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E. P. SPAINE

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LOOP TAKERS FOR LOCK STITCH SEWING MACHINES

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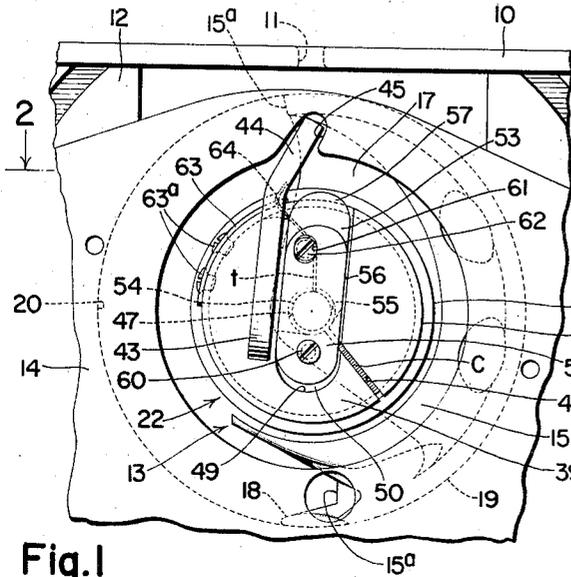


Fig. 1

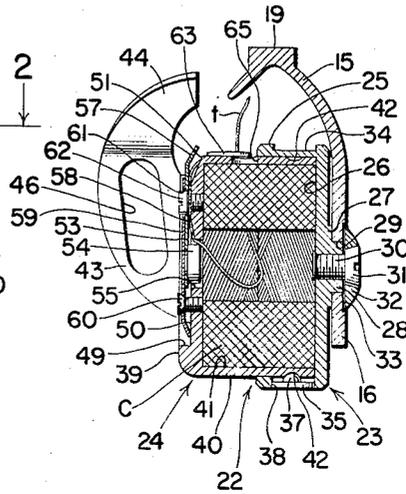


Fig. 3

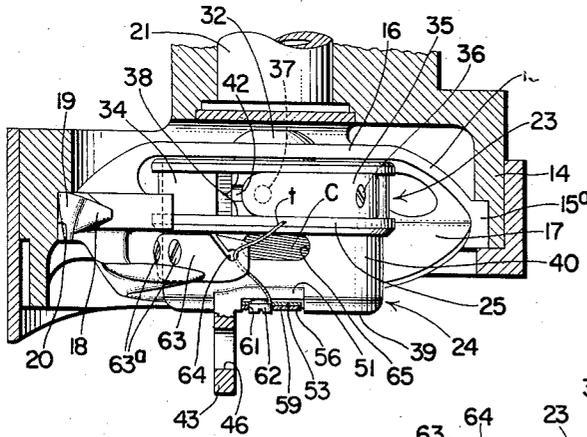


Fig. 2

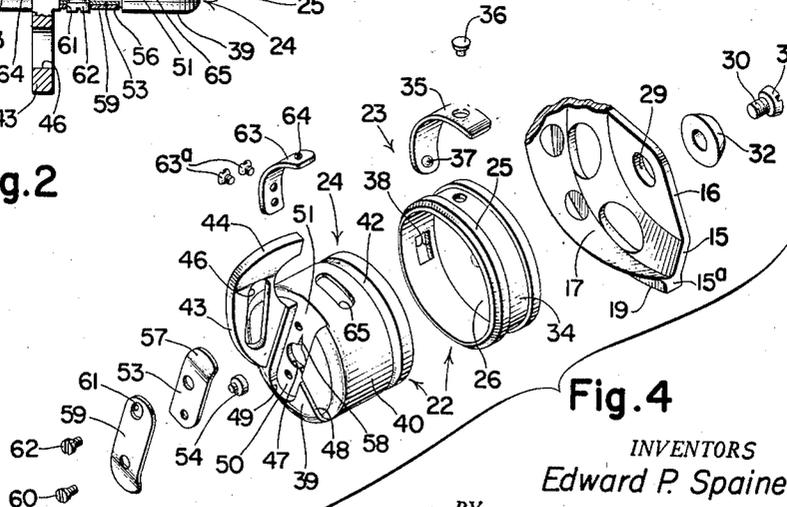


Fig. 4

INVENTORS
Edward P. Spaine

BY

Marshall J. Breen
ATTORNEY

WITNESS

William Martin

2,851,977

LOOP TAKERS FOR LOCK STITCH SEWING MACHINES

Edward P. Spaine, Bridgeport, Conn., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

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13 Claims. (Cl. 112—231)

This invention relates to sewing machines of the lock stitch type and more particularly to a loop taker assembly provided with a thread mass enclosing means adapted to carry a supply of locking thread with which the needle thread is concatenated to form a lock stitch.

The present invention has for its primary object to provide a loop taker assembly having a thread mass enclosing means or thread case which is constructed and arranged to carry the supply of locking thread in the form of a prewound cop from which the thread unwinds from its center.

As is well known, the use of a center unwind cop has many advantages over the bobbin type of thread source, particularly in that the thread cop affords a greater thread capacity and also eliminates the usual time consuming thread winding operation that is required when the conventional bobbin is used. Heretofore, in the adaptation of loop taker assemblies to receive center unwind cops, difficulties have been encountered in controlling the passage of the thread from its thread case. These difficulties are particularly evident during the high speed operation required of present day sewing machines wherein it is found that the thread mass unwinds in coils which at times emerge from the thread-case causing the thread to twist and thereby form kinks making the usual critical locking thread requirements for proper stitch formation difficult to achieve. This action of the thread cop is caused by the inherent characteristics imparted to the cop during the manufacture thereof.

A thread cop is generally prepared by cross winding the thread and under some circumstances compressing the wound thread mass thereby to maintain the cop substantially rigid to withstand the required handling thereof and to eliminate "growing" of the cop due to the effects of humidity. The preparation of a thread cop in this manner tends to create temporary kinks in the thread whereby when a length of the thread is unwound from the cop within the thread case of the loop-taker the unwound thread tends to return to the kinked form. It is this kinking condition which causes difficulties in maintaining the proper thread control of the locking thread.

It is accordingly a further object of the present invention to provide a thread case with a thread controlling device which will control the passage of thread from the thread-case in a manner to smooth and iron the thread to remove any twists or kinks which may be present.

It is another object to provide a novel thread case assembly which is constructed in a manner such that the replenishing of the supply of locking thread may be facilitated.

It is a further object to provide a novel loop-taker assembly incorporating a thread case which is adapted to receive a locking thread source in the form of a thread cop which unwinds from its center.

With the above and other objects in view, as will here-

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inafter appear, the invention comprises the devices, combinations and arrangement of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and advantages attained thereby, will be readily understood by those skilled in the art.

In the accompanying drawings:

Fig. 1 is a fragmentary front elevational view of a sewing machine equipped with a horizontal axis loop taker embodying the invention.

Fig. 2 represents a horizontal sectional view taken substantially along the line 2—2 of Fig. 1 with the loop seizing member of the loop taker rotated approximately 180° from the position shown in Fig. 1.

Fig. 3 represents a vertical sectional view of the loop-taker and its thread-case.

Fig. 4 is an exploded view of the loop taker assembly embodying the present invention showing a fragmentary portion of the loop seizing member.

Referring to the drawings, the present invention has been embodied in a lock-stitch sewing machine having a throat plate 10 formed with a needle hole 11 and supported in a bed 12. Disposed below the throat plate 10 is an oscillating shuttle loop taker assembly 13 which is carried in the usual manner in a bed supported housing 14 of the type disclosed in the E. B. Allen Patent No. 1,869,402, August 2, 1942.

The loop taker assembly 13 comprises a loop seizing member 15 in the form of a substantially semicircular discoidal casing having a substantially closed rear end wall 16 and a forward open end defining an axial hollow 17. The loop seizing member 15 is provided adjacent the open end with the usual loop seizing beak 18 and with a peripheral bearing rib 19 which seats within the raceway 20 formed in the housing 14, wherein the loop seizing member 15 is oscillated in the usual manner by the loop taker actuating shaft 21 having an actuating dog member (not shown) which is adapted alternately to engage the impact faces 15a formed on the ends of the bearing rib 19.

Disposed within the axial hollow 17 of the loop seizing member 15 is a two part thread casing assembly 22 including a thread case holder 23 and a thread case 24. The holder 23 is cup shaped having a circular flange 25 projecting laterally from the periphery of a disc 26 forming the bottom wall of the holder 23. The outer surface of the bottom wall 26 is formed with a raised axially disposed boss 27 and a hub 28 which rotatably seats within an axial opening 29 provided in the rear end wall 16 of the loop seizing member 15. A stud 30 threaded into the rear end wall 16 and swagged on its inner end maintains the holder 23 on the loop seizing member 15. To permit free and non-binding relative oscillation of the shuttle 15 and the holder 23 the stud 30 is formed with a tapered head 31 which is prevented from making direct contact with the rear shuttle wall 16 by a dome-shaped spacing member 32 which seats within a circular recess 33 formed on the outer surface of the wall 16.

The outer surface of the circular flange 25 is formed with a peripheral recess 34 in which there is seated a latching detent in the form of a leaf spring 35, one end of which is fixedly secured to the flange 25 by a rivet 36 and the other end having a semi-spherical protuberance 37 which is adapted to project through an opening 38 formed in the flange 25 and into the interior of the holder 23, whereby the semi-spherical protuberance 37 may engage the thread case 24 to maintain it latched within the holder 23 as will later be described.

The thread case 24 is also cup shaped having a substantially flat top wall 39 and an integral cylindrical wall

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40 having an open end defining a thread cop receiving opening. The cylindrical wall 40 is sized slidably to interfit within the cylindrical flange 25 of the holder 23 and forming therewith an enclosed thread housing 41. For the purpose of maintaining the thread case 24 latched to the holder the lower end of the cylindrical wall 40 is provided with an annular groove 42 which is located such that when the rim of the cylindrical wall 40 is in engagement with the holder bottom wall 26 the semi-spherical protuberance 37 on the leaf spring 35 will resiliently seat therein.

Attached to the top wall 39 and disposed along a chord line spaced from the center thereof is an outwardly projecting semi-circular thread case finger piece 43 having an upwardly extending portion which projects beyond the cylindrical wall 40 and is slightly bent at an angle to the chord line to form a thread case rotation restraining finger 44 which is adapted to be disposed within the usual thread case rotation restraining notch 45 provided in the shuttle housing 14. To facilitate the handling of the thread case 24 during the insertion and removal thereof from the holder 23 the finger piece may be provided with a thumb and forefinger engaging slot 46. It will be appreciated that the semi-circular contour of the finger piece 43 provides a smooth uninterrupted surface over which the usual needle thread loop, formed during the loop seizure portion of the stitching cycle, may be shed.

Centrally located on the top wall 39 of the thread case 24 is a thread delivery eye 47 through which the thread emerges during sewing. Communicating with the thread delivery eye 47 to thread the case 24 is a threading slot 48 which extends radially from the eye 47 along the top wall 39 and down the cylindrical wall 40 opening at the rim thereof.

Parallel to the thread case finger piece 43 there is formed a diametrical recess 49 opening at one end into the cylindrical wall 40. The recess 49 has a substantially flat bottom surface 50 along its major length and slightly beveled surface 51 adjacent to the cylindrical wall 40. Disposed within the recess 49 there is a thread controlling means which serves to restrict the passage of the thread emerging from the thread casing and which also serves to straighten and tension the thread. To this end, there is provided in the recess 49 a substantial flat rectangular ironing plate 53 having secured adjacent one end thereof a projecting stud 54 which enters the thread delivery eye 47 and defines an annular opening 55 through which only a single thickness of thread may emerge. The ironing plate 53 is disposed flush on the bottom surface 50 of the recess 49 with one edge spaced from the edge of the recess intersecting the threading slot 48 thereby forming a thread groove 56 permitting the insertion of the thread beneath the ironing plate 53 and into the annular opening 55. To further facilitate threading of the casing the corner of the ironing plate overlying the threading slot may be rounded as shown and the other end portion of the plate lying over the beveled surface 51 of the recess may be formed with the nose 57 which is angularly bent downwardly and spaced above the beveled surface 51 to provide a thread entrapment space. As shown, when the thread case 24 is threaded the thread *t* passes from the annular opening into a tapering V-notch 58 formed in the bottom surface 51 of the recess 40 and thence between the flat ironing plate 53 and the flat surface 50 of the recess wherein the kinks and twists which may be present are removed to provide a straightened thread which is concatenated with the needle thread to form a lock stitch in the usual manner.

To maintain the ironing plate 53 on the top wall 39 under the desired ironing pressure and to provide a tension on the locking thread *t* there is overlying the ironing plate 53 a tension leaf spring 59. One end of the tension leaf spring 59 extends below the stud end of the ironing plate 53 and the thread delivery eye 47 and is

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secured to the top wall by a screw 60 which is adjustable to vary the tension of the leaf spring. The other end of the leaf spring 59 overlying the ironing plate is formed with a slot 61 receiving a fastening screw 62 which also positions the ironing plate on the top wall.

As shown, the screw 62, securing the ironing plate 53 and the overlying upper end of the leaf spring 59 to the top wall 39, also serves as a guide post for maintaining the thread *t* beneath the ironing plate as it travels upwardly toward the cylindrical wall 40. Mounted on the cylindrical wall 40 by screws 63a or the like is a bowed thread guide 63 having formed adjacent one end thereof an inclined thread guiding notch 64 which is angularly displaced from the thread guiding screw 62 in the direction of the thread case finger piece 43 and lies adjacent an elongated needle clearance opening 65 formed in the cylindrical wall 40.

The present shuttle assembly is particularly adapted for use with a thread cop C adapted snugly to fit within the thread receiving cavity 41 defined by the thread case 24 and holder 23 and having a strand of thread *t* so wound that it may be drawn from the center. Prior to inserting the thread cop C in the thread case 24 a length of the thread *t* is drawn from the center of the cop C and inserted through the threading slot 48 and along the threading space 56 adjacent the side wall of the recess 49 and beneath the nose 57 of the ironing plate 53, whereupon it is tautly drawn sidewise beneath the plate 53 until the thread abuts against the guiding post screw 62 and the thread passes beneath the rounded corner of the ironing plate 53 into the annular opening 55 and is seated in the tapering V-notch 58. Thereafter the thread is laterally inserted into the thread guiding notch 64 of the thread guide 63. After the thread case 24 is threaded it is inserted into the holder 23 with the rim of the cylindrical wall 40 in engagement with the bottom wall, whereupon the semi-spherical protuberance 37 on the leaf spring 37 carried by the holder 23 snaps into the groove 42 of the cylindrical wall 40 to retain the thread case latched to the holder. The shuttle 15 carrying the threaded thread case assembly 22 is then ready to provide a locking thread for the formation of a lock stitch in the usual manner.

The structure of the present invention has many advantages particularly with respect to the means for controlling passage of thread *t* from the thread casing 22. As previously mentioned, thread cops have a tendency to unwind in coils with the thread thereof having a temporary set resulting in kinks and if these are not controlled the thread becomes snarled. By the present invention while the coils may still form they are maintained within the thread casing 22 since the annular opening 55 provides a minimum space through which only a single strand of thread may pass, thereby retaining the coils within the casing. By passing the thread through the restricted opening 55 and then between the tensioned ironing plate 53, the flat surface 50 of the top wall 40, any kinks or twists which may have been present in the thread due to its coiling characteristics are removed.

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

1. A thread case for sewing machine loop takers comprising a cop cavity defining cup-shaped body having a cylindrical side wall and including a substantially flat top wall, a thread delivery eye formed in said top wall through which thread can be delivered from the center of a cop in said cop cavity, and thread controlling means mounted on said top wall and overlying said thread delivery eye, said thread controlling means including means disposed to enter said thread delivery eye to form a restricted opening for preventing the passage of kinks of the cop thread through said thread delivery eye, and means adjacent said thread delivery eye cooperating with said substantially flat top wall for engaging a cop thread emerging from said thread delivery eye between said

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means and said top wall for ironing and tensioning the thread.

2. A thread case for sewing machine loop takers comprising a cop cavity defining cup-shaped body having a cylindrical side wall and including a substantially flat top wall, a thread delivery eye formed in said top wall through which thread can be delivered from the center of a cop in said cop cavity, and thread controlling means mounted on said top wall and overlying said thread delivery eye, said thread controlling means including a thread restricting stud disposed to enter said thread delivery eye to form an annular opening for preventing the passage of kinks of the cop thread through said thread delivery eye, and means adjacent said thread delivery eye cooperating with said substantially flat top wall for engaging a cop thread between said ironing means and said top wall for ironing and tensioning the thread.

3. A thread case for sewing machine loop takers comprising a cop cavity defining cup-shaped body having a cylindrical side wall and including a substantially flat top wall, a thread delivery eye formed in said top wall through which thread can be delivered from the center of a cop in said cop cavity, a plate lying flush on said top wall and overlying said thread delivery eye arranged to cooperate with said top wall to iron a thread after it emerges from said eye, a stud carried by said plate entering said thread delivery eye forming an annular opening for preventing the passage of kinks of the cop thread therethrough, and adjustable spring means overlying said plate imparting an ironing pressure thereon and simultaneously providing a tension on the thread.

4. A thread case for sewing machine loop takers comprising a cop cavity defining cup-shaped body having a cylindrical side wall and including a substantially flat top wall, a thread delivery eye formed in said top wall through which thread can be delivered from the center of a cop in said cop cavity, a plate lying flush on said top wall overlying said thread delivery eye and arranged to cooperate with said top wall to iron said thread after it emerges from said eye, a stud carried by said plate entering said thread delivery eye forming an annular opening for preventing the passage of twisted or kinked cop thread therethrough, adjustable spring means overlying said plate, imparting an ironing pressure thereon and simultaneously providing a tension on the thread, and means for attaching said plate and said spring means on said top wall, said attaching means arranged to guide the thread beneath said plate after emerging from said annular opening.

5. A thread case for sewing machine loop takers comprising a cop cavity defining cup-shaped body having a cylindrical side wall and including a substantially flat top wall, a thread delivery eye formed in said top wall in substantial alignment with the center of said cavity, a diametrical recess formed in said top wall and having a substantially flat bottom surface, a radial threading slot formed in said casing with the inner end opening into said thread delivery eye and said outer end opening into the rim of said cylindrical side wall, a plate overlying the thread delivery eye lying flush on said flat bottom surface of said recess, a stud carried by said plate and entering said delivery eye forming an annular opening through which only a single strand of thread may emerge, a leaf spring having an upper end and a lower end, said leaf spring upper end overlying said plate and said lower end projecting beyond said plate into said recess, an adjustment screw securing said lower end of said leaf spring to said top wall, and a fastening member positioning said plate and said overlying upper end of the leaf spring in said recess, said fastening means being arranged to provide a guiding post for maintaining the travel of the thread beneath said plate after the thread emerges from said annular opening.

6. A shuttle for a lock stitch sewing machine compris-

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ing a discoidal loop seizing member formed with an axially disposed cavity, a thread case holder having a bottom wall, a stud axially positioned on said loop seizing member and journaling said thread case holder within said cavity to permit relative circular movement between said loop seizing member and said holder, a cup-shaped thread case having a cop receiving opening and a cylindrical side wall and having a top wall opposed to said thread case holder bottom wall to define with said bottom wall an enclosed cop receiving housing, and means operatively associated with said cylindrical side wall and thread case holder releasably latching said thread case to said thread case holder.

7. A shuttle for a lock stitch sewing machine comprising a discoidal loop seizing member formed with an axially disposed hollow, a thread case holder having a bottom wall and a cylindrical flange, a stud axially positioned on said loop seizing member journaling said holder within said hollow, a cup-shaped thread case having a cop receiving opening and a cylindrical side wall interfitting said thread case holder cylindrical flange and having a top wall opposed to said bottom wall of said thread case holder to define with said bottom wall an enclosed cop receiving cavity, and a detent operatively associated with said cylindrical wall and said thread case holder flange releasably latching said thread case to said thread case holder.

8. A shuttle for a lock stitch sewing machine comprising a discoidal loop seizing member formed with an axially disposed hollow, a thread case holder having a bottom wall and a cylindrical flange, a stud axially positioned on said loop seizing member journaling said thread case holder within said hollow to permit relative circular movement between said loop seizing member and said thread case holder, a cup-shaped thread case having a cop receiving opening and a cylindrical side wall interfitting said holder cylindrical flange and having a top wall opposed to said bottom wall of said thread case holder to define with said bottom wall an enclosed cop receiving cavity, and resilient means mounted on said thread case holder flange engaging said interfitting cylindrical wall to releasably latch said thread case to said thread case holder.

9. A shuttle for a lock stitch sewing machine comprising a discoidal loop seizing member formed with an axially disposed hollow, a thread case holder having a bottom wall and a cylindrical flange, a stud axially positioned on said loop seizing member journaling said thread case holder within said hollow to permit relative circular movement between said loop seizing member and said holder, a cup-shaped thread case having a cop receiving opening and a cylindrical side wall interfitting said cylindrical flange of said thread case holder, a peripheral groove formed in the portion of the cylindrical wall fitting within said flange, and a spring detent mounted on said flange and adapted to seat within said groove of said cylindrical wall to releasably latch said thread case to said thread case holder.

10. A thread case assembly for sewing machine loop takers comprising a thread case holder having a bottom wall and a cylindrical flange, a cup-shaped thread case having a cop receiving opening and a cylindrical side wall interfitting said flange of said thread case holder, a peripheral groove formed in the portion of the cylindrical wall fitting within said flange, and a spring detent mounted on said flange adapted to seat within said groove of said cylindrical wall to releasably latch said thread case to said thread case holder.

11. A thread case assembly for sewing machine loop takers comprising a thread case holder having a bottom wall and a cylindrical flange, a cup-shaped thread case having a cop receiving opening and a cylindrical wall interfitting said flange of said thread case holder, means operatively associated with said flange and said cylindrical wall releasably latching said case to said holder, and

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an outwardly projecting finger piece mounted on said top wall end having a portion thereof extending beyond said cylindrical wall providing a thread case rotation restraining finger adapted to seat within a rotation restraining notch of a loop taker housing, said finger piece being of a substantially semi-circular contour to provide a needle loop shedding surface.

12. A thread case assembly for a sewing machine loop taker comprising a cop cavity defining a cup-shaped body having a cylindrical side wall and including a substantially flat top wall, a thread delivery eye formed in said top wall through which thread can be delivered from the center of a cop in said cop cavity, a plate lying flush on said top wall overlying said thread delivery eye and arranged to cooperate with said top wall to iron said thread after it emerges through said eye, a stud carried by said plate entering said thread delivery eye forming an annular opening preventing the passage of twisted or kinked cop thread therethrough, an adjustable spring

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means overlying said plate imparting an ironing pressure thereon and providing a tension on the thread, an outwardly projecting finger piece mounted on said top wall and having a portion thereof extending beyond said cylindrical wall providing a thread case rotation finger adapted to seat within a rotation restraining notch of a shuttle housing.

13. The invention as defined in claim 12 in which the finger piece is arcuately contoured to provide a needle loop shedding surface.

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