprocation of the needle, said cam varying the dwell of the needle in the respective paths of reciprocation whereby the needle is maintained a greater length of time adjacent the looper at one point of reciprocation than in the other, and is at all times projected beyond the work support the same distance.

4. In a sewing machine, the combination with a looper arranged to remain in the same center of movement, of a needle bar carrying a needle, means for reciprocating said bar to dispose the needle adjacent the looper, means to change the path of reciprocation of the needle, and means including spaced flanges, the space between the flanges varying, said flanges being adjacent to and controlling the reciprocation of the needle to cause it to be maintained a greater length of time adjacent the looper at one point of its reciprocation than in the other to insure identical coöperation of the looper and needle in the respective paths of operation of the latter, and to also cause the length of stroke of said needle toward the looper to be the same.

5. In a sewing machine, the combination of a looper, a needle bar carrying a needle, means for changing the path of movement of the needle bar, power means for simultaneously reciprocating the needle bar and operating the looper, and means to interrupt the continuous reciprocating movement of the needle bar in one determinate path of movement without affecting the movement of the looper, for forming substantially the same width of loop and in the same rotation to the looper in all the lateral positions to which the needle may be vibrated.

6. In a sewing machine, the combination with a looper, having a definite operative plane of movement, of a needle bar carrying a needle, power means for reciprocating said needle bar to dispose the needle in the operative path of the looper, means to change the path of reciprocation of the needle, and means whereby the needle bar is released from the influence of the power means for a definite interval in a certain path of said needle bar.

7. In a sewing machine, the combination with a looper having a definite operative plane of movement, of a needle bar carrying a needle, means for reciprocating said needle bar to dispose the needle in the operative path of the looper, means to change the path of reciprocation of the needle, power mechanism, and means whereby the needle bar is continually within the influence of the power means in a certain path of reciprocation and released therefrom for a definite interval in any other path of movement, said latter means including two reciprocating elements with a cam located between the same.

8. In a sewing machine, the combination with a looper having a definite operative plane of movement, of a needle bar carrying a needle, means for reciprocating said needle bar to dispose the needle in the operative path of the looper, means to change the path of reciprocation of the needle, power mechanism, and means including two recip-

rocating elements arranged adjacent each other one of which carries a cam whereby the power mechanism actuates the needle toward the looper in all paths of reciprocation of the needle and varies the dwell of the needle in the path of movement of the looper in accordance to the particular path of needle-reciprocation.

9. In combination with a work support, a movable looper, of a needle bar carrying a needle, means for reciprocating the needle bar, means to change the path of movement of the reciprocation of the needle with respect to the looper, and means including a cam and projection to retain the eye of the needle and the hook of the looper in the same relative position in either lateral position of the said needle, said cam and projection causing the needle bar to vary its reciprocating movement according to its vertical path of movement, and to project said needle the same distance beyond the support irrespective of its lateral position.

10. In a sewing machine, a frame, a rod in the frame, a gate pivotally mounted on the rod, a reciprocating needle bar mounted in the gate, a slidable and pivotal connection between the needle bar and rod, and means for detachably mounting the rod in the frame to remove the gate therefrom.

11. In a sewing machine, the combination with a vibrating needle bar mounted to reciprocate in a gate, a gate, power means, a looper, a projection extending outwardly from the needle bar and engaging a cam, a reciprocating element connected to the power means, a cam carried by the reciprocating element, the cam and projection causing the same determinate point of the needle to be met by the hook of the looper irrespective of the vertical plane of movement of the needle bar.

12. In a sewing machine, the connection with a support, a vibrating needle bar, a looper, power means, mechanism connected with and located intermediate said power means and the needle bar including a cam and a projection coöperating with the cam for projecting the needle beyond the support the same distance and causing the same determinate point of the needle to be met by the hook of the looper irrespective of the plane of movement of the needle bar.

13. In a sewing machine, the combination with a work support, a vibrating needle bar, a needle, a looper, power means, an element having a projection and connected to the needle bar, a cam coöperating with the power means which is engaged by the projection, the element and cam causing a variation in the dwell of the needle bar at the time of its downward movement in either lateral position of said needle bar, the cam and projection causing the needle to be projected the same uniform distance beyond the work support in all its paths of reciprocation.

14. In a sewing machine, the combination with a needle bar, a needle, a laterally vibrating gate carrying the needle bar, a projection extending from the needle bar, an element having a cam with which the projection engages, means for vertically guiding the element, a looper, and power means operating the element, the cam causing the same determinate point of the needle to be met by the hook of the looper irrespective of the vertical plane of movement of the needle bar.

15. In a sewing machine, the combination with a needle bar carrying a needle, a vibrating gate in which the needle bar is located, a revolving looper, the axis of which is in alinement with the axis of the vibrating gate, a reciprocating element having a cam, a projection on the needle bar engaging the cam, power means, and a connection between the power means and the element to reciprocate the needle bar, the cam and projection causing the same determinate point of the needle to be met by the hook of the looper irrespective of the vertical plane of movement of the needle bar.

16. In a sewing machine, the combination with a needle bar carrying a needle, a pivoted gate in which the needle bar is mounted, a sleeve, means for reciprocating the sleeve, a projection extending from and fixed to the needle bar and bearing on the sleeve, a rotary looper, and means between the needle bar and sleeve for causing the same determinate point of the needle to be met by the hook of the looper irrespective of the vertical plane of movement of the needle bar, the projection retaining said means and the sleeve in coöperative relationship.

17. In a sewing machine, the combination with a needle bar carrying a needle, a looper, means for reciprocating the needle bar vertically and horizontally, means acting on the needle bar to cause the needle and looper to occupy the same relative position in either lateral position of the needle bar, said means comprising a reciprocating element carrying a cam, and a sleeve having a projection engaging the cam and a projection which bears on the element to retain the latter and the sleeve in relation to each other, and power means for reciprocating the element.

18. In a sewing machine, the combination with a needle bar mounted in a swinging gate, a needle, a swinging gate, a rod on which the gate is mounted, a slidable element on the rod, a cam on the element, means for guiding the element, means for reciprocating the element on the rod, a projection on the needle bar which engages the cam, a second projection extending from the needle bar and bearing on the element to retain

said first mentioned projection and the cam in relationship, a looper and means for horizontally vibrating the needle bar, the cam causing the same determinate point of the needle to be met by the hook of the looper irrespective of the vertical plane of movement of the needle bar.

19. A sewing machine including a needle bar, a needle carried thereby, a looper, a cam for imparting a vertical reciprocating movement to the needle, and means for laterally vibrating the needle bar, said cam being arranged to avoid influencing the needle-bar for a definite time when said bar is in a certain path of vertical reciprocation.

20. In a sewing machine, the combination with a work support, a looper, a reciprocating needle bar, a gate in which the needle bar reciprocates, means for reciprocating the needle bar, means for laterally vibrating the gate compensating mechanism comprising two reciprocating elements one of which is operatively connected with the needle bar and the other said element being adjacent thereto and coöperating with the one connected to the needle bar, the two elements at one point of the reciprocation of the needle bar being connected and in another position of said needle bar being disconnected for a determined period, one of said elements being connected to and positively driven by the reciprocating means, the two elements causing the needle to be projected the same uniform distance beyond the work support and toward the looper, irrespective of the lateral position of the needle bar to form loops of the needle thread of unifom size, the disconnection of the two elements causing the movement of the needle to be delayed until the hook of the looper is adjacent the same.

21. In a sewing machine, the combination with a work support, a reciprocating and vibratory needle bar carrying a needle, means for vibrating the needle bar, a looper having a hook, means for causing the needle bar to be reciprocated to bring the end of the needle the same distance beyond the work support and in the same relation to the hook of the looper, irrespective of the vertical position of said needle bar, whereby to produce uniform size in the loops formed by the needle thread, and a cam operatively related to the needle bar to withdraw the needle at a different relative time in one lateral position of the needle bar than another.

22. In a sewing machine, the combination with a needle bar, a looper adapted to receive a bobbin and revolving in a horizontal path of movement and coöperating with the needle carried by the needle bar, a vertical shaft carrying the looper, gears for revolving the shaft and looper, a pivotally mounted frame supporting the shaft, and a catch for holding the looper in coöperating relationship with the needle, the pivotal frame permitting of the tilting of the looper from horizontal to vertical position to remove the bobbin.

23. In combination, a looper having a hook and operating in a definite path of movement, a needle bar carrying a needle, a projection on the needle bar, means for horizontally vibrating the needle bar, means including a cam having a definite path of movement for reciprocating the needle bar, a guide on which said means operates, the upper edge of the cam having a straight portion and its lower edge having a proud portion, the projection on the needle bar fitting between the straight and proud portions of the cam to cause the needle to be presented in the same position relative to the hook of the looper to form stitches of uniform size irrespective of the horizontal movement of the needle vibrating means.

24. In combination, a revolving looper having a hook, a vertical guide in alinement with the center of movement of the revolving looper, a slide having a definite path of travel in its reciprocation and mounted on the guide including a cam, a vibrating gate mounted on the guide, a reciprocating needle bar mounted in the gate, a projection on the needle bar which engages the cam, means for retaining the projection in proper relationship with the cam, said cam causing the upward movement of the needle bar to vary, but presents the needle to the hook of the looper in the same position irrespective of the horizontal position of the gate.

25. In combination, a revolving looper having a hook, a vertical guide in alinement with the center of movement of the revolving looper, a slide carrying a cam and having a definite path of travel in its reciprocation and mounted on the guide, a gate, a reciprocating needle bar mounted in the gate, a projection on the needle bar which engages the cam, means for retaining the projection in proper relationship with the cam, said cam causing the upward movement of the needle bar to vary, but presents the needle to the hook of the looper in the same position irrespective of the horizontal position of the gate, and means for removably mounting the guide.

26. In combination, a work support, a looper having a hook traveling in a horizontal plane of movement, a vibrating needle bar, means for vibrating the needle bar, means for reciprocating the needle bar, a projection on the needle bar, a cam with which the projection engages, a guide for the cam, a gate mounted on the cam guide, the cam causing the same length of stroke of the needle beyond the support and the same determinate point of the needle to be met by the hook of the looper irrespective

of the vertical plane of movement of the needle bar.

27. In a sewing machine, a work support, a rotary looper arranged to remain in the same center of rotation, means for laterally vibrating the needle bar, means for reciprocating the needle bar including means for projecting the same a definite distance beyond the work support to coöperate with the looper irrespective of the lateral position of said needle bar to form loops of uniform size from the needle thread, said reciprocating means also including an inclined way for returning the needle bar at different periods according to its lateral position.

28. In a sewing machine, the combination with a work support, a needle bar, a movable looper, means for laterally vibrating the needle bar, and means for reciprocating the needle bar including means for projecting a needle carried by the needle bar the same definite distance in each reciprocation beyond the work support and toward the looper irrespective of the lateral position of said needle bar to coöperate with the looper, said means also including means for returning the needle bar at different times according to its lateral position whereby to form loops of uniform size at each reciprocation of said needle bar.

29. In a sewing machine, the combination with a work support, a moving looper arranged to remain in the same center of movement, a reciprocating needle bar, a gate in which the needle bar reciprocates, means for laterally vibrating the gate, compensating mechanism coöperating with the needle bar to at all times drive the needle carried thereby the same uniform distance beyond the work support and toward the looper in either of its lateral positions and to vary the time of withdrawal of said needle away from the looper in the different paths of movement, whereby all the loops of the needle thread will be of uniform size.

30. In a sewing machine, the combination with a work support, a looper arranged to remain in the same center of movement, a needle bar carrying a needle, means for reciprocating said needle bar, means for changing the path of the reciprocation of the needle bar, and means including a cam and flange coöperating with the needle bar to project the latter the same uniform distance beyond the work support in either lateral position and to vary the dwell of the needle relative to the looper, whereby the needle is projected beyond the work support toward the looper the same uniform distance in either lateral position, and is maintained a greater length of time adjacent the looper in one position than in another.

31. In a sewing machine, the combination of a looper, a needle bar carrying a needle, means for changing the path of movement of the needle bar, power means for simultaneously operating the needle bar and looper, spaced flanges and a projection coöperating with the flanges intermediate the needle bar and the power means, the space between the flanges varying, whereby the continuous reciprocating movement of the needle bar in one determinate path of movement will be interrupted without affecting the movement of the looper.

32. In a sewing machine, the combination with a looper having a definite operative plane of movement, a needle bar carrying a needle, means for changing the path of reciprocation of the needle bar, power means, a flange coöperating with the power means to dispose the needle in the operative plane of the looper and a second flange coöperating with the power means and needle bar and located so as to be out of operative relation with said needle bar for a definite interval in a certain path of movement of said needle bar.

33. In a sewing machine, the combination with a work support, a vibrating gate, a reciprocating needle bar mounted in the vibrating gate, a needle, means for vibrating the gate, a revolving looper arranged to remain in the same center of rotation, a reciprocating element having flanges and moving in a continuous and predetermined path and located adjacent the needle bar, one of the flanges engaging a part of the needle bar to project the needle the same distance beyond the work support to form loops of the needle thread of the same size in either lateral position of the needle bar, and the other said flange engaging a part of the needle bar at a different point in one path of its reciprocation than in another to permit the hook of the looper to at all times meet the eye of the needle in the same relative position.

34. In a sewing machine, the combination of a work support, stitch forming mechanism including a reciprocating needle bar and rotative looper, means for laterally vibrating the needle bar, means operating on the needle bar for projecting the needle the same distance beyond the work support irrespective of its lateral position, and means whereby a longer time is required for returning the needle from its lowest point of thrust to the loop engaging position with the looper in one of its lateral positions than in the other, to cause the looper to engage the loops in the same relative position irrespective of the lateral position of said needle bar.

35. In a sewing machine, the combination of a work support, stitch forming mechanism including a reciprocating needle bar and looper, means for laterally vibrating the needle bar, and means coöperating with the needle bar for reciprocating the needle the

same distance beyond the work support irrespective of its lateral position, and for requiring a longer time for returning said needle from its lowest point of thrust to the loop engaging position with the looper in one of its lateral positions than in the other to form the needle thread in loops of uniform size and to cause the loop engaging position to always be the same.

36. In a sewing machine, stitching mechanism including a reciprocating needle bar and a rotative looper, means for laterally vibrating the needle bar, and means for reciprocating the needle bar, said last mentioned means varying the time required in one complete reciprocation of the needle bar with respect to the other lateral reciprocation of said needle bar, whereby to form loops of uniform size at each reciprocation of said needle bar.

37. In a sewing machine, stitching mechanism including a reciprocating needle bar and a rotative looper, means for laterally vibrating the needle bar, and means for reciprocating the needle bar, said means holding the needle bar at its limit of stroke toward the looper throughout time periods, said time varying according to the lateral position of the needle bar under the influence of the vibrating means.

In testimony whereof I affix my signature, in presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:
WM. F. PALMER,
ALONZO KNAPPEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."