Sept. 1, 1964 R. W. BRADSHAW 3,146,744

ROTARY SHUTTLE

Filed Sept. 18, 1961

Fig. 1

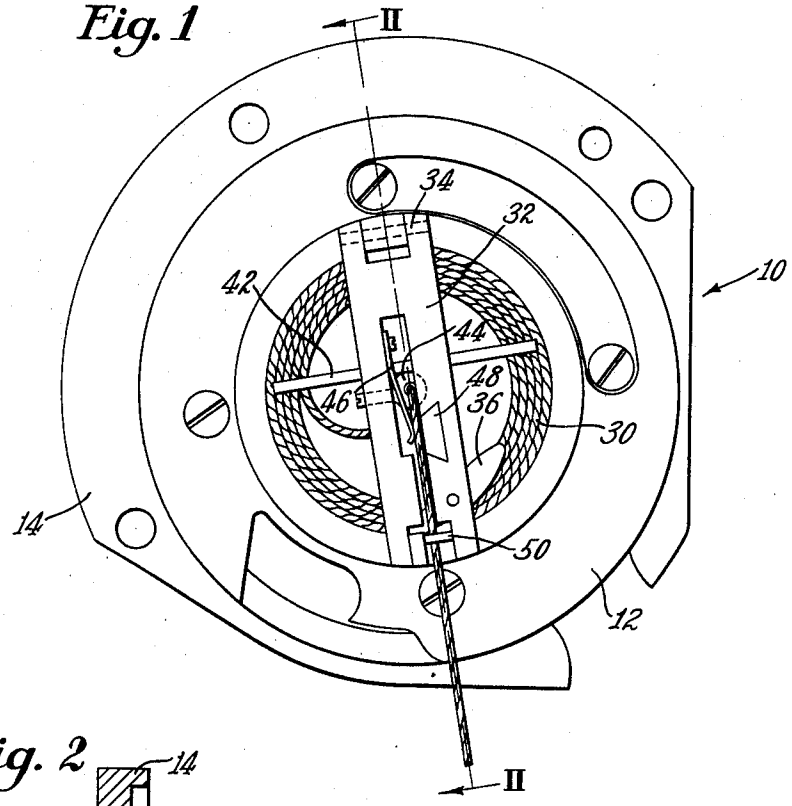


Fig. 2

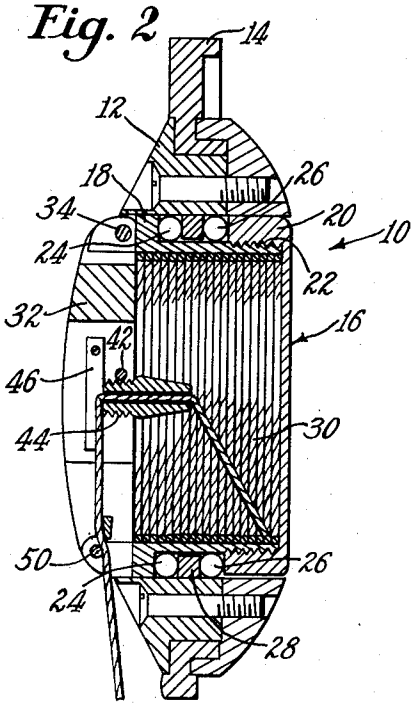
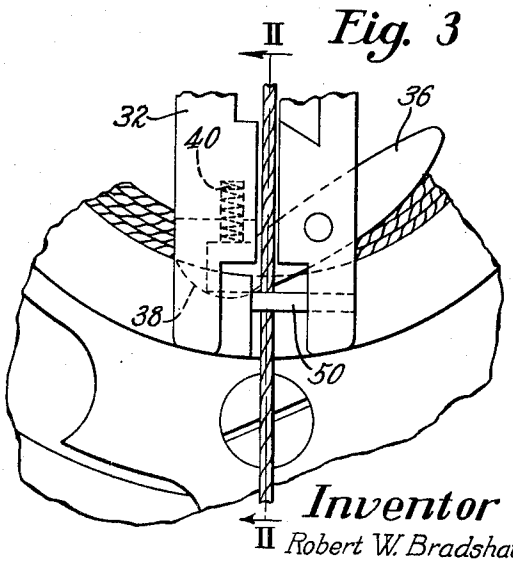


Fig. 3



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ROTARY SHUTTLE

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2 Claims. (Cl. 112—232)

This invention relates generally to sewing machines, and has particular reference to an improved rotary shuttle for use with machines of the type shown in United States Letters Patent No. 2,056,670, granted October 6, 1936, in the name of Joseph Gouldbourn et al.

Lockstitch sewing machines suitable for sewing an outsole to a welt of a welted shoe and as disclosed in said patents comprise a true shuttle which engages a loop of needle thread drawn through the work by a hooked needle and itself passes through the loop of needle thread during each stitch forming cycle and also carries the loop around a supply of locking thread contained in a locking-thread case rotatably mounted within the shuttle. The locking thread is usually wound on a bobbin which is, in turn rotatably mounted on a sleeve which projects forwardly from a rear wall of the locking-thread case.

The locking-thread case also is rotatable on a pin which projects forwardly from a rear wall of a cylindrical recess in the shuttle in which recess the locking-thread case is housed, and the shuttle is rotatably mounted in a raceway which is secured to the machine.

The locking-thread case is prevented from rotating with the shuttle by the engagement of a groove in the front face of the locking-thread case with a projection on a retainer member which is pivoted on the machine and which extends downwardly in front of the locking-thread case. The retainer member also prevents the locking-thread case from moving forwardly and falling out of the shuttle. There is, however, sufficient room between the projection and groove to allow a loop of needle thread, in passing around the locking-thread case, to pass between the projection and the groove and to be drawn down to the work.

The shuttle is usually rotated continuously two or three times during each cycle of the machine and the machine is capable of operating to insert one thousand stitches per minute.

We have found that when lockstitch sewing machines constructed in the above manner are operated at the relatively high speed indicated, comparatively rapid wear takes place between the aforesaid sleeve and pin. Such rapid wear not only necessitates undesirably frequent renewal of the parts which are somewhat costly but is also likely adversely to affect the quality of the stitching.

We have also found that this wear of the parts is, to some extent, due to the fact that the locking thread passes from the bobbin out of the locking-thread case through a hole in the side wall of the case. Such an arrangement is likely to cause a lateral pull to be exerted on the shuttle thread case and cause it to bear against the side of the recess in the shuttle. Such binding of the locking-thread case causes it to tend to rotate with the shuttle and thus cause one side of the groove in the front face of the locking-thread case to be pressed against the retainer projection and prevent the locking thread case from moving freely out of the way of a needle loop at the time when the needle thread is being drawn down from around the locking-thread case to pass between the aforesaid groove in the front of the case and the retainer projection. Hence, the loop of needle thread may meet with excessive frictional resistance from passing between the groove and retainer projection, and the needle thread may be broken or the stitching adversely affected.

An object of this invention is to provide an improved lockstitch shuttle assembly having novel means for restraining the locking thread case against rotation which eliminates interference and excessive resistance to the passage of a thread loop over the case.

A further object of the invention is to provide a shuttle assembly of the type described so constructed as to prevent wear between the locking thread case and the shuttle resulting from laterial resistance producing forces on the locking thread case.

Other objects of the invention will be obvious to one skilled in the art from the following detailed description of a specific embodiment thereof.

In the drawing,

FIG. 1 is a front elevation of a shuttle assembly embodying the features of the invention;

FIG. 2 is a view in section taken on line II—II of FIG. 1; and

FIG. 3 is an enlarged view of a portion of FIG. 1 illustrating the latch mechanism of the cop retainer.

Referring to the drawing, there is illustrated a shuttle assembly **10** which is adapted for use on a lock stitch sewing machine in the same manner as illustrated in the above-identified patent.

The shuttle assembly **10** comprises a true shuttle **12** rotatably disposed in a raceway member **14** which is mounted in the machine. The shuttle **12** is driven by mechanism (not shown) as described in the above-mentioned patent, to pass a thread loop over the supply of locking thread and at the same time passes through the loop itself, as distinguished from a loop taker which does not itself pass through the needle loop while passing it about the thread case. The shuttle **12** has an internal aperture receiving a housing or a case **16** for containing the locking thread. The case **16** comprises front and rear portions **18** and **20** having co-operating threaded portions **22**, which when screwed together retain in place two complete rows **24** and **26** of evenly spaced ball bearings, which are separated by a ring **28** pressed into position inside the shuttle aperture.

The two rows of ball bearings, in co-operation with the ring **28**, prevent endwise movement of the case and also permit the shuttle to rotate freely about the case, with only a minimum amount of force being required otherwise to restrain the case against rotation as the sewing operation proceeds.

According to the present invention the ball bearing mounting **24**, **26** for the thread case avoids the necessity for using a mechanical thread case retaining member to restrain rotation of the thread case. However, a loop taker, which itself does not pass through each needle loop must carry the loop between itself and the thread case. For this reason it has not been possible to provide an adequate ball bearing mounting for a thread case in a loop taker, so that it is essential for a sewing machine so equipped to have a mechanical retaining member.

In the illustrated embodiment the case **16** is adapted to receive the locking thread in the form of a self supporting cop **30**, with the thread being drawn from the center thereof. To hold the cop in the case **16**, a bar **32** is disposed across the front of the case and is joined thereto by a hinge **34** at one end and held in the position indicated by a latch **36** at the other end. The latch **36** is adapted to seat in a recess **38** in the case, and is biased into the locking position by a spring **40**. To assist further in holding the cop in place within the case, a transverse bar **42** is secured to and extends outwardly beyond the bar **32**. A tubular thread guide **44** is secured to the transverse bar and extends along the central axis of the ball bearings substantially to a midposition thicknesswise of the thread case **16**.

Because the tubular thread guide extends into the thread

case the angular lead of thread running from the inside of the cop varies less than it would if the thread were merely drawn through a hole in the side of the thread case. As a result the tension on the thread is kept uniform with less likelihood of snarling the thread.

A thread tensioning spring 46 and a wear block 48 between which the thread passes after passing out of the thread guide 44 are disposed on the outer side of the bar 32. To insure that the moving thread travels through the tensioning device, and for a further purpose to appear hereinafter a second thread guide in the form of a pin 50 is provided on the bar 32 in a position offset from the axis of the housing under which the thread passes before passing downwardly to the work.

The locking thread case 16 is freely rotatable in relation to the shuttle by reason of the very small frictional force offered by the ball bearing mounting. For this reason during rotation of the shuttle, only a small restraining force is required to prevent rotation of the case. This restraining force is provided by the engagement of the pin 50 with the portion of the locking thread extending to the work, which is maintained under tension by the spring 46, thus keeping the tension constant.

The above described structure insures that the friction and wear on the parts will be a minimum, since during a sewing operation any lateral force applied to the case, tending to cause frictional binding between it and the shuttle is reduced by the ball bearing mounting to an insignificant value. Further, since the locking thread alone acting on the offset guide pin 50 prevents rotation of the locking thread case, the usual mechanism provided for this purpose is found to be unnecessary, thereby eliminating interference with the passage of the loop over the thread case.

Since certain obvious changes may be made in the device without departing from the scope of the invention,

it is intended that all matter be interpreted in an illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A rotary shuttle assembly comprising a true shuttle, a locking thread housing disposed within and about which the shuttle carries each needle loop while passing itself therethrough, thread tensioning means on the housing to maintain tension in that portion of the locking thread extending through the work, means on the housing offset from the axis thereof for engaging said thread portion to prevent rotation of the housing during rotation of the shuttle and a complete row of evenly spaced ball bearings between the shuttle and the thread case to permit the shuttle to rotate freely about the thread case without otherwise requiring the housing to be restrained against rotation, in combination with a thread guide mounted in the locking thread housing extending along the central axis of the ball bearing substantially at a midposition in the housing to keep the tension on the locking thread uniform and to reduce the likelihood of snarling.

2. A rotary shuttle assembly, as in claim 1, in which there are two complete rows of evenly spaced ball bearings for mounting the locking thread housing within the shuttle.

References Cited in the file of this patent

UNITED STATES PATENTS

308,711	Tripp	Dec. 2, 1884
934,869	Winkel	Sept. 21, 1909
2,056,670	Gouldbourn et al.	Oct. 6, 1936
2,343,877	Zonis	Mar. 14, 1944
2,817,307	Kuhar	Dec. 24, 1957

FOREIGN PATENTS

842,298	Germany	July 8, 1949