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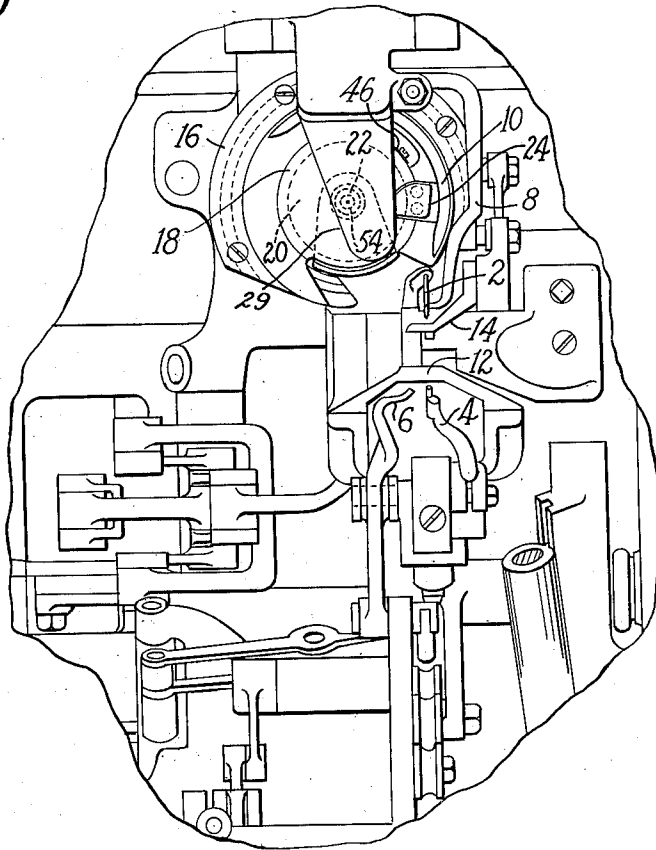
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LOCK STITCH SEWING MACHINE

Filed May 17, 1957

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Fig. 1



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Fig. 2

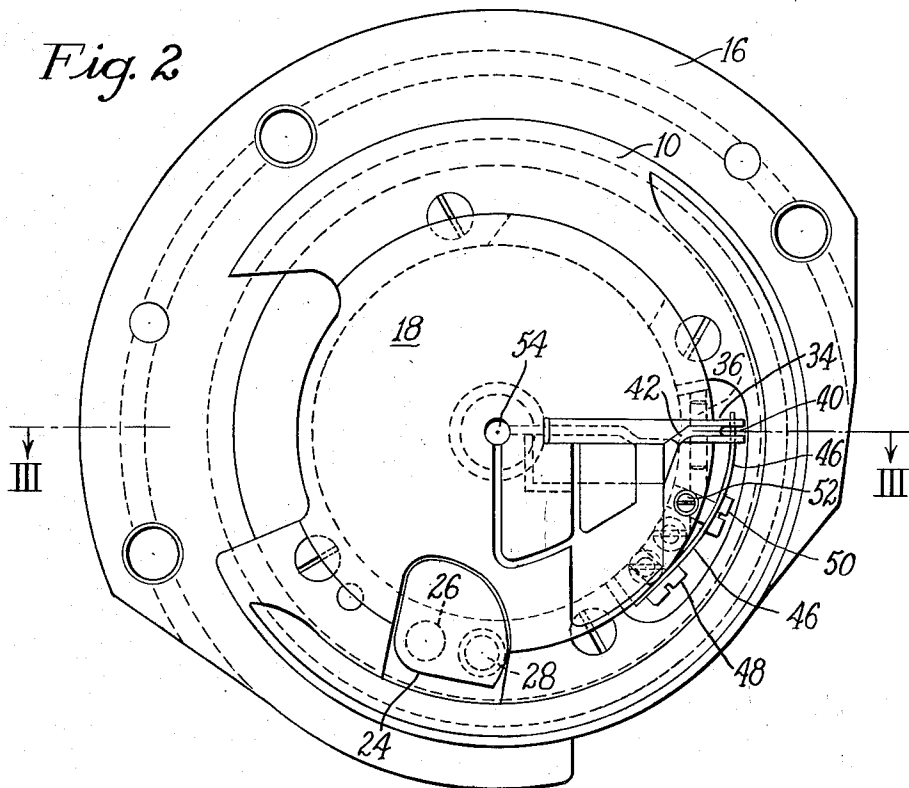


Fig. 3

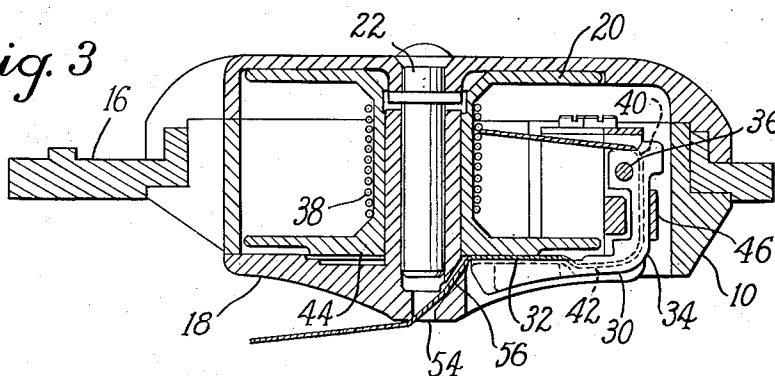
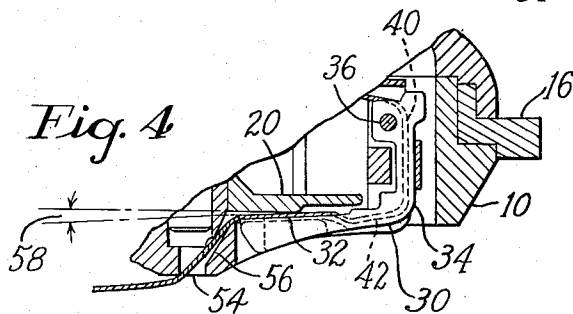


Fig. 4



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LOCK STITCH SEWING MACHINE

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5 Claims. (Cl. 112—233)

This invention relates to lockstitch shoe outsole sewing machines of the hook needle type having an improved form of shuttle for preventing entanglement of locking thread within a supply retainer and is herewith illustrated as embodied in a locking thread supply retainer for a sewing machine of the type disclosed in United States Letters Patent No. 2,056,670, granted October 6, 1936, in the names of Gouldbourn et al.

The machine of the patent above referred to is particularly intended for use in sewing outsoles to shoes of the Goodyear welt type and the shuttle of that machine has rotatably mounted within it a locking thread supply retainer or case carrying a flanged bobbin with a quantity of thread wound between its flanges. The thread case in that machine is held stationary and the shuttle rotates continuously to carry each loop of needle thread about the locking thread supply case. It has been proposed to employ in that machine a locking thread manufactured with fibers having a certain number of twists per inch of thread and then to utilize a shuttle having an integral thread supply retainer or case, or at least one which is not mounted for rotation in the shuttle, so that the rotation of the shuttle modifies the number of twists per inch as the thread is withdrawn from the thread retainer or case into the work. In this way, a highly twisted thread may be provided on the supply bobbin and as the shuttle with the retainer case rotates some of the twists in the thread are removed, so that the thread becomes much softer and more readily conformed to the configuration required, according to desirable sewing practices. In modifying the twist in this way it has been found that difficulty often is encountered from a tendency for the thread to become entangled within the thread retainer case as the result of use of high twist thread when a modifying twist works its way from the work back into loose accumulations within the thread case. To avoid this difficulty the usual form of frictional thread tension device is ineffective, the irregular withdrawal of thread common with sewing operations causing the supply bobbin to overrun excessively and to create large accumulations of loose easily entangled thread within the locking thread retainer case.

It is an object of the invention to prevent overrunning of a bobbin in a locking thread supply case or other retainer for a lockstitch shoe sewing machine of the type referred to, and more particularly to prevent accumulations and consequent entanglement of hard twisted thread contained on a supply bobbin when the thread retainer for supporting the bobbin rotates with the shuttle in a manner to modify the twist in the thread, the means for preventing overrunning in the bobbin also serving to concentrate the modification of the twist in the thread outside the thread case between it and the work.

As illustrated in the accompanying drawings, the means for preventing overrunning of the bobbin and working back of the modifying twist in the thread into the thread supply case or retainer comprises a thread-engaging member yieldingly mounted on the thread supply retainer in-

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dependently of the bobbin between which thread-engaging member and the bobbin the thread is frictionally pressed. By such construction rotation of the bobbin in the supply retainer is controlled by direct frictional engagement of the bobbin with the thread, the thread movement furnishing a fresh, fibrous frictional surface for stopping the bobbin rotation after each length of thread is withdrawn therefrom.

Preferably, the pressure member is in the form of an arm pivoted on the locking thread supply retainer and is provided with a friction surface to force the thread against a flange of the bobbin. In one form of the pressure member its initial force is exerted by a yielding member mounted on the supply retainer and to reduce the force of the yielding member in proportion to the tension on the thread exerted during its withdrawal a guide is formed in the retainer extending from the pressure member at an angle to the friction surface on the pressure member.

These and other features of the invention, as herein described and claimed, will be apparent from the following detailed description taken in connection with the accompanying drawings, in which

Fig. 1 is a view in front elevation of a portion of a lock stitch shoe sole sewing machine including a shuttle and a locking thread supply retainer embodying the features of the present invention;

Fig. 2 is a detail view in front elevation of the shuttle and retainer, including a raceway for the shuttle in the machine of Fig. 1;

Fig. 3 is a sectional view of the shuttle retainer and raceway taken along the line III—III of Fig. 2 while the rotation of the bobbin is stopped by a thread pressure member; and

Fig. 4 is a sectional detail view taken along the line III—III of Fig. 2, illustrating the position of the thread pressure member shown in Fig. 3 during withdrawal of thread.

The illustrated machine is a lock stitch shoe outsole sewing machine similar to that disclosed in the Gouldbourn et al. patent above identified, having stitch-forming, and work supporting and feeding devices including a curved hook needle 2, a needle looper 4, a thread finger 6, a loop spreader 8, a continuously rotating shuttle 10, a work support 12, and a presser foot 14, all operating in a manner described more fully in the patent. The shuttle is hollow and is formed in two parts secured rigidly together and having between them a circular recess into which is fitted a flanged raceway plate 16 secured rigidly to the frame of the machine. Instead of providing a locking thread supply case rotatably mounted within the shuttle, as in the patented machine, the illustrated machine is equipped with a locking thread supply retainer 18 removably mounted on the shuttle and arranged to rotate with the shuttle in such a way that a modifying twist is impressed upon the thread extending from the retainer toward the work. Advantage is taken of the modifying twist impressed upon the thread in the provision of a relatively hard twisted thread arranged to be partially untwisted by the rotation of the shuttle and the thread retainer during operation of the machine. By so doing the locking thread is more readily formed into stitches and drawn more uniformly to a fixed depth within the work by the other stitch-forming devices, the thread being rendered more flexible and of softer texture by reason of the untwisting action.

The thread retainer 18 is formed with a central sleeve portion upon which is rotatably mounted a flanged bobbin 20 for carrying the supply of locking thread. The sleeve portion of the retainer 18 has a central bore of a diameter to fit a spindle 22 secured on the rear wall of the shuttle, the parts of the shuttle providing a cylindrical recess into

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which the bobbin is received and the retainer having at its forward end a radial flange portion forming a cover for the bobbin receiving recess of the shuttle. To insure that the supply retainer 18 rotates uniformly with the shuttle a circumferential portion of the flange on the retainer is cut away leaving a lip to fit beneath a plate 24 (see Fig. 2) secured to the shuttle. To enable the removal of the retainer from the shuttle the plate 24 has an integral pin 26 rotatably mounted on the shuttle and a spring-pressed ball 28 fits a depression on the under side of the plate. When the plate is rotated in a clockwise direction as viewed in Fig. 2, it clears the retainer for easy removal; otherwise, the locking thread supply retainer has no further need for means of securement within the shuttle as by a separate swinging plate engaging its outer exposed face, as in the machine of the prior patent. However, such a plate is illustrated at 29 in Fig. 1, but this plate is used only to control the movements of the needle thread.

To prevent overrunning of the bobbin 20 and any possibility of the modifying twist imparted to the locking thread between the shuttle and the work from working its way back into the retainer recess within the shuttle in a manner to entangle or otherwise disturb the free withdrawal of thread, the illustrated shuttle is equipped with a novel pressure member 30 engaging directly with a portion of the thread, which pressure member is mounted yieldingly on the thread supply retainer to force the thread laterally into live frictional contact with the bobbin.

The pressure member 30 has a flat friction surface 32 formed at its free end, and an angular thread guide arm 34 rotatable for free swinging movement relatively to and independently of the retainer on a pin 36, supported in an arcuate wall of the locking thread supply retainer 18, the arcuate wall portion of the retainer being slotted to receive the pressure member 30 and the free end of the pressure member extending along an outer flange of the bobbin towards its center of rotation.

The locking thread contained on the bobbin is indicated at 38 and is unwound from the bobbin by intermittent pull on the thread extending from the thread retainer, which pull is exerted by each needle loop as it is drawn into the work to set each stitch. Inherently the motion of thread withdrawal is intermittent and at high speed, producing a strong rotational tendency for the bobbin to overrun and unwind thread within the recess in the shuttle for the thread retainer. For this reason there is danger that the locking thread will become entangled and broken.

The locking thread as it leaves the bobbin 20 extends radially outwardly from its hub into an open slot 40 entering the outer surface of the arm 34 close to the pin 36 and extending about the angle of the arm toward a position in front of the bobbin 20. The depth of the slot is so chosen that the locking thread will not be engaged by any other part along the slot and will be withdrawn freely. After passing the angle in the arm of the pressure member 30, the slot 40 terminates and the thread is guided by an angular groove 42 from the front of the arm rearwardly beneath it, so that a portion of the thread is carried between the surface 32 of the arm and the bobbin flange. Along the friction surface 32 of the arm is a shallow trough cut less deeply than the groove 42 in order to hold the thread in position along the surface while exposing a substantial proportion of the thread thickness. In this way the movement of the surface 32 toward the outermost bobbin flange presses the thread firmly against the flange of the bobbin, which is formed with a flat surface 44 to apply a fixed thread tensioning force to the locking thread. In so doing, the surface 44 of the bobbin flange meets with substantial frictional resistance for braking its rotation and the thread, as it is withdrawn from the bobbin, supplies a constantly renewed fresh frictional wearing surface. The pressure of the thread against the outer bobbin flange acts not only directly to retard rotation of the bobbin, but it also presses the bobbin rearwardly along the sleeve portion of the retainer 18 and

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against a rearward wall of the shuttle, the rearward wall being machined to fit closely with the rearward flange of the bobbin. Thus, the force of the pressure member has two frictional effects on the bobbin, one along the surface 44 of its forward flange, and the other along the rearward surface of its rearward flange.

To cause a fixed tensioning force to be applied yieldingly by the pressure member 30 to the portion of locking thread, the portion of the arm 34 comprising the pressure member between the pin 36 and the angle in the arm is engaged by an arcuate resilient leaf spring 46, secured to an arcuate portion of the retainer by a screw 48 passing through the spring into the container, the spring 46 being disposed between the retainer and the arm 34. To adjust the force of the spring 46 its central portion is perforated to receive a screw 50 also threaded into the arcuate portion of the retainer and capable of being clamped in adjusted position by a locking screw 52.

For convenience in thread withdrawal from the locking thread supply and to overcome the irregular effects of static friction, the locking thread is withdrawn from the thread retainer in a direction axially of the bobbin through a guide consisting of an eye 54 formed concentrically to the axis of shuttle rotation. Between the eye 54 and the friction surface 32 on the pressure member the locking thread extends through an angle to the friction surface 32 in a direction to counteract the yielding force of the spring 46 in accordance with the thread tension. Thus, the pressure of the member is quickly reduced when the thread starts to be withdrawn from the bobbin, offsetting any tendency to cling to the surface 44 of the bobbin flange and the tension is controlled more nearly dynamically rather than statically.

To guide the thread between the pressure member 30 and the axial eye 54 it passes through an inclined passageway 56 just before it leaves the end of the pressure member. Under static conditions when a demand for locking thread arises the angle in the thread as it enters the guide 56 causes the pressure member to swing about the pin 36 through an angle 58 (see Fig. 4) quickly reducing the pressure on the thread and avoiding irregular or excessive frictional resistance while maintaining a uniform dynamic frictional force thereon. As soon as the demand for locking thread ceases, the tension in the thread drops abruptly causing the thread to be pressed with substantially the force of the spring 46 against the flanged surface 44 of the bobbin, stopping its rotation and preventing overrunning. Because of the fact that the surface 44 of the bobbin flange is flat the locking thread as it passes between the pressure member of the surface 44 also is flattened slightly on one side and kept from twisting and displacement beneath the friction surface 32 of the arm 34. By keeping the thread from twisting beneath the pressure member 30 any modifying twist impressed on the thread by the rotation of the shuttle is kept from working its way back into the space occupied by the bobbin and between its flanges where loose thread or accumulations might possibly be entangled. In this way the danger of thread entanglement is substantially reduced and maximum uniformity in thread withdrawal is insured.

The nature and scope of the invention having been indicated and a particular embodiment having been described, what is claimed is:

1. A sewing machine locking thread supply retainer containing a bobbin on which a supply of locking thread is wound, having in combination therewith means to prevent overrunning of the bobbin comprising a thread engaging member pivoted to the thread retainer and formed with a friction surface for pressing the thread against the bobbin.

2. A sewing machine locking thread supply retainer containing a bobbin on which a supply of locking thread is wound, having in combination therewith means to prevent overrunning of the bobbin comprising a thread en-

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gaging arm pivoted to the thread retainer for movement toward and from the bobbin and formed with a friction surface for pressing the thread against the bobbin, a yielding member on the supply retainer acting on the arm to apply a fixed thread tensioning force to the thread running between the arm to the bobbin and a guide for the thread extending from the arm at an angle to the friction surface thereon, to counteract the force of the yielding member as the thread is withdrawn from the bobbin.

3. A rotary shuttle for a sewing machine having a locking thread supply retainer in the shuttle containing a flanged bobbin between the flanges of which a supply of locking thread is wound, in combination with means to prevent overrunning of the bobbin comprising a thread engaging arm pivoted on the thread supply retainer for movement toward and from the bobbin and formed with a friction surface between which and one flange of the bobbin the thread is pressed, a yielding member on the thread case acting on the arm to exert a fixed thread tensioning force on the thread running between the arm and said bobbin flange in a direction to press the other flange of the bobbin against the thread case and a guide formed concentric to the axis of shuttle rotation for the thread extending from between the arm and the first-mentioned bobbin flange in a direction to counteract the force of the yielding member as the thread is withdrawn from the outlet.

4. A lock stitch shoe sewing machine, having a hook needle, a continuously rotating shuttle including a locking thread case rotating with the shuttle and containing a bobbin on which a supply of locking thread is wound and other stitch-forming devices for carrying loops of thread from the needle to the shuttle and for retracting each needle loop from the shuttle to draw the locking thread surrounded by each loop into the work, the direction of rotation of the shuttle causing the locking thread

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running between the bobbin case and the work to be untwisted, in combination with means to prevent overrunning of the bobbin comprising a thread engaging member on the thread case for pressing the thread against the bobbin frictionally, and a guide for the thread disposed at an angle to that portion of the thread pressed between pressure member and the bobbin to counteract the pressure of the said member on the thread as the thread is withdrawn from the guide.

5. A sewing machine locking thread supply retainer containing a relatively rotatable flanged bobbin from which a supply of locking thread is unwound intermittently, producing a strong rotational tendency for the bobbin to overrun, said retainer having in combination therewith means to prevent overrunning of the bobbin in the retainer as the thread is withdrawn, comprising a thread-engaging arm, means for mounting the thread-engaging arm on the thread supply retainer for free movement relatively to and independently of the retainer and the bobbin, between which thread-engaging arm and a flange of the bobbin the thread is directly pressed frictionally, and resilient means disposed between the thread supply retainer and the arm for actuating the arm to apply a tensioning force yieldingly to the portion of the thread running between the thread-engaging arm and the bobbin flange.

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