March 16, 1965 F. J. BARTOSZ 3,173,390

CHAIN STITCH DEVICE FOR LOCK STITCH SEWING MACHINES

Filed Aug. 7, 1963 3 Sheets-Sheet 1

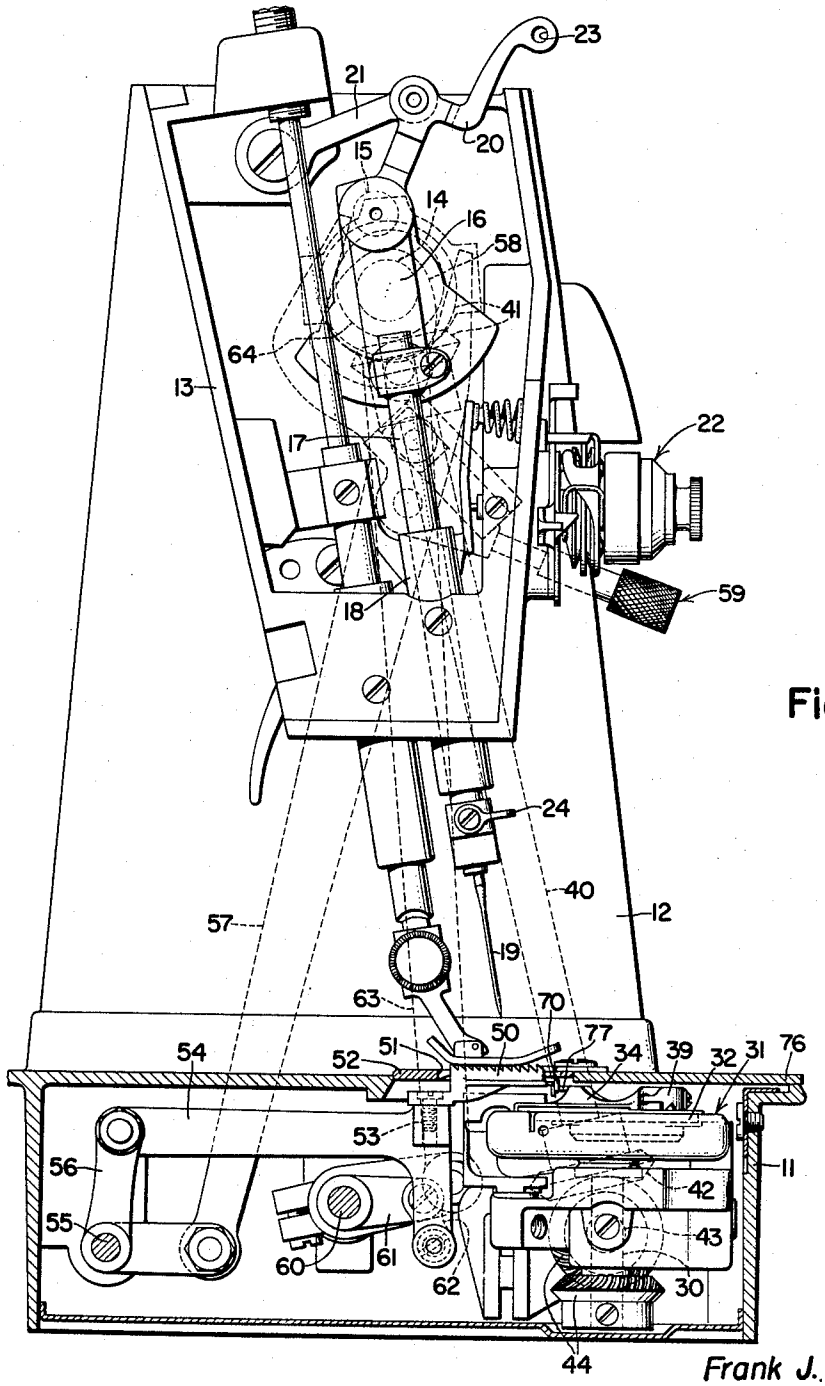


Fig. 1

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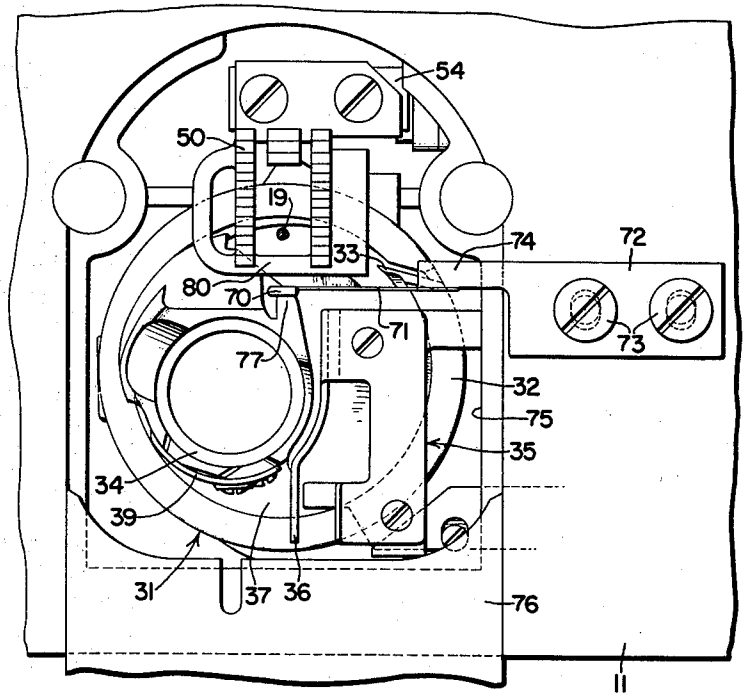
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CHAIN STITCH DEVICE FOR LOCK STITCH SEWING MACHINES

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Fig. 2



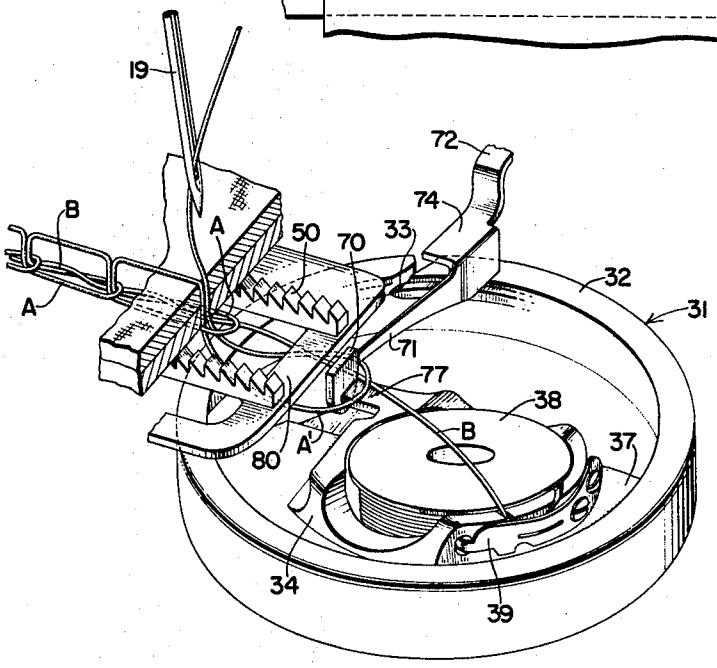


Fig. 3

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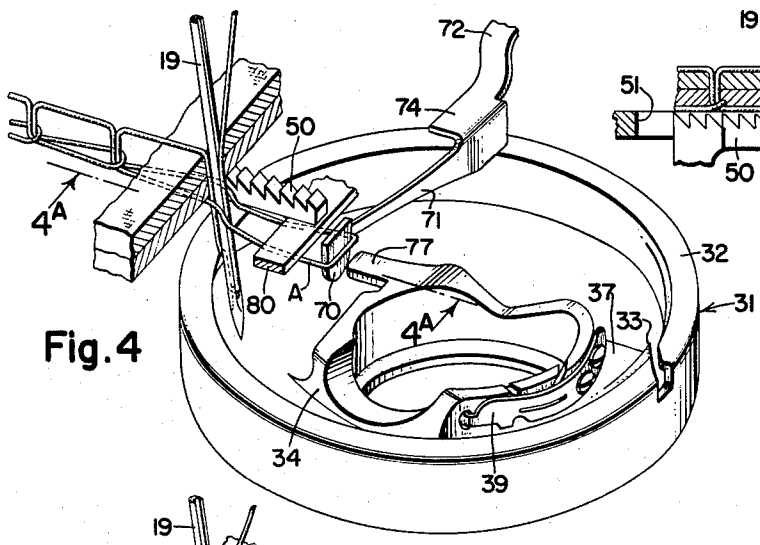


Fig.4

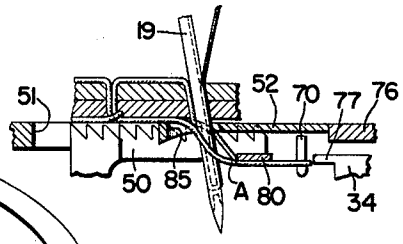


Fig.4A

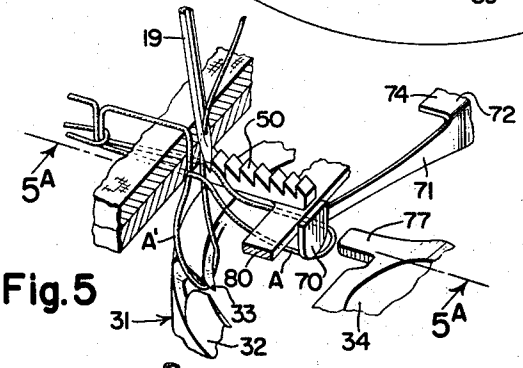


Fig.5

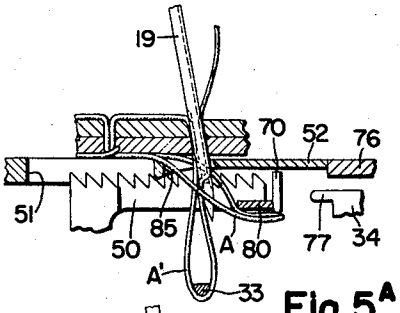


Fig.5A

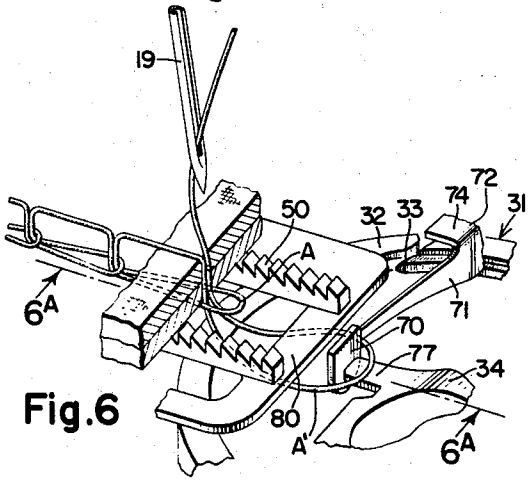


Fig.6

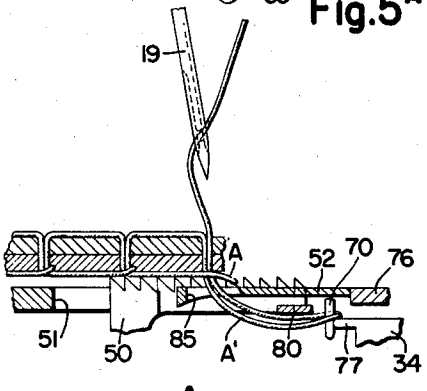


Fig.6A

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CHAIN STITCH DEVICE FOR LOCK STITCH SEWING MACHINES

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Filed Aug. 7, 1963, Ser. No. 300,559
6 Claims. (Cl. 112—168)

This invention relates to sewing machines, and more particularly, to devices for converting a lock stitch sewing machine into a chain stitch sewing machine.

It is an object of this invention to provide devices attachable to a lock stitch sewing machine for converting the machine to chain stitch formation.

A further object of this invention is to provide a simple and effective chain stitch conversion device of the above character which may be applied to lock stitch forming instrumentalities including needle, loop taker, needle thread take-up and work feeding mechanism unaltered in structure or cooperative relation from that required for the formation of lock-stitches.

A still further object of this invention is to provide chain stitch conversion devices of the above character which may be applied to lock-stitch forming instrumentalities in which the bobbin on which locking thread for lock stitch formation is stored may remain in place in the loop taker to supply a locking thread for incorporation into the chain stitch seam.

Another object of this invention is to provide chain stitch conversion devices of the above character particularly adapted for use with a lock-stitch sewing machine employing a vertical axis circularly moving loop taker.

The accompanying drawings illustrate a preferred embodiment of this invention in which:

FIG. 1 represents a head end elevational view of a lock stitch sewing machine with the bracket arm cover plate removed and portions of the bed broken away to illustrate the stitch forming instrumentalities having the chain stitch conversion device of this invention applied thereto,

FIG. 2 represents an enlarged top plan view of a portion of the work supporting bed of the sewing machine of FIG. 1 with the throat plate removed and the bed slide withdrawn to expose the stitch forming instrumentalities within the bed,

FIG. 3 represents a perspective view of fragments of the stitch forming instrumentalities of the sewing machine of FIG. 1 with the chain stitch conversion device of this invention and includes both the needle and bobbin threads illustrating the formation of a chain stitch seam with a locking thread,

FIG. 4 represents a perspective view of fragments of the stitch forming instrumentalities of the sewing machine of FIG. 1 with the chain stitch conversion device of this invention including only the needle thread and illustrating the position of parts and thread at needle penetration during the formation of chain stitches,

FIG. 4A is a vertical cross sectional view taken substantially along line 4A—4A of FIG. 4,

FIG. 5 represents a perspective view of fragments of the stitch forming instrumentalities of the sewing machine similar to that of FIG. 4 but with the position of parts and thread illustrated shortly after needle loop seizure during the formation of chain stitches,

FIG. 5A is a vertical cross sectional view taken substantially along line 5A—5A of FIG. 5,

FIG. 6 represents a perspective view of fragments of the stitch forming instrumentalities of the sewing machine similar to that of FIG. 4 but with the position of parts and thread illustrated at the upstroke of the needle and after the seized needle thread loop has been cast off the loop taker beak, and

FIG. 6A is a vertical cross sectional view taken substantially along line 6A—6A of FIG. 6.

This invention provides for the conversion to single thread chain stitch sewing of a conventional lock stitch sewing machine. FIG. 1 illustrates a head end elevational view of a conventional household lock stitch sewing machine to which this invention may be applied.

The sewing machine frame includes a bed 11 from which rises a standard 12 supporting a bracket arm 13 overhanging the bed. A mainshaft 14 journaled lengthwise in the bracket arm drives all of the moving parts of the sewing machine and may be actuated by an electric motor (not shown), by foot treadle or the like.

A counterbalanced crank 15 on the mainshaft 14 is operatively connected by means of a drive link 16 to a needle bar 17 endwise slidable in a bearing 18 in the bracket arm and carrying at its lower extremity an eye pointed needle 19. The crank 15 also actuates a needle thread take-up lever 20 of which the motion is constrained by an anchor link 21. The path of a needle thread passes from a supply (not shown) to a thread tensioning device 22, through an eyelet 23 in the take-up lever 20, and then through appropriate guides such as the thread guide 24 on the needle bar 17 and to the needle eye. This needle thread control arrangement is typical of that which is required for lock stitch formation. The use of the chain stitch conversion devices of this invention will operate successfully, however, with such lock stitch type needle thread controls.

Journaled in the bed on a loop taker shaft 30 is a loop taker indicated generally at 31. The loop taker illustrated in the drawings is a vertical axis rotary hook adapted to partake of two revolutions for each reciprocation of the needle. The loop taker is formed with a cup shaped body portion 32 formed with an inwardly extending loop seizing beak 33 adapted to engage and manipulate loops of thread from the needle 19 which as illustrated in FIG. 2 reciprocates in a path which passes inwardly of the cup shaped loop taker body portion.

A bobbin case 34 is journaled within the loop taker body portion 32 and constrained against rotation therewith by means of a rotation restraining assembly 35 including a spring 36 which engages an abutment 37 on the bobbin case 24. A bobbin 38 is accommodated within the bobbin case 34 and is free to turn, the under or locking thread from the bobbin being directed as illustrated in FIG. 3 to the action of a leaf spring 39 on the bobbin case to provide a tension thereon.

The needle and loop taker thus far described are capable of producing lock stitches in a conventional manner. The loop seizing beak 33 of the loop taker will engage and carry loops of needle thread completely about the bobbin case and thus the needle and bobbin threads will be concatinated into true lock stitches (Federal type #301) following each needle penetration. The loop taker may be driven at two revolutions for each needle reciprocation by means of a shaft 40 in the standard 12 driven by bevel gears 41 from the mainshaft and connected in turn by bevel gears 42 to a bed shaft 43 which drives the loop taker shaft 30 by a set of bevel gears 44.

Illustrated in FIG. 1 is a work feeding mechanism of the four-motion or "drop feed" variety. A work engaging feed dog 50 operating through slots 51 in a throat plate 52 on the bed is secured by screws 53 to a feed bar 54 beneath the bed. Feed advance and return movements are imparted to the feed bar from an oscillating feed advance rock shaft 55 connected to the feed bar by means of a rock arm 56. The feed advance rock shaft 55 is oscillated by means of conventional connections 57 in the standard from a feed cam 58 on the mainshaft 14. The connections 57 may include conventional regulating means 59 for varying the stitch length. Rising and fall-

ing motion is imparted to the feed bar from an oscillating feed lift rock shaft 60 in the bed. The feed lift rock shaft 60 is provided with a rock arm 61 connected by means of a link 62 to the feed bar 54. The feed lift rock shaft is oscillated by means of conventional connections 63 in the standard from a feed lift eccentric 64 on the mainshaft 14. It will be appreciated that as is conventional in the art the work feeding mechanism is timed relatively to the needle reciprocation so that the feed dog is lifted and advanced while the needle is raised out of any work on the throat plate, and the feed dog is lowered beneath the throat plate and returned while the needle descends.

Referring to FIG. 2, the conversion device for rendering the above described lock stitch sewing machine suitable for sewing chain stitches includes a thread loop engaging finger 70 which is arranged beneath the throat plate 52 and depends substantially parallel to the path of needle reciprocation between the needle path and the bobbin case 34. The thread loop engaging finger 70 is carried on a leaf spring 71 which extends from a bracket 72 secured as by screws 73 on the bed. The bracket 72 is formed with a downward offset 74 arranged at one side of an access opening 75 in the bed which access opening exposes the loop taker. The bracket offset 74 is preferably arranged at the juncture of the throat plate 52 and a slide cover plate 76 which closes the access opening 75. The thread loop engaging finger 70 is biased by the leaf spring 71 toward an abutment projection 77 formed on the bobbin case and disposed between the axis of the loop taker and the path of motion of the needle.

As illustrated in FIGS. 2–6, the feed dog 50 is formed between the path of needle reciprocation and the thread loop engaging finger 70 with a transverse web 80 which thus rises and falls with the feed dog lift movements and always occupies a position above the thread loops being manipulated by the loop taker.

FIGS. 4 to 6 and 4A to 6A illustrate the thread handling sequence in the formation of single thread chain stitches using the conversion device of this invention.

In order to ready the lock stitch sewing machine for chain stitching, the bracket 72 with the thread loop detaining finger 70 thereon must be secured on the bed 11 as illustrated in FIG. 2 so that the finger 70 is biased against the abutment projection 77 of the bobbin case. A throat plate for a conventional lock stitch sewing machine is usually formed with a round needle aperture. Chain stitches may be formed using a round throat plate needle aperture, but since the setting of a chain stitch involves relative movement of the thread through the preceding stitch, it is preferable to replace the throat plate ordinarily used for lock stitch sewing with a similar throat plate differing only in that a needle aperture 85 is provided which is elongated in the direction of feed.

FIGS. 4 and 4A illustrate the position of parts and of the thread as the needle penetrates the work fabrics and the needle aperture 85 in the throat plate. A loop of thread A from the preceding needle penetration will extend through the needle aperture 85 and tightly around the loop engaging finger 70 which will be drawn by the thread loop A away from the abutment projection 77. The spring constant of the leaf spring 71 is preferably selected so as to yield in response to the tension in the thread loop A which is developed during setting of the preceding stitch.

In FIGS. 4 and 4A, the feed dog 50 will be in its rearward position having just completed a feed stroke and will also be dropping in preparation for a return stroke. The web 80 will thus begin to press downwardly on the thread loop A so as to strip the thread loop A from the loop engaging finger 70 after the needle 19 has passed through the thread loop A.

FIGS. 5 and 5A illustrate the position of parts and of the thread as the needle is emerging from the work fabrics. The loop seizing beak 33 of the loop taker has

seized a fresh loop A' of needle thread and the web 80 of the feed dog 50 is stripping the previous thread loop A from the loop engaging finger 70. The feed dog 50 has moved toward the bobbin case and is in position to be raised for a feed advance stroke.

FIGS. 6 and 6A illustrate the position of parts when the needle is substantially at the top of its stroke. The loop engaging finger 70 will be moved into engagement with the abutment projection 77 by the leaf spring 71. The new thread loop A' when it is shed from the loop taker loop seizing beak 33 will be supported by the abutment projection 77 until it is drawn tightly about the loop engaging finger 70. The previous thread loop A will have been reduced in size somewhat by the manipulation of the new thread loop A', but the previous thread loop A will not be drawn tightly against the work to set the stitch until the needle thread take up lever 20 tightens the new thread loop A' on the loop supporting finger 70. When this happens, the thread will be arranged as is illustrated in FIG. 4 ready for the succeeding penetration of the needle.

Since the spring 71 returns the loop supporting finger 70 against the abutment projection 77, the danger of the loose thread loop A' slipping accidentally beneath the loop supporting finger 70 is obviated. The only influence moving the loop supporting finger from the abutment projection 77 is the tension in the thread. However, once the thread loop becomes taut about the loop supporting finger, friction prevents it from slipping off, and the web 80 which acts as a stripping member is necessary to force the thread loop from the loop supporting finger.

FIG. 3 illustrates the position of parts and the resulting seam which is formed if a thread carrying bobbin 38 is placed in the bobbin case 34. The bobbin thread B will not be set tightly with the needle thread as in conventional lock stitch formation since stitch setting is delayed in the formation of chain stitches. The bobbin thread B will, however, be concatenated with the needle thread so as to lock the chain stitches against raveling. The bobbin thread B running loosely through the resulting chain stitch seam may be readily pulled lengthwise from the seam leaving a plain chain stitch seam which may be raveled if desired.

Having thus set forth the nature of the invention, what is claimed herein is:

1. In a sewing machine having lock-stitch forming instrumentalities including a frame having a work support formed with a needle aperture, a thread-carrying eye-pointed needle supported above the work support for endwise reciprocation through said needle aperture, a circularly moving loop taker disposed below said work support, means for driving said needle and loop taker in timed relation for the seizure of a loop of thread from the eye of the needle by said loop taker during each stroke of the needle downwardly through said needle aperture and the release of said seized loop by the loop taker during each succeeding upward stroke of the needle, a bobbin supporting case journaled in said loop taker, stop means sustained on said frame for constraining said bobbin supporting case from circular movement with said loop taker and, a linear work feeding mechanism effective to advance work fabric on said work support in one direction from said needle aperture between each needle penetration thereof, means for sewing chain stitches using thread carried by said needle comprising a thread loop engaging finger carried beneath said work support and having a free extremity extending in a direction away from the work support substantially parallel to said path of endwise needle reciprocation and arranged at that side of said path of needle reciprocation which is opposite the direction of advancement of work fabric by said work feeding mechanism, thread directing means carried on said bobbin case and cooperating with said thread loop engaging finger for directing thread manipulated by said loop taker onto said thread loop engaging finger,

a thread stripping element disposed between said thread engaging finger and the path of endwise reciprocation of said needle, and means for reciprocating said stripping element in timed relation with said endwise reciprocation of said needle and toward the free end of said thread loop engaging finger as said needle penetrates said needle aperture.

2. In a sewing machine having lock-stitch forming instrumentalities including, a frame having a work support formed with a needle aperture, a thread-carrying eye-pointed needle supported above said work support for endwise reciprocation through said needle aperture, a circularly moving loop-taker disposed below said work support on an axis substantially parallel to the path of endwise reciprocation of said needle, and a bobbin supporting case journaled in said loop taker, stop means sustained on said frame for constraining said bobbin supporting case from circular movement with said loop taker, means for sewing chain stitches using thread carried by said needle comprising a thread loop engaging finger carried beneath said work support and having a free extremity extending in a direction away from the work support substantially parallel to said path of endwise needle reciprocation and arranged between the path of endwise needle reciprocation and the axis of said loop taker, thread directing means carried on said bobbin case and cooperating with said thread loop engaging finger for directing loops of thread manipulated by said loop taker onto said thread loop engaging finger, a thread stripping element disposed between said thread loop engaging finger and the path of endwise reciprocation of said needle, and means for reciprocating said stripping element in timed relation with said endwise reciprocation of said needle and toward the free end of said thread loop engaging finger as said needle penetrates said needle aperture.

3. A device as set forth in claim 1 in combination with a thread carrying bobbin sustained in said bobbin supporting case and supplying a locking thread for concatenation with said chain stitches.

4. In a sewing machine having lock-stitch forming instrumentalities including a frame having a work support formed with a needle aperture, a thread carrying eye-pointed needle supported above said work support for endwise reciprocation through said needle aperture, a circularly moving loop taker disposed below said work support on an axis substantially parallel to the path of endwise reciprocation of said needle, a bobbin supporting case journaled in said loop-taker, stop means sustained on said frame for constraining said bobbin supporting

case from circular movement with said loop taker, a needle thread take-up mechanism, and a work feeding mechanism effective to advance work fabric on said work support in a direction from said needle aperture radially outward of said loop taker, means for sewing chain stitches using thread carried by said needle comprising, a thread loop engaging finger carried beneath said work support and having a free extremity extending in a direction away from the work support, means for shiftably supporting said thread loop engaging finger relatively to said frame for movement substantially in the direction of work feed and between the path of endwise needle reciprocation and the axis of said loop taker, means associated with said bobbin case and formed with an abutment surface disposed between the axis of said loop taker and the path of endwise reciprocation of said needle in the path of movement of said thread loop engaging finger, spring means biasing said thread loop deflecting finger into engagement with said abutment surface with a force less than that applied to the needle thread by said take-up mechanism in the setting of a stitch, a thread stripping element disposed between said thread loop engaging finger and the path of reciprocation of said needle and means for reciprocating said stripping element in timed relation with said endwise reciprocation of said needle and toward the free end of said thread loop engaging finger as said needle penetrates said needle aperture.

5. A device as set forth in claim 4 in which said means for shiftably supporting said thread loop deflecting finger and said spring means biasing said thread loop deflecting finger into engagement with said abutment surface comprises a leaf spring secured to said sewing machine frame and secured to said thread loop deflecting finger.

6. A device as set forth in claim 4 in which said work feeding mechanism comprises a four motion work feeding mechanism including a feed dog, and said thread stripping element is carried by said feed dog.

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