Nov. 18, 1941. F. B. KEALL 2,263,502

SHUTTLE FOR SEWING MACHINES

Filed Oct. 19, 1939

Fig. 1

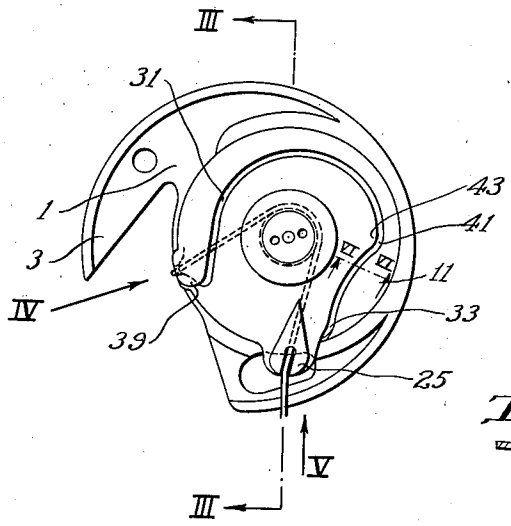


Fig. 6



Fig. 2

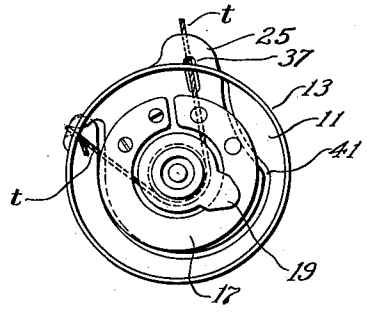


Fig. 3

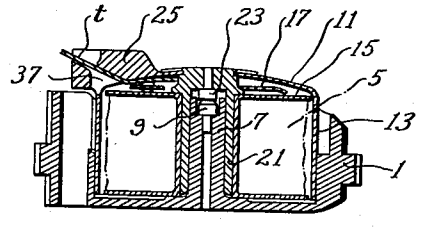


Fig. 4

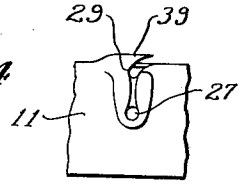
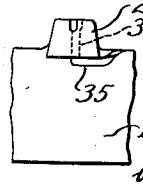


Fig. 5



Witness

Paul F. Bryant

Inventor

Frank B. Keall

by Rush Hylduth

Cary & Jenney Attys

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SHUTTLE FOR SEWING MACHINES

Frank Bycroft Keall, Leicester, England, assignor to United Shoe Machinery Corporation, Borough of Flemington, N. J., a corporation of New Jersey

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8 Claims. (Cl. 112—232)

This invention is concerned with improvements in or relating to shuttle devices for sewing machines and is particularly, but by no means exclusively, concerned with oscillating shuttle devices for curved hooked needle sewing machines of the well-known type used for boot or shoe outsole stitching and for sewing suitcases or bags, as disclosed, for instance in the patents to French and Meyer No. 473,870 dated April 26, 1892, and Ricks and Reid No. 1,695,718 dated December 18, 1928.

Shuttle devices for machines of this type usually comprise three parts, namely a discoidal shuttle body of a somewhat semi-cylindrical shape having a loop-taking beak at one side thereof and having a hollow cylindrical housing therein, a cylindrical bobbin case which is adapted to fit within said housing, and a bobbin which is adapted to fit within the bobbin case and to be placed with the latter, as a unit, into said housing. The bobbin case usually has a thread tension device extending peripherally around a groove in its side wall and, consequently, said side walls are usually of a relatively thick construction. This fact seriously restricts the diameter of bobbin which can be accommodated in the case and, therefore, correspondingly restricts the amount of thread which can be contained on the bobbin. This necessitates frequent replenishment of fresh bobbins in the shuttle device.

With a view to allowing a bobbin housing of given diameter to accommodate a bobbin of greater diameter than is possible with the arrangement above referred to, there is described in the patent to Minett No. 1,883,812, dated October 18, 1932, an arrangement in which no bobbin case of usual type is used within the housing, there being a spindle in the housing for supporting the bobbin, a thin metal cover detachably secured in the open end of the housing to retain the bobbin therein, and a thread tension device mounted on the interior of the end face of the cover.

While such an arrangement as just referred to has proved to allow of the use of bobbins containing a considerably greater quantity of thread than the bobbins housed in shuttle arrangements of the kind first above referred to, yet the arrangements described in the patent last mentioned suffer from certain disadvantages. For example, not only has it proved difficult to provide effective and readily detachable means, able to stand up to long periods of wear, for securing the cover in place on the shuttle body, but the fact that the bobbin is mounted on a spindle projecting from the shuttle body causes the bobbin to oscillate to and fro with the shuttle body and this, in turn, tends to cause thread to be drawn off the bobbin in an undesirable manner and become ravelled within the shuttle housing.

Among the several objects of the present invention are to provide a shuttle arrangement which will combine the advantages arising from the use of a thin cover for the shuttle housing with the benefit (existing in known shuttle arrangements) of holding the bobbin against rotary movement with the shuttle body and, at the same time, to overcome certain disadvantages which are known to exist in the usual shuttle arrangement, e. g., that friction between the side wall of the bobbin-case housing in the shuttle body and the bobbin case tends to cause considerable wear to take place between the bobbin case and the latching means which holds it against rotary movement with the shuttle body.

With the above in mind, a particular illustrative embodiment, hereinafter more fully described, of the present invention includes a bobbin or locking thread case in the form of a thin shell having on the interior of its end face an adjustable thread tension spring of the cantilever type, much like that described in the patent to Minett and having projecting axially of the thread case a hollow sleeve on which a bobbin of large capacity is supported. The bobbin case, with the bobbin in it, is inserted into a housing in a shuttle body which has a pin projecting axially of the housing to enter into the hollow sleeve on the shell-like bobbin case and thus support the latter, and the bobbin, centrally of the housing. The case also has a thread-exit nose projecting radially from it and this nose is arranged to be engaged by a latch arm of the usual type which, by its engagement with the nose, holds the thin bobbin case against rotary movement with the shuttle body. By reason of this fact the tendency previously experienced, when making use of the arrangements described in the patent to Minett, for rotary to and fro movement of the bobbin case to cause ravelling of the thread therein is prevented. Moreover, by supporting the thin bobbin case on a pin projecting axially of the housing for the latter and formed on the shuttle body, the undesired frictional engagement which is experienced in cases where a bobbin case is merely supported by the side wall of the housing is obviated and thus the tendency for the bobbin case to rotate with the shuttle body is greatly reduced as is also the

consequent wear previously experienced between the nose on the case and said latch arm. Thus the said illustrative embodiment, while making it possible to use, in a shuttle housing of a given diameter, a bobbin of greater capacity than has usually hitherto been possible, yet avoids the disadvantages which are likely to arise when making use of shuttle-housing covers, such as are described in the patent to Minett which, together with the bobbin, partake of the rotary movement of the shuttle body.

In order that the various objects and the several features of the present invention (which features are set forth in the appended claims) may become clear, there will now be described with reference to the accompanying drawing the illustrative embodiment aforementioned, from which description, it will be gathered that the invention also includes various other novel details of construction and arrangement than those above referred to.

In the drawing Figure 1 is a front elevation of said illustrative embodiment; Figure 2 is a rear elevation of the bobbin case of the illustrative embodiment; Figure 3 is a sectional view taken along the line III—III in Figure 1; Figure 4 is a detail view of part of the bobbin case taken in the direction of the arrow IV in Figure 1; Figure 5 is a detail view of part of the bobbin case taken in the direction of the arrow V in Figure 1; and Figure 6 is a detail sectional view taken along the line VI—VI in Figure 1.

The illustrative embodiment comprises a discoidal shuttle body 1 having a loop taking beak 3 at one side and having formed therein a cylindrical housing for a bobbin of thread 5 (Figure 3). A hollow pin 7 projects axially from the base of the housing and near its forward end a hardened metal plug 9 is inserted into the pin 7.

The plug 9 is seated against a neck formed in the interior of the hollow pin and can be pushed forwardly out of the pin, when it becomes badly worn, to allow another similar plug to be inserted in its place.

For a purpose which will hereinafter become clear, the forward end face of the plug 9 does not extend far enough forward to lie level with the forward end face of the pin 7 but, instead, the pin 7 extends beyond the plug, and the forward end of the bore in it provides a small socket of which the plug 9 provides the base.

The illustrative embodiment also includes a relatively thin shell-like bobbin case 11, the thin peripheral wall 13 of which extends axially for a distance substantially equal to the width of the bobbin 15 to be used in the shuttle 1. The thin case 11 has provided on the interior of its end face an adjustable thread-tension spring 17 generally similar to that referred to as 39 in the patent to Minett, together with a finger 19 (similar to the finger 43 of Minett) which is movable around the spring 17 to vary the pressure with which the latter presses the thread *t* against the interior of the case.

As contrasted with the cover 7 of the Minett construction, the bobbin case of the present illustrative embodiment has a hollow bobbin-supporting sleeve 21 extending axially of it, this sleeve being of such an internal diameter as to fit snugly over the hollow pin 7 projecting from the shuttle body 1. It is contemplated that a full bobbin shall be inserted in the thin bobbin case 11 and slid over the sleeve 21 and that the case 11, together with the bobbin 15 in it, shall then be inserted in the housing in the shuttle body 1 with the sleeve 21 fitting over, and supported by, the hollow pin 7 of the latter. It will be understood that since the bobbin case 11 has only a relatively thin peripheral wall 13, the bobbin 15 may have a diameter but little less than that of the housing and that, since the bobbin case 11 is supported by the central pin 7 of the shuttle body 1 instead of resting against the side wall of the housing, there will be very little frictional tendency for the bobbin case 11 or bobbin 15 to be carried round with the shuttle body 1 during the rotary oscillating movements of the latter.

The central bobbin-supporting sleeve 21 on the bobbin case 11 is rotatably mounted within the end wall of the bobbin case and carries, at the interior of the case, the finger 19. By rotating the sleeve 21 from the outer face of the bobbin case 11 (in a similar manner to that described in the Minett patent for rotating said finger 43) the finger 19 may be moved around the thread tension spring 17 to vary the tension applied to the thread by the spring 17. A hardened steel plug 23 fitted into the sleeve 21 near its forward end is arranged to project into the socket at the forward end of the supporting pin 7 in the shuttle body and, by bearing against the hardened plug 9 in the pin 7, positions the relatively thin bobbin case 11 endwise within the housing and prevents chafing of the end of its sleeve 21 against the base of the housing. The plug 23 in the sleeve 21 abuts against a neck at the forward end of the sleeve and can be driven out rearwardly to allow a fresh plug to be inserted therein in case it should become worn.

Contrary, moreover, to the arrangement described in the Minett patent, it is intended that the thin bobbin case shall be held against rotary movement with the shuttle body and, for this purpose, it has projecting both radially and forwardly from its forward face a thread-exit nose 25 which is received in a groove in a bobbin-case retaining arm similar to that disclosed in the patent to French and Meyer which both serves to hold the bobbin case more or less stationary during the rotary movements of the shuttle body and holds it securely in place within the shuttle housing. By this means ravelling of the thread in the bobbin case due to angular movement of the latter to and fro with the shuttle body is prevented.

The peripheral wall 13 of the relatively thin bobbin case 11 has a thread hole 27 formed in it about half way along its length through which the thread *t* issues from the bobbin 15. From that hole, when threading up the bobbin case, the thread *t* is led, externally of the case and in a direction parallel to its axis, to the adjacent end portion 29 of a slot 31 which extends, for a purpose hereinafter described, from the junction of the peripheral wall 13 and the end wall of the bobbin case 11 around the control sleeve 21 in the end wall of the bobbin case to the opposite side of the nose 25, i. e., to the region indicated at 33 in Figure 1. From this region a portion 35 of the slot 31 continues around the peripheral wall 13 of the bobbin case (see Figure 5) to a position just below the nose 25, as seen in Figure 5, where it leads into a thread exit hole 37 formed in the nose 25. The thread passes through the end portion 29 of the slot 31 into the interior of the case and immediately passes beneath the cantilever thread tension spring 17, more or less radially of the case, between the spring and the end wall of the case. The thread

then proceeds around the hollow bobbin supporting sleeve 21 in contact with about half the circumference of the latter and eventually passes out of the bobbin case through the thread exit hole 37 in the nose 25 on the bobbin case, the thread issuing from the end of the nose direct to the sewing instrumentalities. Such a passage of the thread from the bobbin 15 avoids, as far as possible, the presence of sharp corners around which the thread must pass and this allows the degree of tension applied to the thread by the cantilever spring to be controlled within relatively fine limits.

By reason of the precise arrangement, above described, of the illustrative embodiment, it will be understood that the benefit in increasing the thread holding capacity of the shuttle made possible by the use of a relatively thin bobbin case with a thread tension device on its forward end is retained, that a very convenient means is used for holding the bobbin case in place and for preventing its rotation with the shuttle body, that the central support for the case substantially eliminates the friction which has hitherto been responsible for the development of excessive wear between a bobbin case and its retaining latch, that the renewable plugs 9 and 23 provide good bearing surfaces between the bobbin case 11 and its supporting pin 7 and prevent rapid wear developing between the end of the bobin case sleeve 21 and the base of the housing in the shuttle body, and that the combination of the cantilever thread tension spring 17 and the easy path in which the thread is led from the bobbin 15 enables a well controlled tension to be applied to the thread.

The bobbin case has an external diameter substantially equal to the internal diameter of the housing so that, especially at its inner open end, it fits closely within the housing. The thin wall of the bobbin case is thus supported against distortion and injury by reason of the strains exerted on the bobbin case during sewing by the thread tension device and restraining nose on the closed end wall of the bobbin case.

In placing a bobbin in its case the thread will first be threaded through the hole 27 from the inside of the case, after which the bobbin may be placed in position on the sleeve 21 in the bobbin case 11. The thread which protrudes from the hole 27 on the outside of the bobbin case is then introduced into the end portion 29 of the slot 31, one side of the end portion 29 being formed by an upstanding lip 39 (see Figure 4) to enable the thread more easily to slip into the slot. By pulling the thread around the slot 31 until the end protrudes from the portion 35 of the slot 31, the thread is caused to enter between the thread tension spring 17 and the end wall of the bobbin case 11, as indicated in Figures 1 and 2 and the end of the thread is led through the hole 37 in the nose 25, it finally lying in the path shown in Figure 3.

As will be seen from Figure 1, the slot 31 in the end wall of the bobbin case 11 is formed by two curved slots which are connected by a sharply curved portion 41, the inside edge 43 of which may be bent inwardly somewhat, as indicated in Figure 6, (i. e., towards the base of the bobbin case housing) so as, in effect, to be shrouded by the outside edge of the curved portion 41. This will insure that as a loop of needle thread is being passed over the bobbin case there will be no risk of the thread becoming trapped in the slot 31, but will be eased over the slot in the region of the portion 41. Similarly after the loop of needle thread has been passed over the bobbin case 11, the upstanding lip 39 serves to guide the thread over the end portion 29 of the slot 31.

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

1. In a sewing machine shuttle of the discoidal type, the combination of a shuttle body having a hollow cylindrical housing, a cylindrical bobbin case having an external diameter substantially equal to the internal diameter of the housing to fit within the housing comprising a thin peripheral side wall and an end wall, a thread tension device mounted on the end wall inside of the bobbin case, guides to direct the bobbin thread to the tension device and from the tension device to the work, and means on the end wall outside of the bobbin case to cooperate with a latch arm to prevent rotation of the bobbin case with the shuttle body.

2. In a sewing machine shuttle of the discoidal type, the combination of a shuttle body having a hollow cylindrical housing, a cylindrical bobbin case having an external diameter substantially equal to the internal diameter of the housing to fit within the housing comprising a thin peripheral side wall and an end wall, a thread tension device mounted on the end wall inside of the bobbin case, a bobbin supporting sleeve projecting from the end wall, a pin to form a journal for the sleeve projecting from the shuttle body axially of the housing, guides to direct the bobbin thread to the tension device and from the tension device to the work, and means on the end wall outside of the bobbin case to cooperate with a latch arm to prevent rotation of the bobbin case with the shuttle body.

3. In a sewing machine shuttle of the discoidal type, the combination of a shuttle body having a hollow cylindrical housing, a cylindrical bobbin case to fit within the housing comprising a peripheral side wall and an end wall, a bobbin supporting sleeve projecting from the end wall, a pin to form a journal for the sleeve projecting from the shuttle body axially of the housing, and renewable bearing plugs mounted at the end of the pin and on the end wall within the sleeve.

4. In a sewing machine shuttle of the discoidal type, the combination of a shuttle body having a hollow cylindrical housing, a cylindrical bobbin case having an external diameter substantially equal to the internal diameter of the housing to fit within the housing comprising a peripheral side wall and an end wall, a bobbin supporting sleeve projecting from the end wall, a thread tension device mounted on the end wall inside of the bobbin case, guides to direct the bobbin thread to the tension device and from the tension device to the work, and a quick threading slot in the end wall of the thread case extending substantially around the bobbin supporting sleeve for directing the thread into engagement with the tension device.

5. In a sewing machine shuttle of the discoidal type, the combination of a shuttle body having a hollow cylindrical housing, a cylindrical bobbin case to fit within the housing comprising a peripheral side wall and an end wall, a bobbin supporting sleeve rotatably mounted in and projecting from the end wall, a thread tensioning spring mounted on the end wall inside of the bobbin case and extending around the sleeve,

and a tension adjusting lug on the sleeve arranged to bear against the spring.

6. In a sewing machine shuttle of the discoidal type, the combination of a shuttle body having a hollow cylindrical housing, a cylindrical bobbin case having an external diameter substantially equal to the internal diameter of the housing to fit within the housing comprising a thin peripheral side wall and an end wall, a thread tension device mounted on the end wall inside of the bobbin case, a radially and axially projecting nose on the end wall outside of the bobbin case to cooperate with a latch arm to prevent rotation of the bobbin case with the shuttle body, and guides to direct the bobbin thread to the tension device and from the tension device through the nose to the work.

7. In a sewing machine shuttle of the discoidal type, the combination of a shuttle body having a hollow cylindrical housing, a cylindrical bobbin case having an external diameter substantially equal to the internal diameter of the housing to fit within the housing comprising a thin peripheral side wall and an end wall, a thread tension device mounted on the end wall inside of the bobbin case, a bobbin supporting sleeve projecting from the end wall, a pin to form a journal for the sleeve projecting from the shuttle body axially of the housing, a radially and axially projecting nose on the end wall outside of the bobbin case to cooperate with a latch arm to prevent rotation of the bobbin case with the shuttle body, and guides to direct the bobbin thread to the tension device and from the tension device through the nose to the work.

8. In a sewing machine shuttle of the discoidal type, the combination of a shuttle body having a hollow cylindrical housing, a cylindrical bobbin case to fit within the housing comprising a peripheral side wall and an end wall, a bobbin supporting sleeve projecting from the end wall, a pin to form a journal for the sleeve projecting from the shuttle body axially of the housing, and an end thrust bearing within the sleeve between the end of the pin and the end wall.

FRANK BYCROFT KEALL.