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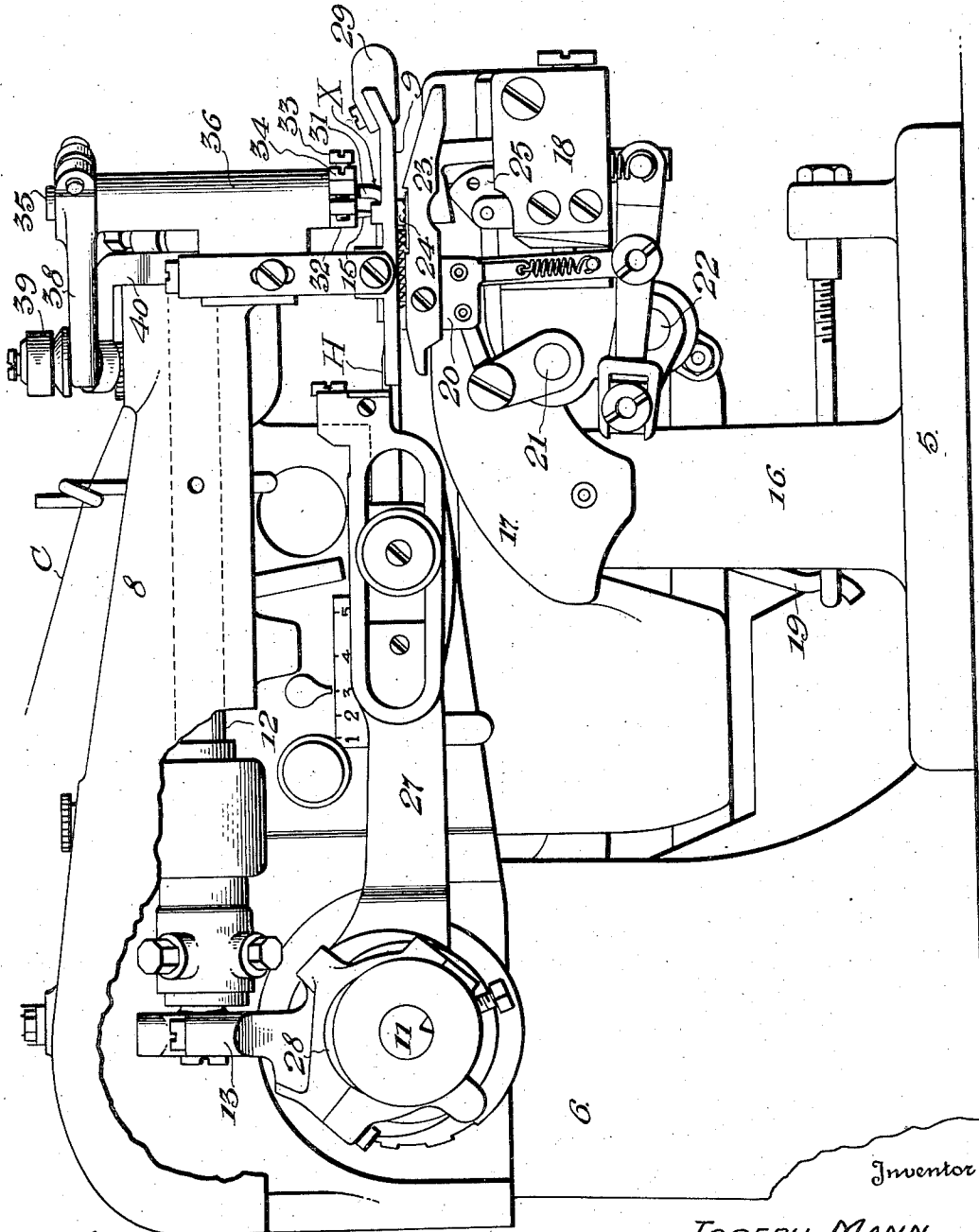
J. MANN

2,030,751

BLIND STITCH SEWING MACHINE

Filed Jan. 17, 1935

4 Sheets-Sheet 1



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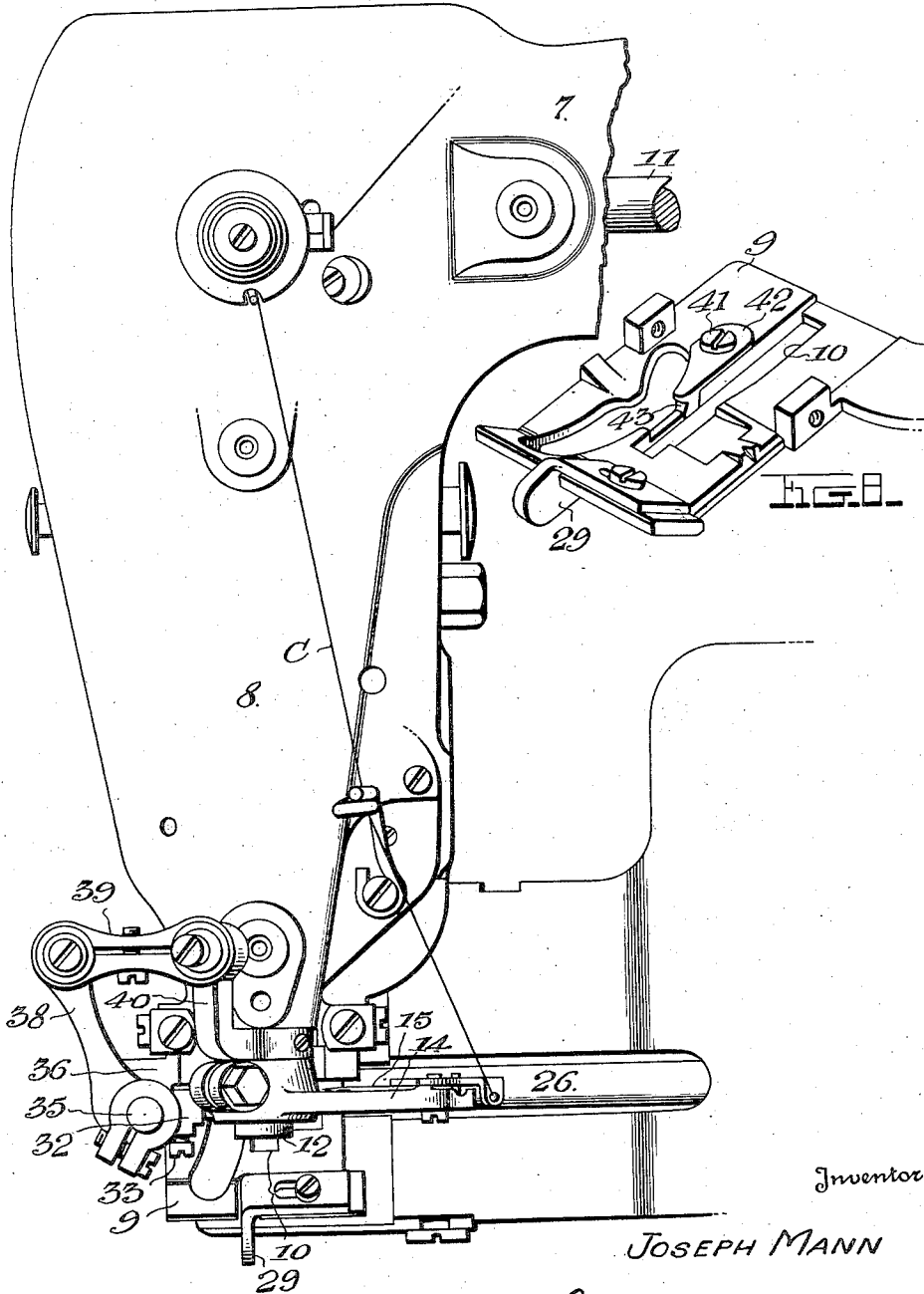
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BLIND STITCH SEWING MACHINE

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4 Sheets-Sheet 2

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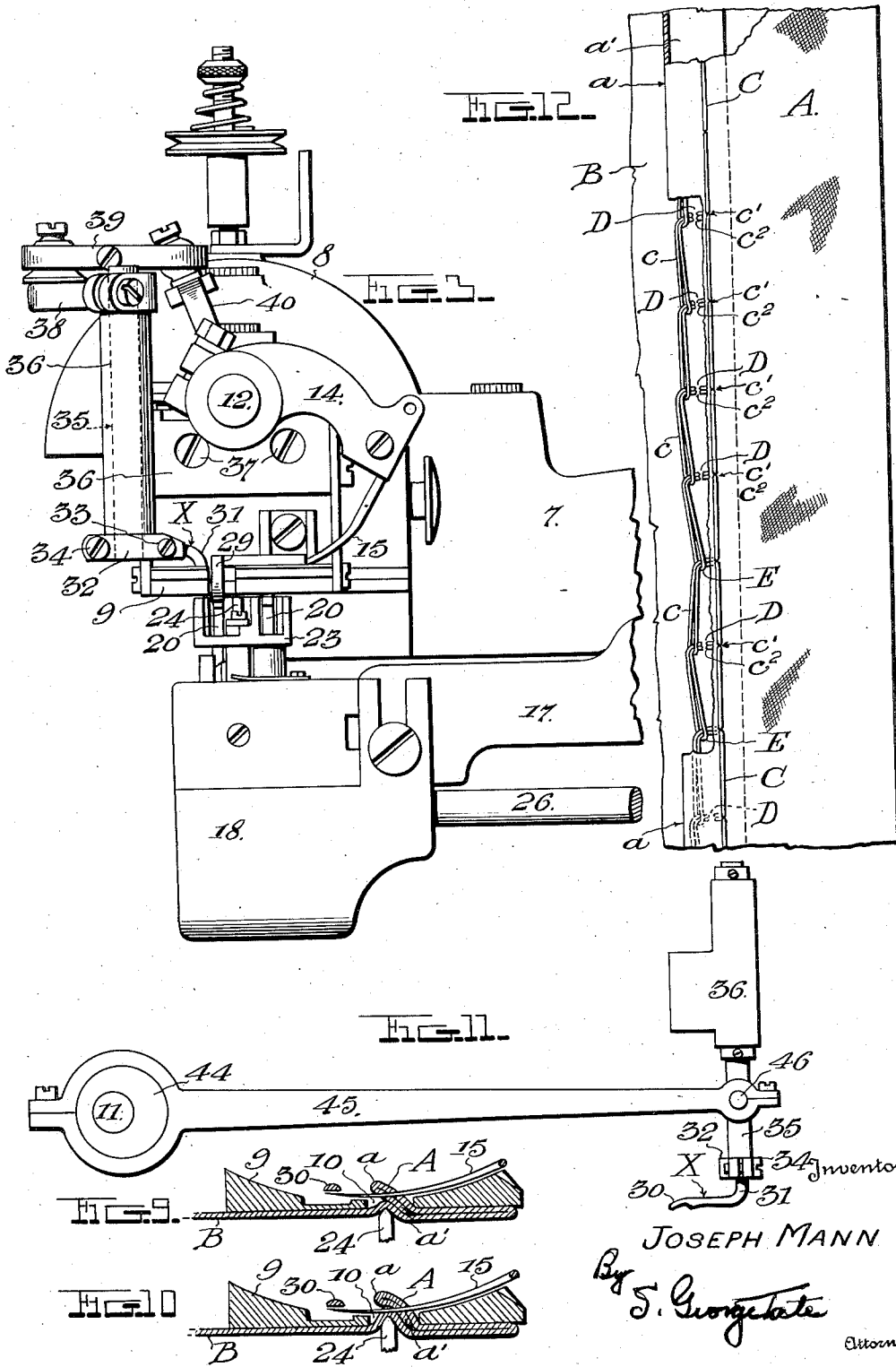
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BLIND STITCH SEWING MACHINE

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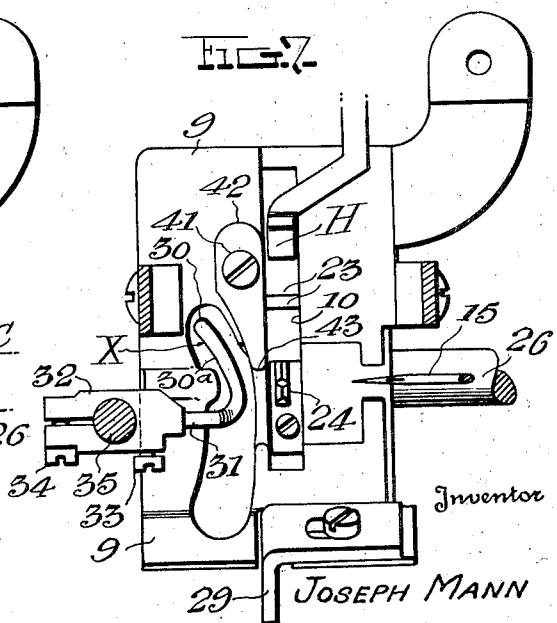
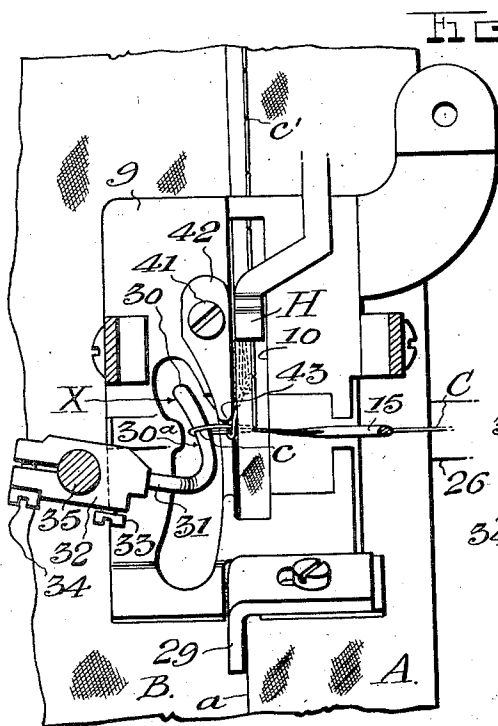
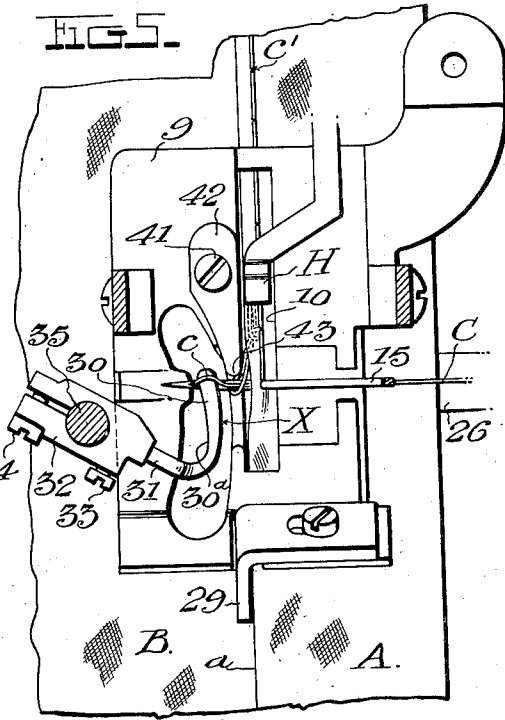
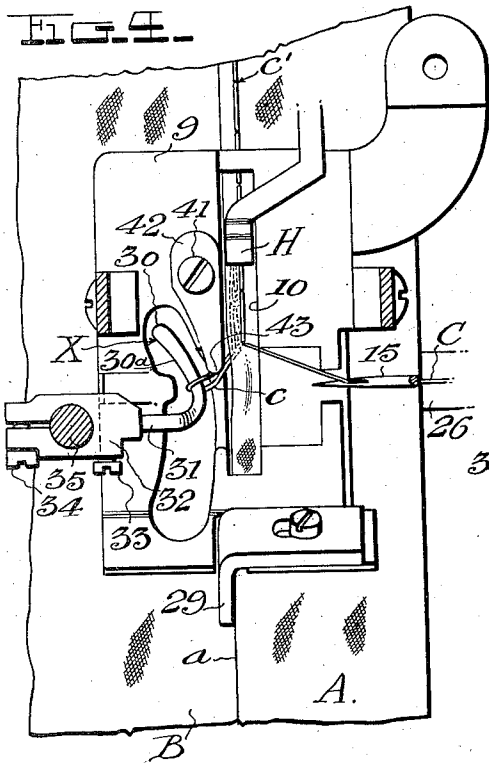
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2,030,751

BLIND STITCH SEWING MACHINE

Filed Jan. 17, 1935

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,030,751

BLIND STITCH SEWING MACHINE

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Application January 17, 1935, Serial No. 2,257

15 Claims. (Cl. 112—177)

This invention relates to new and useful improvements in blind stitch sewing machines generally, although more particularly to blind stitch sewing machines employed in hemming operations.

The principal object of the invention is to provide a blind stitch sewing machine of the single thread chain stitch type for seaming hems, by means of which a line of chain stitches will be formed to unite the hem fold to the body fabric, the connecting portions of the thread between adjacent needle loops being positioned in a straight line in parallelism with the inner edge of the hem and the enchainment loops being disposed under the inner edge of the hem and thereby concealed from view.

Another object of the invention is to provide a stitch forming mechanism of the type described wherein means are provided for insuring the needle entering its own loop on each penetrating movement of the needle.

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

In the drawings:—

Figure 1 is a left hand elevation of a sewing machine constructed in accordance with my invention,

Figure 2 is a partial top plan view of the left hand end of such machine,

Figure 3 is a front elevation thereof,

Figures 4, 5 and 6 are enlarged detail plan views of the presser foot, the fabric, and the stitch forming mechanism showing the needle and the cooperating non-threaded looper in different positions in a given cycle,

Figure 7 is a view similar to Figure 4 but with the fabric removed in order to better disclose the ridge forming element and the work clamp,

Figure 8 is a perspective view of the presser foot,

Figure 9 is an enlarged diagrammatic view illustrating the relative positions of the presser foot, the fabric, the needle, the cooperating looper, and the ridge forming element when the hem only is being stitched,

Figure 10 is a similar view but showing the ridge forming element in position when anchor stitches are being formed in the hem and body fabric,

Figure 11 is a detail view showing a modification of a driving connection between the looper and the main shaft, and

Figure 12 is an enlarged plan view of the hem seam constructed in accordance with my invention.

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

My invention is adapted especially for joining a hem A to a body fabric or base layer B by a line of blind stitches, as shown in Figure 12. The inner edge of the hem is indicated at *a*, and the hem may have an inturned edge portion *a'* if desired. A single needle thread C is employed to form a line of chain stitches and the needle loops *c* are spaced equidistantly apart. These loops pass downwardly through the hem A at points *c'*, and the connecting portions of the thread between the loops are arranged in a straight line and in parallelism to the inner edge *a* of the hem. Certain of these needle loops enter and emerge from the upper face of the body fabric as indicated at *c²* to thereby form "anchor" stitches D which function to join the hem with the body fabric, while other needle loops miss the body fabric entirely to thereby form resultant "skip" stitches E. In the upper portion of Figure 12, I have illustrated a plurality of successively formed "anchor" stitches D, and in the lower portion of this figure, I have illustrated a plurality of alternately formed "anchor" stitches D and "skip" stitches E. It will be noted that the enchainment loops are all located between the hem and the body fabric and that they are concealed from view by the former. It will be understood that either all "anchor" stitches, or alternate "anchor" and "skip" stitches, or any combination thereof, may be employed in joining a hem to a body fabric.

The machine of my invention includes a base 5 having a standard 6 projecting upwardly from the rear right hand corner thereof, an arm 7 which extends laterally from the upper end of said standard, and an arm 8 which extends forwardly from the left hand end of the arm 7. Fixed to the free end of the arm 8 in the usual manner is a presser foot 9 having a centrally located and longitudinally extending opening 10 formed therein. Journaled in the laterally extending arm 7 is a main shaft 11 and journaled in the arm 8 is an oscillatory needle shaft 12 which is driven from the main shaft by a connection indicated generally at 13. The needle shaft 12 is disposed directly above the opening 10 in the foot, and fixed to the outer end of the shaft is a needle arm 14 carrying a curved needle 15. Thus when the needle shaft 12 is oscillated the

needle 15 will reciprocate transversely across the opening 10 in the presser foot. It will be noted at this time that the penetrating stroke of the needle 15, as viewed from the front of the machine, is from right to left.

Rigid with the base 5 is a post 16 which is located in a plane in advance of the standard 6 and pivotally supported on the upper end of this post is a work support 17 having a lateral extension 18 which projects under the presser foot 9, the work support 17 being yieldably held against depression by a spring 19.

The mechanism employed for presenting the work to the needle, is substantially identical with that shown in the application of Charles W. Mueller, filed Jan. 17, 1934, Serial No. 707,029, for improvements in Blind stitch sewing machines; and a general description thereof will be sufficient to a clear understanding of my invention. A lower 4-motion feed dog 20 cooperates with the lower face of the presser foot to intermittently feed the work to the needle. This feed dog is actuated from the rock shafts 21, 22 which are journaled on the work support 17 and are driven by suitable connections from the main shaft 11. A vertically yieldable work clamp 23 is also mounted on the work support and cooperates with the lower face of the foot to clamp the work against the thrust of the needle. Also mounted on the work support is a vertically reciprocatory ridge forming element or plunger 24 which is actuated by an oscillatory cam 25, the latter being connected to a cam shaft 26 journaled on the work support and driven by suitable connections from the main shaft, as shown and described in said Mueller application. These driving connections are such that normally the plunger 24 rises to the same height during successive cycles, thereby insuring the formation of successive "anchor" stitches D, as shown in Figure 9. These driving connections, however, include a manual control means whereby the plunger will rise to a lesser height during alternate cycles, thereby insuring the formation of alternate "anchor" and "skip" stitches D, E respectively, as shown in Figs. 9 and 10. An upper feed dog H, which operates in the opening 10 of the foot in rear of the needle path and cooperates with the work clamp 23 to engage the hem and feed the work rearwardly, is fixed to the front end of a feed lever 27 pivoted on the needle arm 8, the rear end of the lever being eccentric-connected as at 28 to the main shaft 11. An edge guide 29 for the inner edge *a* of the hem A, is attached to the front end of the foot 9 and is disposed in substantial alinement with the left hand wall of the presser foot opening 10.

In order to form the line of single thread chain stitches, I employ a complemental stitch forming mechanism which cooperates with the needle and includes a loop taker X. As shown in the accompanying drawings, this loop taker X is in the form of a non-thread carrying looper having an arcuate beak 30 and an attaching shank 31, the latter being secured to a holder 32 by a clamp screw 33. The holder 32 is clamped by a screw 34 to the lower end of a vertically disposed rock shaft 35 which is journaled in a bracket 36 attached to the forward end of the frame arm 8 by screws 37, the shaft 35 and the loop taker X being located above the presser foot 9 and at the left of the opening 10 therein. The shaft 35 is also disposed in front of the vertical plane containing the path of needle reciprocations. The beak 30 of the loop taker X extends rearwardly relative to the shank 31 and oscillates in a horizontal

plane above the needle 15. The inner edge 30*a* of the looper beak 30 is concentric to the axis of the shaft 35. Fixed to the upper end of the looper shaft 35 is a rearwardly extending rock arm 38 and pivotally connected to the rear end of this rock arm 38 is one end of a link 39, the other end of said link being pivotally connected to the upper end of a rock arm 40 fixed to the needle shaft 12 directly in rear of the needle arm 14. Thus when the needle shaft 12 oscillates, the looper X will oscillate in timed relation thereto. Fixed to the presser foot 9 by a screw 41 is a looper abutment 42. This abutment is located intermediate the looper X and the left wall of the presser foot opening 10, and the forward end 43 of this abutment is located at a point slightly in rear of the vertical plane containing the path of needle travel.

Instead of oscillating the looper shaft 35 by the mechanism described above, I may employ the construction shown in Figure 11 wherein a driving eccentric 44 is fixed to the main shaft 11 and an eccentric strap 45 has its rear end engaged with the eccentric 44 and its front end connected to a rock arm 46 fixed to the looper shaft 35.

In operation, the machine is loaded in the usual manner by first lowering the work support and inserting the body fabric and hem under the presser foot with the inner edge *a* of the hem alined with the hem guide 29. It will be observed in this connection that the body fabric extends to the left of the machine and that the hem is formed by folding the right hand edge of the fabric over the body fabric thereby insuring the needle entering the upper surface of the hem and having its penetrating or forward movement in a direction toward the inner edge *a* of the hem. Assuming that the driving connections for the plunger 24 have been manually controlled for forming successive "anchor" stitches D, the needle on its forward or penetrating stroke will enter the upper surface of the hem A at a point spaced from the inner edge *a* thereof. The needle will then emerge from the lower face of the hem and then enter and emerge from the upper face of the body fabric as shown in Figure 10. The point where the needle enters and emerges from the body fabric is under the hem and in spaced relation to the inner edge *a* thereof. As the needle begins to recede it casts out the usual needle thread loop and the beak 30 of the looper X will enter said needle thread loop as shown in Figure 5. As soon as the needle point withdraws from the hem, the fabric is fed by the feeding mechanism a stitch length distance and during this feed stroke the needle thread loop which is around the looper X is fed rearwardly against the forward end 43 of the abutment 42 which functions to maintain the needle loop in open relation and in the proper position to be entered by the needle on its next forward stroke. By reason of the shaft 35 being located in advance of the vertical plane containing the path of needle reciprocations and the inner edge of the looper being concentric to the axis of the shaft, the beak of the looper will hold the needle thread loop against slipping off the point of the looper until after the needle has entered said loop. As soon as the needle has entered this needle thread loop the looper X withdraws from said loop, and as a result the enchainment of needle thread loops will lie in a straight line under the hem and in spaced relation to the inner edge *a* thereof. Thus by my invention, I am enabled to join a hem to a body fabric with a line of

chain stitches wherein the connecting portions of the threads between adjacent needle loops will be positioned in a straight line in parallelism with the inner edge of the hem and the enchain loops will be disposed under the inner edge of the hem and thereby concealed from view.

It will be noted that the frame includes a forwardly extending arm 8; that the main shaft 11 is journaled in the frame in rear of said arm 8; that the axis of the needle shaft 12 is in parallelism with the major axis of the presser foot opening 10, and that the vertical looper shaft 35 is oscillated from the main shaft in timed relation to the needle reciprocations.

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

I claim:—

1. In a single thread blind stitch sewing machine, the combination with a frame including a standard and a laterally extending arm supported thereby, of a presser foot mounted on said arm and having an opening, a threaded needle mounted on the arm above the foot for reciprocations transversely across the presser foot opening, a ridge forming element for projecting a ridge of fabric upwardly through the opening into needle penetrating position, means for intermittently feeding the fabric to the needle, and a non-threaded loop taker supported on the arm and located above the foot and operating entirely on that side of the ridge forming element opposite the point of needle penetration in the fabric for engaging the needle thread loop and holding the same for re-entrance by the needle.

2. In a single thread blind stitch sewing machine, the combination with a frame including a standard and a laterally extending arm supported thereby, of a presser foot mounted on said arm and having an opening, a threaded needle mounted on the arm above the foot for reciprocations transversely across the presser foot opening, a ridge forming element for projecting a ridge of fabric upwardly through the opening into needle penetrating position, means for intermittently feeding the fabric to the needle, and a non-threaded loop taker supported on the arm and located above the foot and operating entirely on that side of the ridge forming element opposite the point of needle penetration in the fabric for engaging the needle thread loop and holding the same for re-entrance by the needle, said loop taker being supported for oscillatory movements about a vertical axis and including a curved beak movable in a horizontal plane.

3. In a single thread blind stitch sewing machine, the combination with a frame including a standard and a laterally extending arm supported thereby, of a presser foot mounted on said arm and having an opening, a threaded needle mounted on the arm above the foot for reciprocations transversely across the presser foot opening, a ridge forming element for projecting a ridge of fabric upwardly through the opening into needle penetrating position, means for intermittently feeding the fabric to the needle, and a non-threaded loop taker supported on the arm and located above the foot and operating entirely on that side of the ridge forming element opposite the point of needle penetration in the fabric for engaging the needle thread loop and holding the same for re-entrance by the needle, said loop taker being supported for oscillatory movements about a vertical axis located in ad-

vance of the vertical plane containing the path of needle reciprocations and including a rearwardly extending curved beak movable in a horizontal plane above the needle.

4. In a single thread blind stitch sewing machine, the combination with a presser foot having an opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, a ridge forming element for projecting a ridge of fabric upwardly through the opening into needle penetrating position, means for intermittently feeding the fabric to the needle, a non-threaded loop taker located above the foot and operating entirely on one side of the ridge forming element opposite the point of needle penetration in the fabric for engaging the needle thread loop and holding the same for re-entrance by the needle, and an abutment on the foot between the loop taker and the ridge forming element for retaining the needle loop extending around the loop taker in position for re-entrance by the needle.

5. In a single thread blind stitch sewing machine, the combination with a presser foot having an opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, a ridge forming element for projecting a ridge of fabric upwardly through the opening into needle penetrating position, means for intermittently feeding the fabric to the needle, a non-threaded loop taker located above the foot and operating entirely on one side of the ridge forming element opposite the point of needle penetration in the fabric for engaging the needle thread loop and holding the same for re-entrance by the needle, said loop taker being supported for oscillatory movements about a vertical axis and including a curved beak movable in a horizontal plane, and an abutment on the foot between the loop taker and the ridge forming element for retaining the needle loop extending around the loop taker in position for re-entrance by the needle.

6. In a single thread blind stitch sewing machine, the combination with a presser foot having an opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, a ridge forming element for projecting a ridge of fabric upwardly through the opening into needle penetrating position, means for intermittently feeding the fabric to the needle, a non-threaded loop taker located above the foot and operating entirely on one side of the ridge forming element opposite the point of needle penetration in the fabric for engaging the needle thread loop and holding the same for re-entrance by the needle, said loop taker being supported for oscillatory movements about a vertical axis located in advance of the vertical plane containing the path of needle reciprocations and including a rearwardly extending curved beak movable in a horizontal plane above the needle, and an abutment on the foot between the loop taker and the ridge forming element for retaining the needle loop extending around the loop taker in position for re-entrance by the needle.

7. In a single thread blind stitch sewing machine, the combination with a presser foot having an opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, a ridge forming element for projecting a ridge of fabric upwardly through the opening into needle penetrating position, means for intermittently feeding the fab-

ric to the needle, a non-threaded loop taker located above the foot and operating entirely on one side of the ridge forming element opposite the point of needle penetration in the fabric and entirely above the path of the needle for engaging the needle thread loop and holding the same for re-entrance by the needle, and an abutment on the foot between the loop taker and the ridge forming element for retaining the needle loop extending around the loop taker in position for re-entrance by the needle.

8. In a single thread blind stitch sewing machine for joining a hem to a body fabric, the combination with a horizontal presser foot having a longitudinally extending opening therein, a hem guide mounted on the front end of the foot in substantial alinement with the left wall of the presser foot opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, the penetrating stroke of the needle being towards the left wall of the presser foot opening, a ridge forming element for projecting a ridge of body fabric and the hem upwardly through the opening into needle penetrating position whereby the needle will pass first through the hem and then enter and emerge from the body fabric, means for feeding the fabric rearwardly to the needle, a movable non-threaded loop taker located above the foot and operating entirely on the left side of the ridge forming element for engaging the needle thread loop and holding the same for re-entrance by the needle, and means for moving said loop taker in timed relation to the needle reciprocations.

9. In a single thread blind stitch sewing machine for joining a hem to a body fabric, the combination with a horizontal presser foot having a longitudinally extending opening therein, a hem guide mounted on the front end of the foot in substantial alinement with the left wall of the presser foot opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, the penetrating stroke of the needle being towards the left wall of the presser foot opening, a ridge forming element for projecting a ridge of body fabric and the hem upwardly through the opening into needle penetrating position whereby the needle will pass first through the hem and then enter and emerge from the body fabric, means for feeding the fabric rearwardly to the needle, a movable non-threaded loop taker located above the foot and operating entirely on the left side of the ridge forming element for engaging the needle thread loop and holding the same for re-entrance by the needle, an abutment located on the foot in rear of the path of needle travel and between the loop taker and the ridge forming element for retaining the needle loop extending around the loop taker in position for re-entrance by the needle, and means for moving said loop taker in timed relation to the needle reciprocations.

10. In a single thread blind stitch sewing machine for joining a hem to a body fabric, the combination with a horizontal presser foot having a longitudinally extending opening therein, a hem guide mounted on the front end of the foot in substantial alinement with the left wall of the presser foot opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, the penetrating stroke of the needle being towards the left wall of the presser foot opening, a ridge forming element for projecting a ridge of body

fabric and the hem upwardly through the opening into needle penetrating position whereby the needle will pass first through the hem and then enter and emerge from the body fabric, means for feeding the fabric rearwardly to the needle, a movable non-threaded loop taker located above the foot and operating entirely on the left side of the ridge forming element for engaging the needle thread loop and holding the same for re-entrance by the needle, said loop taker being supported for oscillatory movements about a vertical axis and including a curved beak movable in a horizontal plane, and means for moving said loop taker in timed relation to the needle reciprocations.

11. In a single thread blind stitch sewing machine for joining a hem to a body fabric, the combination with a horizontal presser foot having a longitudinally extending opening therein, a hem guide mounted on the front end of the foot in substantial alinement with the left wall of the presser foot opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, the penetrating stroke of the needle being towards the left wall of the presser foot opening, a ridge forming element for projecting a ridge of body fabric and the hem upwardly through the opening into needle penetrating position whereby the needle will pass first through the hem and then enter and emerge from the body fabric, means for feeding the fabric rearwardly to the needle a movable non-threaded loop taker located above the foot and operating entirely on the left side of the ridge forming element for engaging the needle thread loop and holding the same for re-entrance by the needle, said loop taker being supported for oscillatory movements about a vertical axis located in advance of the vertical plane containing the path of needle reciprocations and including a rearwardly extending curved beak movable in a horizontal plane above the needle, and means for moving said loop taker in timed relation to the needle reciprocations.

12. In a single thread blind stitch sewing machine for joining a hem to a body fabric, the combination with a horizontal presser foot having a longitudinally extending opening therein, a hem guide mounted on the front end of the foot in substantial alinement with the left wall of the presser foot opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, the penetrating stroke of the needle being towards the left wall of the presser foot opening, a ridge forming element for projecting a ridge of body fabric and the hem upwardly through the opening into needle penetrating position whereby the needle will pass first through the hem and then enter and emerge from the body fabric, means for feeding the fabric rearwardly to the needle, a movable non-threaded loop taker located above the foot and operating entirely on the left side of the ridge forming element for engaging the needle thread loop and holding the same for re-entrance by the needle, said loop taker being supported for oscillatory movements about a vertical axis and including a curved beak movable in a horizontal plane, an abutment located on the foot in rear of the path of needle travel and between the loop taker and the ridge forming element for retaining the needle loop extending around the loop taker in position for re-entrance by the needle, and means for moving said loop taker in timed relation to the needle reciprocations.

13. In a single thread blind stitch sewing machine for joining a hem to a body fabric, the combination with a horizontal presser foot having a longitudinally extending opening therein, a hem guide mounted on the front end of the foot in substantial alinement with the left wall of the presser foot opening, of a threaded needle mounted above the foot for reciprocations transversely across the presser foot opening, the penetrating stroke of the needle being towards the left wall of the presser foot opening, a ridge forming element for projecting a ridge of body fabric and the hem upwardly through the opening into needle penetrating position whereby the needle will pass first through the hem and then enter and emerge from the body fabric, means for feeding the fabric rearwardly to the needle, a movable non-threaded loop taker located above the foot and operating entirely on the left side of the ridge forming element for engaging the needle thread loop and holding the same for re-entrance by the needle, said loop taker being supported for oscillatory movements about a vertical axis located in advance of the vertical plane containing the path of needle reciprocations and including a rearwardly extending curved beak movable in a horizontal plane above the needle, an abutment located on the foot in rear of the path of needle travel and between the loop taker and the ridge forming element for retaining the needle loop extending around the loop taker in position for re-entrance by the needle, and means for moving said loop taker in timed relation to the needle reciprocations.

14. In a single thread blind stitch sewing machine, the combination with a frame including a base and a forwardly extending arm, of a horizontal presser foot fixed to the forward end of said arm and having a longitudinally extending opening, a work support located under the foot, a main shaft journaled in the frame in rear of the forwardly extending arm, an oscillatory needle shaft journaled in the forwardly extending arm and having its axis in parallelism with the major axis of the presser foot opening, a needle arm fixed to the forward end of the needle shaft, a threaded needle fixed to said needle arm for re-

ciprocations entirely above and across the presser foot opening, a ridge forming element mounted on the work support for projecting a ridge of fabric upwardly through the presser foot opening into needle penetrating position, means for feeding the work rearwardly to the needle, a vertically disposed rock shaft supported on the forward end of said forwardly extending frame arm, a non-threaded loop taker fixed to the lower end of the rock shaft for engaging the needle loop and holding the same for re-entrance by the needle, and actuating connections between said rock shaft and the main shaft for oscillating the former in timed relation to the needle reciprocations.

15. In a single thread blind stitch sewing machine, the combination with a frame including a base and a forwardly extending arm, of a horizontal presser foot fixed to the forward end of said arm and having a longitudinally extending opening, a work support located under the foot, a main shaft journaled in the frame in rear of the forwardly extending arm, an oscillatory needle shaft journaled in the forwardly extending arm and having its axis in parallelism with the major axis of the presser foot opening, a needle arm fixed to the forward end of the needle shaft, a threaded needle fixed to said needle arm for reciprocations entirely above and across the presser foot opening, a ridge forming element mounted on the work support for projecting a ridge of fabric upwardly through the presser foot opening into needle penetrating position, means for feeding the work rearwardly to the needle, a vertically disposed rock shaft supported on the forward end of said forwardly extending frame arm, a non-threaded loop taker fixed to the lower end of the rock shaft for engaging the needle loop and holding the same for re-entrance by the needle, actuating connections between said rock shaft and the main shaft for oscillating the former in timed relation to the needle reciprocations, and an abutment on the foot between the loop taker and the ridge forming element for retaining the needle loop extending around the loop taker in position for re-entrance by the needle.

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