

May 30, 1944.

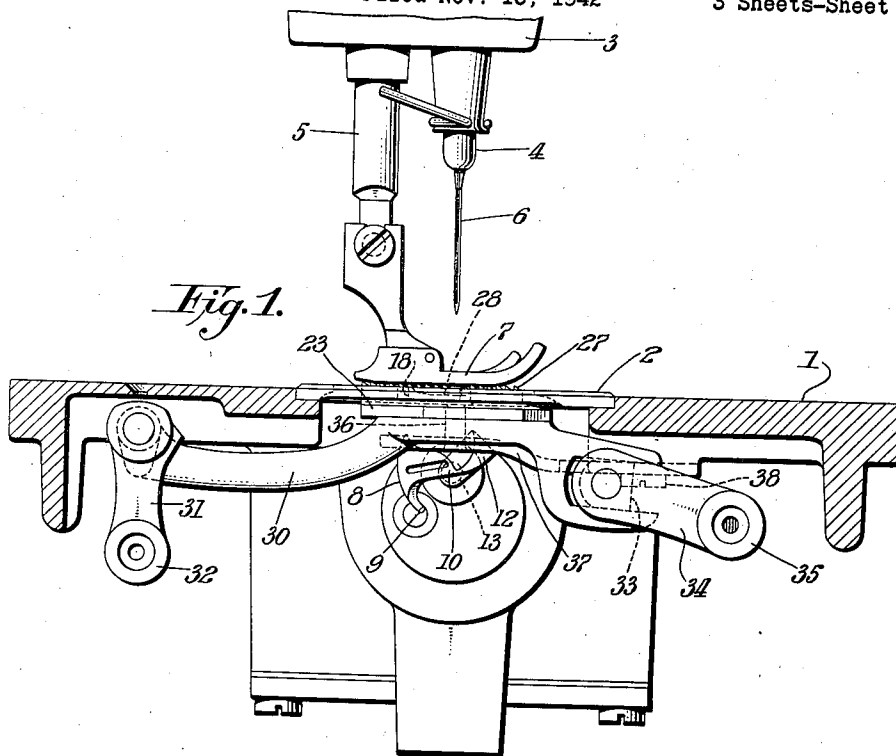
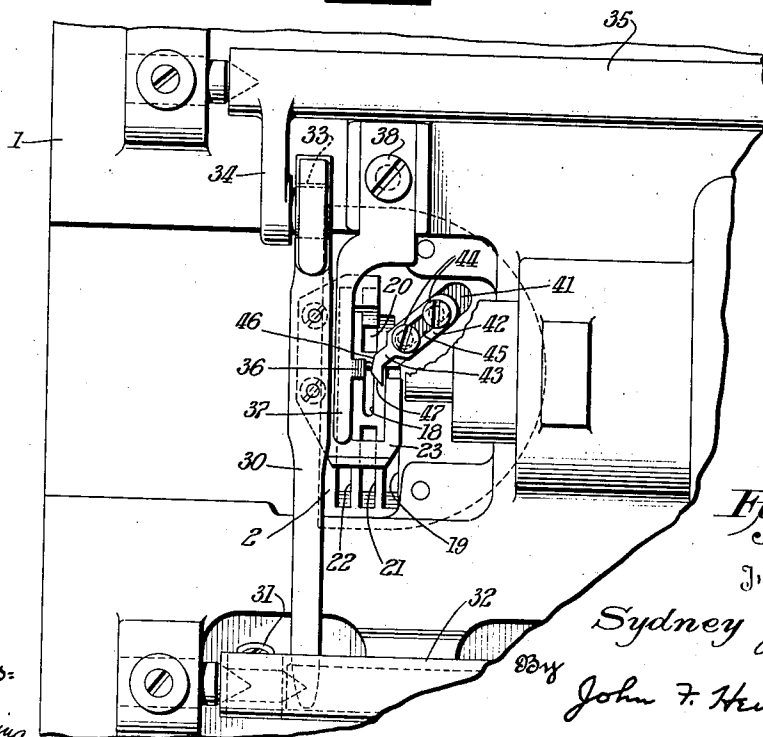
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2,350,267

SEWING MACHINE FOR CORNER STITCHING

Filed Nov. 13, 1942

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

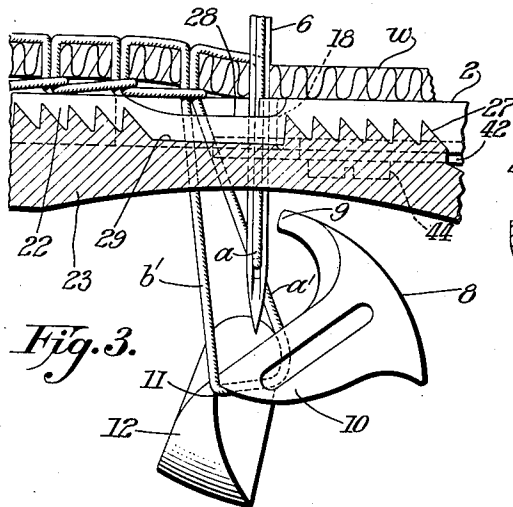


Fig. 3.

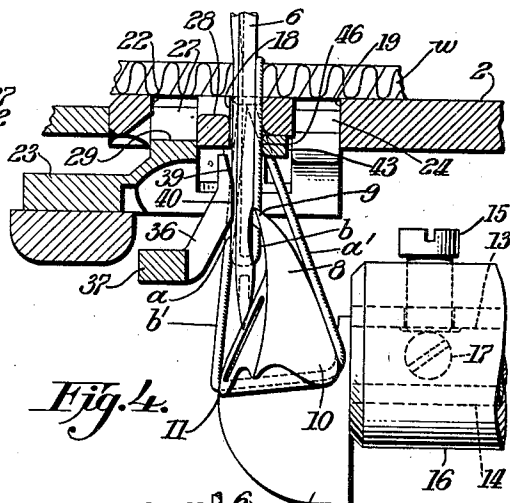


Fig. 4.

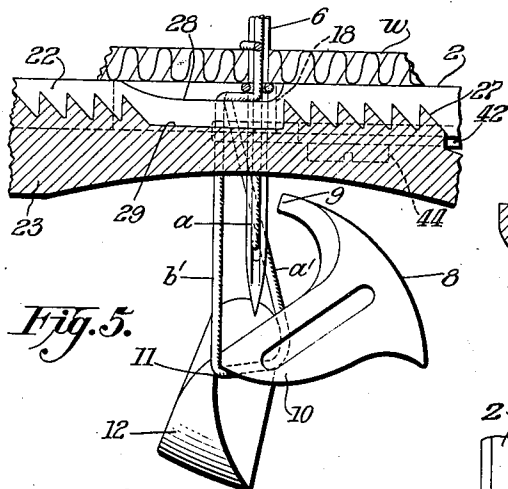


Fig. 5.

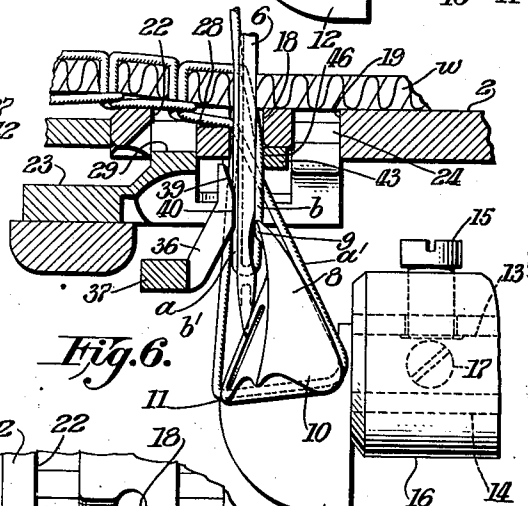


Fig. 6.

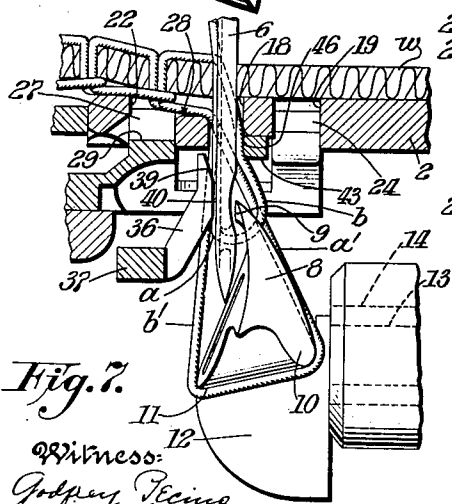


Fig. 7.

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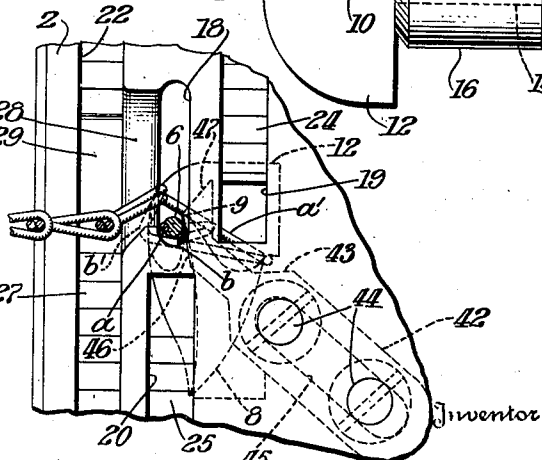


Fig. 8.

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3 Sheets-Sheet 3

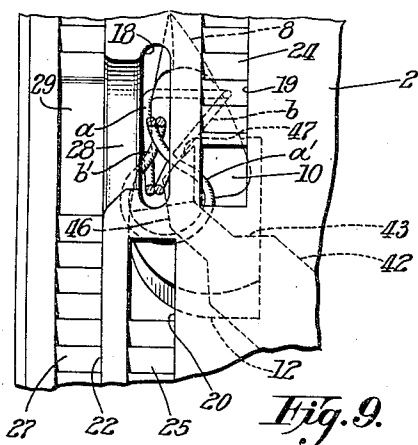
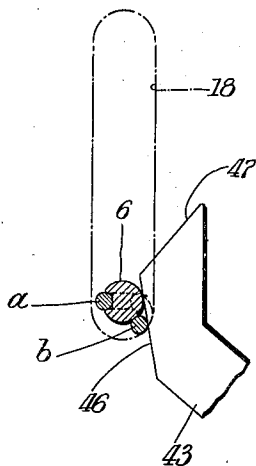


Fig. 10.

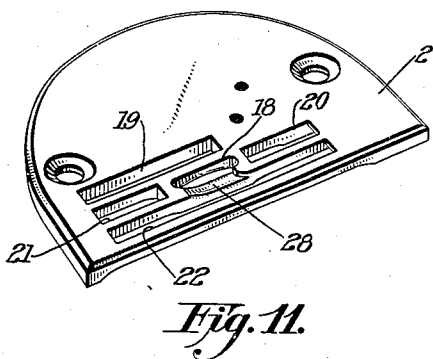


Fig. 11.

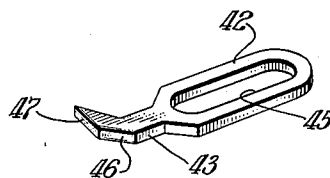


Fig. 12.

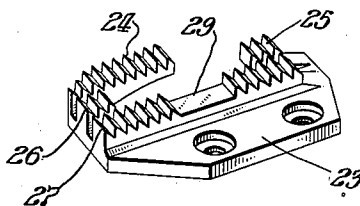


Fig. 13.

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UNITED STATES PATENT OFFICE

2,350,267

SEWING MACHINE FOR CORNER
STITCHING

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Application November 13, 1942, Serial No. 465,415

17 Claims. (Cl. 112—197)

This invention relates to sewing machines and more particularly to sewing machines employed for producing angular or corner seams, i. e., for producing stitched seams in which a line of stitches continues about a sharp corner into another line of stitches.

In employing sewing machines for making angular seams, as for example substantially right-angled seams, it has been heretofore the common practice to position the needle in the work, after stopping the machine, so as to turn the work about the needle after the looper or loop-taker has seized the needle-thread loop. This procedure was necessitated by the fact that the turning of the work about the needle resulted in also wrapping about the needle the work-limb of the needle-thread loop extending from the needle-eye and anchored to the work; whereby the needle failed properly to present the needle-thread loop for entrance by the looper or loop-taker.

In employing chain-stitch sewing machines for making angular seams, an additional difficulty heretofore existing arose from the fact that, when the work was turned about the needle, the thread-loop previously seized by the looper or held spread by the looper was bent about a side edge of the needle-slot in the work-support, thereby tensioning the thread-loop sufficiently to result in thread-breakage, or in stealing thread from the supply and thus making a loose stitch, or in buckling of the work.

The present invention has for its primary object to provide a sewing machine with means whereby the above mentioned difficulties are eliminated when the work is turned about the needle in any work-penetrant position of the needle beyond the needle-eye, thereby substantially to increase production and the quality of the product.

With this and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts described in connection with the accompanying drawings which illustrate a preferred embodiment of the invention and in which:

Fig. 1 is a front end elevation of a chain-stitch sewing machine containing the present improvement, the bed-plate being shown in vertical section and the bracket-arm being partly broken away. Fig. 2 is a bottom plan view of a portion of the machine in the region of the needle, the looper being broken away to expose the thread-positioning member. Fig. 3 is an enlarged end elevation, partly in vertical section, of the stitch-forming and work-feeding instrumentalities,

with the needle in substantially its lowest position while in the work; the feed-dog being sectioned longitudinally of the left hand row of the teeth thereof and the work being sectioned in the line of seam formation. Fig. 4 is a front side elevation, partly in vertical section, of the stitch-forming instrumentalities in the position thereof illustrated in Fig. 3; the section being taken substantially through the needle path of reciprocation crosswise of the line of feed. Fig. 5 is a view similar to Fig. 3, but with the work turned 90° to the left about the needle. Fig. 6 is a view corresponding to Fig. 4, but with the work turned about the needle as in Fig. 5. Fig. 7 is a view corresponding to Fig. 6, but in an upstroke position of the needle in which the work-limb of the needle-thread loop is bowed outwardly and entered by the looper. Fig. 8 is a top plan view of the mechanism as illustrated in Fig. 7; the needle being shown in section and the finished stitches being shown partly in section as disposed substantially normal to the line of seam formation. Fig. 9 is an enlarged fragmentary top-plan view of the work-support, feed-dog and looper, and illustrates the needle-thread loops (partly in section) in the loop-casting-off position of the looper. Fig. 10 is an enlarged fragmentary view in top plan of the needle-thread positioning member, with the needle and needle-thread shown in horizontal section, and the needle-slot of the work-support shown in dot-dash lines. Fig. 11 is a perspective view of the throat-plate. Fig. 12 is a perspective view of the needle-thread positioning member. Fig. 13 is a perspective view of the feed-dog.

The present invention is illustrated in the drawings as embodied in the single-thread chain-stitch sewing machine more completely disclosed in the pending patent application of S. Zonis et al., Serial No. 381,242, filed Mar. 1, 1941.

Referring to the drawings, the sewing machine in part shown has a frame including a bed-plate 1 provided with a throat-plate 2 which, in conjunction with the upper face of the bed-plate, forms a work-support. Overhanging the bed-plate 1 is a bracket-arm terminating at its free end in a head 3.

Journaled in the bracket-arm head 3 is an endwise vertically reciprocatory needle-bar 4 and an endwise vertically movable presser-bar 5. The needle-bar 4 carries at its lower end an eye-pointed needle 6, while the presser-bar 5 carries at its lower end a presser-foot 7; said presser-bar 5 being spring-depressed in any usual or suitable manner.

Complemental to the needle 6, below the work-

support and in the formation of single-thread chain-stitches, is a rotary wing-type looper 8 of conventional form. The looper 8, as usual, has a curved loop-seizing beak 9 merging into a loop-expanding body 10 which terminates in a transverse loop-detaining throat 11. Extending rearwardly beyond the throat 11 is a loop-twisting and spreading wing 12 for holding the seized and spread needle-thread loop in position for subsequent entrance by the beak 9 of the looper. The looper 8 has a shank-pin 13 entering an end bore of a rotary looper-shaft 14, to which shaft the shank-pin 13 is secured by a screw 15. The looper-shaft also carries the usual spacing collar 16, secured to the shaft by a screw 17 and disposed adjacent the looper. The looper-shaft 14 is journaled horizontally at the under side of the bed-plate 1 and is suitably driven to perform one rotation for each complete reciprocation of the needle.

The throat-plate 2 is provided with a needle-slot 18 which is elongated in the line of seam formation to extend rearwardly a substantial distance beyond the path of reciprocation of the needle 6; the needle having its path of reciprocation at the forward end of the needle-slot 18.

The throat-plate 2 is also provided with a plurality of feed-slots 19, 20, 21 and 22; the middle feed-slots 20 and 21 being aligned and respectively disposed forwardly and rearwardly of the needle-slot 18 in the line of seam formation. The feed-slot 19 is disposed at the right hand side of the needle-slot 18; said feed-slot beginning from adjacent the forward end of the needle-slot 18 and terminating at its rearward end adjacent the rearward end of the feed-slot 21. The feed-slot 22 is disposed at the left hand side of the needle-slot 18 and preferably extends from adjacent the forward end of the feed-slot 20 to adjacent the rearward end of the feed-slot 21.

Operating through the described throat-plate feed-slots is a feed-dog 23 which is opposed in the work-engaging movements thereof by the presser-foot 7. The feed-dog 23 has a right hand row of teeth 24 suitable to operate through the feed-slot 19; a middle front row of teeth 25 suitable to operate through the feed-slot 20; a middle rear row of teeth 26 suitable to operate through the rear feed-slot 21; and a left hand row of teeth 27 suitable to operate through the feed-slot 22.

The upper face of the throat-plate 2 is cut away or depressed between the needle-slot 18 and the feed-slot 22 to provide in the work-support a thread-clearance recess 28 which preferably begins slightly rearwardly of the forward end of said needle-slot; thereby to leave adequate support for the work adjacent the needle path. The edge defining the forward end of the recess 28 is preferably inclined forwardly toward the feed-slot 22; and the bottom wall of the recess 28 is gradually curved upwardly at the rearward end of said recess to merge gradually into the upper face of the throat-plate 2.

The left hand row of teeth 27 of the feed-dog 23 is also interrupted or cut away between the ends of the row to provide a thread-clearance depression or recess 29 adjacent to and forming a continuation of the throat-plate recess 28.

The feed-dog 23 is carried by a feed-bar 30 disposed below the work-support. The rearward end of the feed-bar 30 is pivotally connected to a feed-rocker 31 rising from a feed-advance rock-shaft 32 which may be supported and actuated in any usual or suitable manner,

The forward end of the feed-bar 30 is forked to slidably embrace a pivot-block 33 carried by a crank-arm 34 extending rearwardly from a feed-lift rock-shaft 35 which may likewise be supported and actuated in any usual or preferred manner in timed relation to the movements of the feed-advance rock-shaft 32 to impart intermittent work-advancing movements to the feed-dog 23.

In order to insure the requisite cooperation between the needle 6 and the looper 8, in the seizure of needle-thread loops by the looper, there is employed a needle-guide 36 bent upwardly from its shank 37; said shank 37 being attached by a screw 38 to the under side of the bed-plate 1. The needle-guide 36 has a needle-deflecting face 39 inclined downwardly to merge into a substantially vertical needle-abutment face 40 disposed at the long-groove side of the needle, i. e., the face 40 is disposed at the side of the needle opposite to that at which the looper 8 enters the needle-thread loops. Being disposed in close proximity to the path of needle-reciprocation, the face 40 of the needle-guide serves as an abutment inducing the opening of the needle-thread loops at the looper side of the needle, in the rising movement of the needle.

As is well understood in the art, the looper 8 enters the needle-thread loop *a, b* between the needle 6 and the needle-thread loop-limb *b* which is anchored in the work. This limb *b* of the needle-thread loop is therefore commonly termed the work-limb; while the other limb *a* of the needle-thread loop, at the opposite side of the needle is commonly termed the take-up limb, because it extends through the work to the needle-thread take-up (not shown).

The throat-plate 2 is recessed in its under face and at the looper-beak side of the needle-path to form a seat 41 for the shank 42 of an endwise adjustable needle-guiding and thread-loop positioning member 43; said member 43 being attached in set position to the throat-plate 2 by screws 44 passing through a slot 45 formed lengthwise in the shank 42. The parallel side edges of the seat 41, which confine the shank 42 to endwise adjustment, are inclined rearwardly at an angle of approximately 50° to the line of seam formation.

The member 43 extends in front of and across the throat-plate feed-slot 19 toward the path of needle reciprocation. Near its free end, the member 43 has a needle-guiding and thread-loop positioning edge 46 which is rearwardly inclined, preferably at an angle of approximately 10°, toward the line of seam formation. The edge 46 of the member 43 extends partly across the throat-plate needle-slot 18 and slightly past the needle-path in close proximity to said path at the needle-thread-loop work-limb side of said path, whereby said edge 46 is disposed substantially tangential to the needle 6 rearwardly of said work-limb *b* of the needle-thread loop in any work-penetrant positions of said needle beyond the needle-eye. The edge 46 preferably terminates at its rearward end substantially in the plane containing the line of seam formation and the path of needle-reciprocation. By endwise adjustment of the member 43, the edge 46 thereof may be shifted laterally toward and from the path of needle-reciprocation in a direction inclined to the length of the needle-slot 18 of the throat-plate 2.

Merging into the rearward end of the thread-loop positioning edge 46 is a thread-loop cast-

off edge 47 inclined rearwardly away from the line of seam formation at the edge 46 side of said line; the cast-off edge 47 is therefore disposed at the work-limb *b* side of the line of seam formation and is inclined in a direction oppositely to the direction of inclination of the edge 46.

As illustrated in Fig. 10 of the drawings, the inclined edge 46 of the member 43 functions to crowd the work-limb *b* of the needle-thread loop *a, b*, forwardly as the needle-eye passes said edge 46 during the descending or work-penetrating movement of the needle 6. As the needle 6 is held by the needle-guide 36 against deflection away from the edge 46, and as the edge 46 is substantially tangential to the needle-path directly to the rear of the work-limb *b*, said work-limb *b* is restrained by the complementary action of the needle 6 and the edge 46 from passing rearwardly therebetween in any work-penetrating position of the needle beyond the needle-eye.

This condition is particularly of advantage when the work is turned about the needle in the production of angular or corner seams, because the work-limb *b* is thereby restrained from wrapping about the needle 6 at any point below the member 43, whereby the work-limb *b* of the needle-thread loop will be properly opened out and presented for seizure by the looper. In other words, the present invention provides for turning the work about the needle for corner-stitching, in any work-penetrant position of the needle, because the work-limb will inevitably be crowded forwardly and positioned properly for seizure by the looper.

The stitch-formation is illustrated in Figs. 3 to 9 inclusive of the drawings. In Fig. 3, the work *w* is shown as being advanced in the line of seam formation; the needle 6 being shown at substantially the lower end of its stroke. The previously seized and spread thread-loop *a', b'* is held opened out rearwardly of the needle 6 by the throat 11 of the looper 8, and the beak 9 of the looper is shown approaching the needle. As it is essential that the thread-loop *a', b'* is at this time positioned to the rear of the needle, it is equally essential that the upper end of said thread-loop *a' b'* must have been free to move lengthwise of the throat-plate needle-slot 18 during the previous feeding movement of the work. As the needle 6 is out of the work during the feeding of the work, the present work-limb positioning device leaves the thread-loop *a' b'* free to advance rearwardly in the needle-slot 18 during said feeding of the work.

Fig. 4 of the drawings illustrates the same position of the parts as in Fig. 3, but as viewed from the front of the machine. It will be observed that the abutment face 40 of the needle-guide 36 is opposed to the needle-guiding and thread-positioning member 43, whereby the needle 6 is constrained to reciprocate in such close proximity to the member 43 as to insure against rearward movement of the work-limb *b* out of proper position for seizure by the looper 8.

In Figs. 5 and 6, the parts are in the same position as in Figs. 3 and 4, but the work has been turned approximately 90°, as in corner stitching. It will be observed from Fig. 6 that while the work-limb *b* of the needle-thread loop is partly wrapped about the needle 6 above the positioning member 43, as a result of the turning of the work about the needle 6, the portion

of said work-limb *b* below the member 43 remains in the position which, as shown by comparison with Fig. 4, is the same as before the work was turned.

Now when the needle begins to rise, as illustrated in Figs. 7 and 8, the work-limb *b* opens out in proper position for seizure by the looper-beak 9, even though the work has been turned 90° about the needle 6. This condition will obviously be obtained when the work is turned about the needle in any work-penetrant position of the needle. By thus eliminating any requirement to critically position the needle before turning the work, production is very substantially increased.

In chain-stitch sewing machines, such as the basting machine in which the present invention has been embodied and which are designed to make long stitches, the limbs *a' b'* of the thread-loop held spread by the looper are bent sharply about a side edge of the needle-slot 18 by turning the work about the needle. This is due to the fact that the length of the stitches is greater than the width of the needle-slot 18. By thus bending the thread-loop *a' b'* about the edge of the needle-slot 18 the thread-loop is likely to become sufficiently tensioned to result in skipping of stitches or in fact thread-breakage. This condition is to some extent aggravated by the thread holding action of the positioning member 43.

In accordance with the present invention, the described recesses 28 and 29 in the throat-plate and feed-dog, adjacent the needle-slot 18, provide sufficient thread-clearance to render negligible the tension imposed upon the thread when the work is turned to the left about the needle. This is clearly illustrated in Figs. 5 to 8 of the drawings, which show the upper ends of the loop-limbs *a', b'* as lying in the recesses 28 and 29. By thus easing the tension imposed upon the thread, there is less tendency for the work-limb *b* of the needle-thread loop to pass rearwardly between the needle 6 and the member 43 when turning the work about the needle.

When the thread-loop *a', b'* is cast off by the looper, the limb *a'* thereof underlies the cast-off edge 47 which is obtusely inclined to the thread-positioning edge 46 of the member 43. This position of the thread-loop *a', b'* is illustrated in Fig. 9 of the drawings. Owing to the relationship to each other of the edges 46 and 47, the thread-loop *a', b'* is free to be drawn up to the work to set the stitch, without incurring any liability of the thread-loop being snagged by the convergence corner of said edges.

Having thus set forth the nature of the invention what I claim herein is:

1. In a sewing machine adapted for producing angular stitched seams, in combination, a work-support having a needle-opening, an endwise reciprocatory eye-pointed needle operating through said needle-opening, means complementary to said needle in the formation of stitches, and a thread-positioning member disposed at the needle-thread-loop work-limb side and with respect to the path of reciprocation of said needle for coaction with the needle in blocking wrapping of the work-limb of the needle-thread-loop about the needle responsively to turning of the work in one direction about the needle.

2. In a sewing machine adapted for producing angular stitched seams, in combination, a work-support provided with a needle-slot elongated in the line of seam formation, work-feeding means

for advancing work rearwardly of said needle-slot, an endwise reciprocatory needle operating through the forward end portion of said needle-slot, said needle having a thread-receiving eye extending crosswise of said needle-slot, a rotary looper disposed below said work-support and having a loop-seizing beak and a loop-detaining wing constructed and arranged to enchain loops of thread presented by said needle, and means for restraining the work-limb of the needle-thread loop from wrapping rearwardly about the needle between the needle-eye and the work in any work-penetrant positions of the needle beyond the needle-eye and responsively to turning of the work about the needle, said means comprising a thread-positioning member complementary to said needle in blocking rearward movement of said work-limb.

3. In a sewing machine having a work-support provided with a needle-opening, work-feeding means, an endwise reciprocatory needle operating through said needle-opening and having a thread-receiving eye, and means complementary to said needle in the formation of stitches, the improvement which consists in the provision in the region of said work-support of a member having a substantially straight needle-thread positioning edge extending past the path of needle-reciprocation at the needle-thread-loop work-limb side of said path and at an angle inclined rearwardly toward the line of seam-formation, said edge being disposed substantially tangential to said needle rearwardly of said work-limb in any work-penetrant positions of said needle beyond the needle-eye.

4. The construction set forth in claim 3, in which the needle-thread positioning edge terminates at its rearward end substantially in the plane containing the path of needle-reciprocation and the line of seam formation.

5. The construction set forth in claim 3, in which the needle-thread positioning edge of the member is inclined rearwardly at an angle of approximately 10° to the line of seam formation.

6. The construction set forth in claim 3 in which the needle-thread positioning edge is adjustable toward and from the path of needle reciprocation.

7. In a sewing machine, in combination, a work-support provided with a needle-opening, work-feeding means, an endwise reciprocatory needle having a thread-receiving eye extending crosswise of the line of feed, means complementary to said needle in the formation of stitches, and a member having a needle-thread positioning edge disposed at the needle-thread-loop work-limb side of the line of seam formation for engagement by the needle rearwardly of said work-limb in any work-penetrant positions of said needle beyond the needle-eye, said edge terminating substantially in the plane containing the path of needle-reciprocation and the line of seam formation.

8. In a sewing machine, in combination, a work-support provided with a needle-slot, feeding means for advancing work lengthwise of said needle-slot, an endwise reciprocatory needle having a thread-receiving eye extending crosswise of said needle-slot, a looper complementary to said needle in the formation of chain-stitches, a member having a needle-thread positioning edge extending from the needle-thread-loop work-limb side of the line of seam formation for engagement by the needle rearwardly of said work-limb in any work-penetrant posi-

tions of said needle beyond the needle-eye, and means for detachably securing said member to the under side of said work-support.

9. In a sewing machine, in combination, a work-support provided with a needle-slot, feeding means for advancing work lengthwise of said needle-slot, an endwise reciprocatory needle provided crosswise of said needle-slot with a thread-receiving eye, a looper complementary to said needle in the formation of stitches, a member having a needle-thread positioning edge extending partly across said needle-slot from the work-limb side of the needle-thread loop into close proximity to the rearward side of the needle path of reciprocation, and means for securing said member to said work-support for adjustment of said edge with respect to said needle-path.

10. The construction set forth in claim 9 in which the thread-loop positioning edge of the member is laterally adjustable in a direction inclined to the length of the needle-slot of the work-support.

11. In a sewing machine, in combination, a work-support provided with a needle-slot, feeding means for advancing work lengthwise of said needle-slot, an endwise reciprocatory needle provided crosswise of said needle-slot with a thread-receiving eye, a looper complementary to said needle in the formation of stitches; a stationary member disposed in the region of said work-support and having a needle-thread positioning edge extending past the needle-path at the work-limb side of the needle-thread loop carried by the needle, said edge being tangential to the needle at a point rearwardly in proximity to the needle-eye, and said edge terminating rearwardly of the needle in substantially the line of feed, and adjustable means for securing said member in set position.

12. In a sewing machine, in combination, a work-support provided with a needle-slot elongated in the line of seam formation, an endwise reciprocatory needle operating through and having a thread-receiving eye extending crosswise of said needle-slot, a looper complementary to said needle in the formation of stitches, and a stationary member having thread-positioning and thread-loop cast-off edges oppositely inclined to the line of seam formation at the work-limb side of the needle-thread loop, said edges merging together in the region of said work-support rearwardly of and in close proximity to the path of needle reciprocation.

13. In a sewing machine, in combination, a work-support provided with a needle-slot elongated in the line of seam formation, an endwise reciprocatory needle operating through and having a thread-receiving eye extending crosswise of said needle-slot, a looper complementary to said needle in the formation of stitches, a stationary thread-positioning edge rearwardly inclined to the line of seam formation at the work-limb side of the needle-thread loop and extending into tangential relation with the needle-path rearwardly of the needle-eye, and a stationary thread-loop cast-off edge inclined rearwardly away from the line of seam formation at the work-limb side of said needle-slot, said cast-off edge merging into the rearward end of said thread-positioning edge, and being disposed in the region of said work-support.

14. In a sewing machine having a work-support provided with a needle-slot and a feed-slot lengthwise parallel to and disposed at one

side of said needle-slot, a feed-dog having work-engaging teeth operating through said feed-slot, an endwise reciprocatory needle operating through said needle-slot, said needle having a thread-eye extending crosswise of said needle-slot, and a looper cooperating with said needle at the side thereof opposite to said feed-slot in the formation of chain-stitches, the improvement which consists in the provision in the work-engaged face of said work-support of a thread-clearance recess extending from said needle-slot to said feed-slot, and in the provision in the teeth of said feed-dog of a thread-clearance recess adjacent to and forming a continuation of the recess of said work-support, thereby to provide clearance for the thread-loop extending from the work to the looper when the work is turned about the needle.

15. In a sewing machine, in combination, a work-support provided with a needle-slot and a feed-slot lengthwise parallel to and disposed at one side of said needle-slot, a feed-dog having work-engaging teeth operating through said feed-slot, an endwise reciprocatory needle operating through said needle-slot, said needle having a thread-eye extending crosswise of said needle-slot, a looper cooperating with said needle at the side thereof opposite to said feed-slot in the formation of chain stitches, said work-support being provided in the work-engaged face thereof with a thread-clearance recess extending from said needle-slot to said feed-slot, and said feed-dog being cut away to provide the work-engaging portion thereof with a thread-clearance recess adjacent to and forming a continuation of the recess of said work-support, said recesses providing clearance for the thread-loop extending from the work to the looper when the work is turned about the needle, and a thread-positioning member complementary to said needle for restraining the work-limb of the needle-thread loop from wrapping rearwardly about the needle between the needle-eye and the work in any position of the needle while in the work and responsively to turning of the work about the needle.

16. In a sewing machine, in combination, a work-support provided with a needle-slot and a

feed-slot lengthwise parallel to and disposed at one side of said needle-slot, a feed-dog having work-engaging teeth operating through said feed-slot, an endwise reciprocatory needle operating through said needle-slot, said needle having a thread-eye extending crosswise of said needle-slot, a rotary looper disposed below said work-support and having a loop-seizing beak and a loop-detaining wing, said looper rotating in timed relation to the reciprocations of said needle to carry each newly seized needle-thread loop through the previously seized needle-thread loop held spread by the looper, said work-support being provided in the work-engaged face thereof with a thread-clearance recess substantially co-extensive with the length of said needle-slot and extending from said needle-slot to said feed-slot, and said feed-dog being cut away to provide the work-engaging portion thereof with a thread-clearance recess adjacent to and forming a continuation of the recess of said work-support, said recesses together providing clearance for the thread-loop extending from the work to the looper when the work is turned about the needle, and a thread-positioning member complementary to said needle for restraining the work-limb of the needle-thread loop from wrapping rearwardly about the needle between the needle-eye and the work in any position of the needle while in the work and responsively to turning of the work about the needle.

17. In a sewing machine, in combination, a work-support having a needle-opening, work-feeding means, an endwise reciprocatory eye-pointed needle operating through said needle-opening, means complementary to said needle in the formation of stitches, a stationary member having a needle-guiding and thread-loop positioning edge disposed substantially tangential to said needle in the region of said work-support and rearwardly of the needle-thread-loop limb anchored in the work, and a needle-guide disposed at the side of the needle opposite to said edge in sufficiently close proximity to said needle to maintain the tangential relation of said edge with the needle.

SYDNEY ZONIS.