Oct. 29, 1940. O. R. HAAS 2,219,308

WAX THREAD SEWING MACHINE

Filed April 24, 1939

Fig. 1

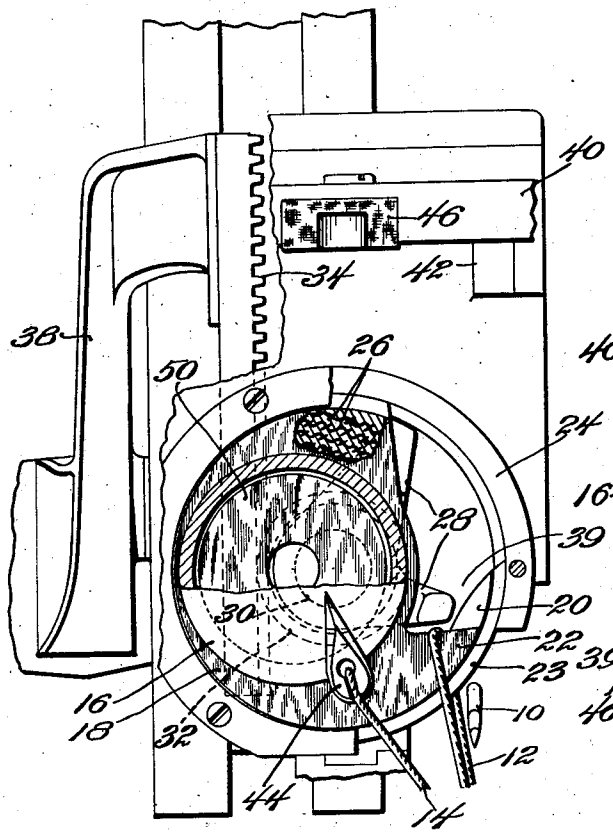


Fig. 2

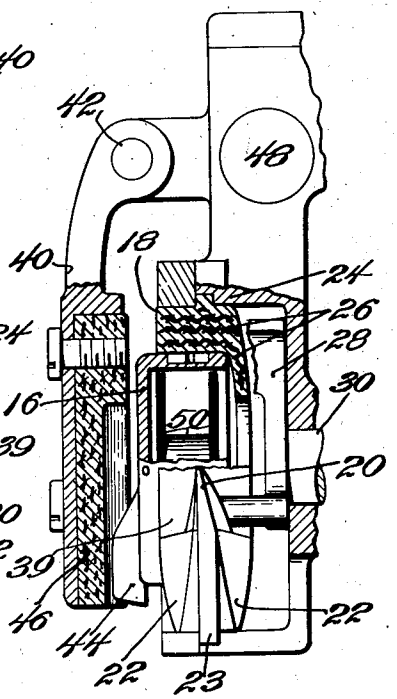


Fig. 3

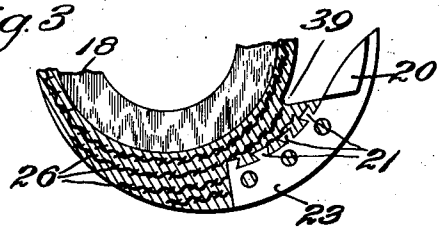
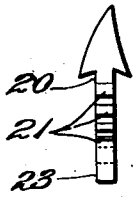


Fig. 4



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UNITED STATES PATENT OFFICE

2,219,308

WAX THREAD SEWING MACHINE

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13 Claims. (Cl. 112—38)

The present invention relates to shoe sewing machines of the waxed thread type, and more particularly to rotary shuttles or loop takers for hook needle sewing machines in which the supply of thread is kept heated to a temperature sufficiently high to prevent the wax from congealing before reaching the seam.

A common problem in all waxed thread sewing machines is in keeping the wax in working condition without subjecting it to excessively high or rapid change in temperature. The waxes employed are generally of low grade, and unless the heat supplied to the thread engaging parts is carefully regulated to maintain an even temperature below a critical point, wax on the thread or accumulations on the parts will become cracked and burned. As a result, the lubricating and seam sealing qualities of the wax are lost. With improper lubrication of the thread in a hook needle sewing machine the thread will not pass smoothly about the thread engaging parts, but will become frayed and broken. Another cause of damage or broken thread in a machine of this type is due to obstructions encountered by the thread in passing about the rotary loop taker or shuttle, particularly of a lockstitch sewing machine wherein a supply of locking thread is contained within a case supported by and held from rotation within the loop taker. In order to permit smooth passage of loops of needle thread about the loop taker, the surfaces of the loop taker are carefully and accurately finished with a high polish. Roughness or irregularity of any kind on the thread engaging surfaces of the loop taker will result in rapid accumulations of hardened wax or other materials and thread damage or breakage. Furthermore, to permit passage of a needle loop about a non-rotating thread case held within a loop taker which passes with the thread case through the needle loop, there must be a loose engagement between the loop taker and its driver, and also between the thread case and the means for holding the thread case from rotation within the loop taker. Insufficient polish along the cooperating surfaces of these parts is particularly destructive to the thread, due to the tendency of the thread to jam at the points of contact between the engaging surfaces of the parts.

The objects of the present invention are to provide a sewing machine of the type indicated in which the difficulties enumerated are to a great extent eliminated and in which there is less necessity for accurate control of the temperature to which the thread engaging parts of the machine are heated. A further object is to provide an efficient sewing machine having a simple and more economical construction than heretofore.

With these and other objects in view, the present invention contemplates the provision of a wax thread shoe sewing machine having a rotary loop taker formed with the principal thread engaging surfaces of synthetic resin material. While the loop taker, according to the construction illustrated is provided with a metal beak or other reenforcement, in order to furnish greater strength where the parts are subject to unusual strains, such reenforcement is of advantage only with the heaviest classes of work, care being taken to avoid exposure of metal surfaces at those points where the problem of thread passage is acute.

Modern synthetic resins are entirely impervious to waxes commonly employed to impregnate sewing threads and, as a result, there is less tendency for the waxes to accumulate on roughened surfaces of a loop taker composed of these materials. Also where the thread is required to pass between the loop taker driver and the loop taker, or between the thread case and the means for holding the thread case from rotation with the loop taker, if synthetic resin material is employed at one of each pair of cooperating surfaces between which active engagement is made, a substantial reduction in the tendency of the thread to jam results. The reduction in jamming may be due either to the ability of the resin material to receive a high polish with little effort or from the effect of its low heat conducting quality on the wax. Another advantage of synthetic resin in one of a pair of actively cooperating surfaces is that resiliency in the resin causes an absorption of noise and destructive vibration at points where looseness in engagement is necessitated by the passage of thread between said surfaces.

A further feature of the invention relates to the use in a lockstich shoe sewing machine of a cup-shaped loop taker having its circular side walls of synthetic resin material arranged to rotate in a circular heated raceway and to have its enclosed locking thread supply heated through the resin material of the side walls, thus retarding the flow of heat transmitted and avoiding rapid cooling, or concentration of heat at more exposed points in the locking thread supply. This feature of the invention is embodied in a sewing machine in which the locking thread

supply is further protected from too rapid cooling or heating by supporting the supply on a bobbin reel also composed of synthetic resin material, and this feature is of advantage either when employed with the loop taker of the type referred to or when employed in a loop taker composed wholly of metal.

These and other features of the invention will be more clearly understood from the following detailed description taken with reference to the accompanying drawing.

In the drawing Fig. 1 is a view in front elevation of a portion of a shuttle for a sewing machine embodying the features of the present invention, parts having been broken away and shown in section; Fig. 2 is a sectional view in side elevation of the parts illustrated in Fig. 1; Fig. 3 is a sectional view of a portion of the shuttle illustrated in Fig. 1; and Fig. 4 is an edgewise view of a metal insert for the shuttle.

The shuttle or loop taker illustrated in the drawing is constructed to operate in a machine similar to that disclosed in U. S. Letters Patent to French and Meyer No. 473,870 of April 26, 1892, and cooperates with a curved hook needle 10, and other stitch-forming and work feeding devices more fully described in the patent to form a lockstitch seam, a loop of needle thread 12 being indicated in a position assumed during passage about a supply of locking thread 14 contained in a circular thread case 16 of usual metal construction, as illustrated in the patent.

The shuttle of the present invention has a main cup-shaped body 18 molded from synthetic resin preferably of the phenolic or urea type base. When molded of these materials, a shuttle results which has sufficiently smooth external surfaces to permit immediate use after the mold marks and fins have been removed. The nature of the material used is such that even if glassy surfaces are not formed in molding, there is less tendency for wax covered thread to adhere or become frayed by irregularities in the surfaces particularly after said surfaces receive a wax coating from contact with the thread, and those parts of the shuttle engaged by the thread quickly receive a high polish in spite of the wax by movement of the thread along them when the shuttle is placed in use. These results are due at least in part to an unusual quality of the resinous material which tends to prevent hardening or burning of the wax so as to cake and pile up on the thread engaging surfaces of the resin. Also the advantages in the use of the resinous material may follow from the ability of the material, after long continued use, to resist grooving by the thread to such an extent as occurs with metal shuttles or loop takers.

In order to obtain a maximum strength, the illustrated shuttle is suitably reenforced. A reenforcement at the beak of the shuttle is provided by inserting into the mold in which the shuttle is formed, a curved steel beak plate member 20 having perforations and dovetailed teeth 21 along one edge to obtain a rigid grip in the resin material. The tip of the metal member has the same shape as the beak of the shuttle in the patent, but below the tip the member is reduced in width so as to be covered by wedge-shaped portions 22 of the resin shuttle body, which portions assist in spreading the needle loops in their passage about the shuttle. The inserted member also is formed with an outer rib 23 merging with the outer circumferential line of the shuttle to provide a wearing surface engaged by a raceway 24 on the machine frame in which the shuttle is rotatably supported. The shuttle body is further reenforced by strips of canvas 26 or other material having fibres running lengthwise about the circular side walls of the cup-shaped body and also from the circular side walls into an end wall of the cup formed by the body.

When the needle 10 withdraws from the work with a loop of needle thread in the machine of the patent, it is transferred from the hook of the needle to the shuttle, sliding over the beak and into the throat of the shuttle, as indicated in Fig. 1. In entering the throat of the shuttle, the thread passes between cooperating surfaces on the shuttle, and on the lowermost arm of a shuttle driver 28 similar to that disclosed in the patented machine. The driver 28 is secured to a shaft 30 mounted in bearings in the machine frame and arranged to rotate first in a counter-clockwise direction to cause the needle loop 12 to be carried about the shuttle and thread case, and then in a clockwise direction to return the shuttle to its original position. To rotate the driver 28 in this manner, the rearward end of the shaft 30 has secured to it a bevel gear 32 meshing with a toothed segment 34 at the end of a cam actuated lever 36. The driver 28 is so shaped that it will enter a cut-away portion 38 of the shuttle body which forms the throat of the shuttle. The driver engages loosely with the surfaces of the shuttle within the cut-away portion 38. During the counter-clockwise rotation of the shuttle, the upper arm of the driver contacts the shuttle body along the uppermost surface of the cut-away portion, leaving a space between the lower arm of the driver and the shuttle body for passage of the needle loop 12. Before the shuttle reaches the end of its counter-clockwise rotation, the needle loop has passed between the lowermost arm of the driver 28 and is moving along the surface of the shuttle towards the uppermost arm of the driver. To provide a space for the thread between the uppermost arm and the shuttle body, the shuttle continues to rotate after the driver 28 reaches the end of its counter-clockwise rotation either through its own momentum or due to the tension on the needle loop 12 until the space between the lowermost arm of the driver 28 and the shuttle body is closed, and the surface engaged by the uppermost arm of the driver moves away from said arm. As a result of the relative movement between the driver and the shuttle, a continuous series of impacts is produced with the cooperating surfaces of the shuttle and, when the machine is operated at high speeds, the shuttle may vibrate at high periodicity at the end of each rotation even while the needle thread is passing between the arms of the driver and the cooperating surfaces of the shuttle body, thus causing the needle thread to be pinched and retarded in its movement along the surfaces of the shuttle body. Also the wax becomes hardened and burned causing the parts to stick together, further retarding the movements of the thread. With the use of synthetic resin in the present machine, the impacts between the cooperating surfaces of the driver and shuttle are substantially reduced with a resulting reduction in noise and vibration. The tendency of the parts to adhere from hardened wax so as to retard the movement of the thread is also materially lessened.

A similar thread retarding action in the machine of the patent occurs as the needle loop is

being drawn from the shuttle between the thread case and a retainer arm 40 pivoted at 42 to the frame of the machine, the thread case being formed with a projecting nose 44, the sides of which are engaged loosely by surfaces on the retaining arm. The space between the retainer and thread case may become choked with hardened wax. To facilitate movement of the needle loop, and to reduce the effects of vibration of the nose of the thread case between the cooperating surfaces on the retainer arm 40 in the present machine, a slotted block 46 of a resin material similar to that which forms the shuttle body is secured to a recess in the arm 40, the sides of the slot in the block surrounding the nose 44.

As in the machine of the patent, the raceway 24 for the shuttle has mounted within it a heating element 48 to conduct heat to the raceway and through the circular walls of the cup-shaped shuttle body into the locking thread supply within the thread case. The temperature of the parts thus heated is usually controlled by a valve or an electrical rheostat which is adjusted according to the operator's judgment. Where the machine is not used continuously, the heater may be left on or turned off and on a number of times a day, causing the wax on the thread to be overheated or cooled rapidly. Overheating, as well as alternate rapid cooling and heating have undesirable effects on the wax. The resin material of the shuttle body in the present machine being of lower heat conductivity than the metal shuttle body of the patented machine, there is less opportunity for the locking thread supply within the thread case to be overheated or cooled too rapidly. As a result, there is less opportunity for the wax on the thread to deteriorate or to become cracked and hardened and a more even distribution of the heat in the thread supply is effected.

To further retard the flow of heat towards and from the thread supply, and to provide an effective construction which may be manufactured more economically than heretofore, the supply in the thread case of the machine illustrated is contained on a bobbin reel 50 composed in its entirety of molded synthetic resin. Thus, with the circular walls of the shuttle body acting to retard the flow of heat to the thread case, the supply on the reel is effectively guarded against the effects of sudden heating or cooling by the central tubular sleeve and side flange portions of the reel 50.

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

1. A rotary loop taker for use in combination with the stitch-forming devices of a waxed thread sewing machine formed with thread engaging surfaces of synthetic resin material.

2. A rotary loop taker for use in combination with the stitch-forming devices of a waxed thread shoe sewing machine formed with thread engaging surfaces of waxed synthetic resin material and a pointed metal beak.

3. A rotary loop taker for use in combination with the stitch-forming devices of a waxed thread shoe sewing machine formed with thread engaging surfaces of synthetic resin material and a pointed metal beak embedded within the material of the loop taker and arranged with wedge portions of resin material at either side, the surfaces of which wedge portions act to spread the needle loop during passage about the loop taker.

4. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a needle thread loop taker, and means for rotating the loop taker and for holding the thread case from rotation with the loop taker provided with pairs of cooperating waxed surfaces between which the needle thread passes as the needle loop is carried about the thread case, at least one in each pair of said surfaces being of synthetic resin material.

5. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a needle thread loop taker, formed with thread engaging surfaces of waxed synthetic resin material, and a metallic driver between which and the loop taker the needle loops pass arranged to contact the loop taker along certain of said surfaces with a loose engagement to provide spaces through which the needle loop passes as it is carried about the thread case.

6. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a needle thread loop taker, and retaining means between which and the thread case the needle loops pass provided with thread case engaging surfaces of waxed synthetic resin material to hold the thread case from rotation with the loop taker.

7. A waxed thread lockstitch sewing machine having, in combination, stitch forming devices including a rotary loop taker, a locking thread supply case supported by the loop taker and arranged with a projecting member to be held from rotation as the loop taker rotates, and a thread case retainer comprising an arm movable towards and from the thread case and a slotted block of synthetic resin material carried by the arm to surround the projecting member of the thread case.

8. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a needle thread loop taker of synthetic resin material and a heated raceway in which the loop taker is supported, arranged to transmit heat through resin walls of the loop taker to the locking thread supply within the thread case.

9. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a cup-shaped needle thread loop taker formed of synthetic resin material reenforced with fibre layers having fibres extending lengthwise around circular side walls of the cup.

10. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, and means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a cup-shaped needle thread loop

taker formed of synthetic resin material reenforced with fibre layers having fibres extending lengthwise from circular side walls into an end wall of the cup.

11. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a needle thread loop taker, formed of synthetic resin material, a raceway in which the loop taker is supported for rotary movement, and a metallic insert embedded in the material of the loop taker forming a wearing surface engaged by the raceway.

12. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a needle thread loop taker formed of synthetic resin material, a raceway in which the loop taker is supported for rotary movement, and a metallic loop entering beak plate embedded within the material of the loop taker forming a wearing surface engaged by the raceway.

13. A waxed thread lockstitch shoe sewing machine having, in combination, stitch-forming devices including a locking thread supply case, means for supporting the thread case and for carrying loops of needle thread about the thread case comprising a needle thread loop taker formed with circular side walls of synthetic resin material, a heated raceway in which the loop taker is supported arranged to transmit heat through the circular resin walls of the loop taker to the locking thread supply within the thread case, and a thread supply reel within the thread case having side flanges of synthetic resin material.

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