EUROPEAN PATENT SPECIFICATION

Date of publication and mention of the grant of the patent:
08.03.2017 Bulletin 2017/10

Application number: 07013024.0

Date of filing: 03.07.2007

Bobbin case for use with full rotary hook in industrial sewing machine
Spulenkapsel zur Verwendung mit einem Umlaufgreifer für eine industrielle Nähmaschine
Boîtier à canette à utiliser avec un boucleur rotatif dans une machine à coudre industrielle

Designated Contracting States:
DE IT

Priority: 04.07.2006 JP 2006184532

Date of publication of application:
09.01.2008 Bulletin 2008/02

Proprietors:
• Brother Kogyo Kabushiki Kaisha
  Nagoya-shi, Aichi-ken 467-8561 (JP)
• Hirose Manufacturing Co., Ltd.
  Osaka-shi
  Osaka 555-0001 (JP)

Inventors:
• Nakano, Motonari
  Nagoya-shi
  Aichi-ken 467-8562 (JP)
• Hayakawa, Norikazu
  Nagoya-shi
  Aichi-ken 467-8562 (JP)
• Wataya, Takeo
  Nagoya-shi
  Aichi-ken 467-8562 (JP)
• Hatanaka, Jun
  Osaka-shi
  Osaka-fu
  555-0001 (JP)

Representative: Prüfer & Partner mbB
Patentanwälte · Rechtsanwälte
Sohnckestraße 12
81479 München (DE)

References cited:
• JP-A- 2 068 096
• US-A- 4 275 675

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
The present invention relates to a bobbin case to facilitate smooth thread handling.

The invention provides a bobbin case according to claim 1. The bobbin case is detachably attached to a bobbin case holder which is mounted in the rotating hook so as to be unrotatable, and a bobbin case attached to the holder. The bobbin case houses a lower thread bobbin and an outer peripheral wall including a right side provided with a bobbin thread tension spring. The bobbin thread tension spring has a distal end or an upper right portion of the bobbin case formed with a lower thread exit. A lower thread wound on the lower thread bobbin is drawn from the lower thread exit through the vicinity of an upper end of the bobbin case, extending directly above a needle hole of a needle plate.

In this case, however, when the lower thread comes upward through the lower thread exit which is the distal end of the bobbin thread tension spring, the lower thread is pulled upward upon execution of cloth feed. The bobbin thread tension spring floats depending upon the strength of tension applied to the lower thread, whereupon the spring force of the bobbin thread tension spring is rendered unstable. As a result, the thread tension of the lower thread can be rendered unstable such that stitches are irregular.

From US 4,275,675 a bobbin case according to the preamble of claim 1 can be taken. The bobbin case incorporates a thread guide consisting of a piano wire soldered to the cylindrical skirt of the case in the region between the leaf tension spring and the point at which the thread is cut by the trimming plate. A groove is formed under and partly through the wire and also partly through the cylindrical skirt. The groove is directed to an angle to the longitudinal direction of the skirt such as to place the groove in line with the direction of movement of the thread to facilitate smooth thread handling.

From US 2,098,270 a bobbin-thread case is known for sewing machines, having a cylindrical cup-shaped body, a free ended tension leaf-spring applied circumferentially to the cylindrical wall of the body. A thread guide is applied to the cylindrical wall of the body independently of the tension spring and disposed immediately adjacent to the free end of the latter.

From JP 02-068096 A a full rotary hook for lock stitch sewing machines can be taken.

Therefore, an object of the present invention is to provide a bobbin case in which the mixture of perfect and hitch stitches can be prevented by a simple construction, the thread tension spring mounted on the bobbin case can normally exert the spring force thereof, and the thread tension of the lower thread can be rendered stable.

The present invention provides a bobbin case according to claim 1. The bobbin case is detachably attachable to a full rotary hook forming stitches in cooperation with a sewing needle of a sewing machine and which houses a lower thread bobbin on which a lower thread is wound, the bobbin case having an outer peripheral wall formed with a lower thread exit through which the lower thread is introduced outwards and a thread tension spring imparting a tension to the lower thread which has come out of the lower thread exit, the bobbin case having a front and characterized by a lower thread guide provided at a location spaced away both from the front of the bobbin case and from an imaginary line extended from a vertical movement trajectory of the sewing needle, the lower thread guide guiding the lower thread extending out of the lower thread exit.

The lower thread is pulled laterally at the lower thread exit by the lower thread guide even when pulled to the workpiece cloth side on the occasion of cloth feed. Accordingly, the thread tension spring provided in the lower thread exit is prevented from inadvertently floating. Consequently, since the thread tension imparted to the lower thread is rendered stable, the thread tension spring can normally exert spring force thereof and well-looking stitches can be formed.

The invention will be described, merely by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a front view of a vertical full rotary hook in accordance with a first embodiment of the present invention;
FIG. 2 is a plan view of the vertical full rotary hook;
FIG. 3 is a perspective view of the vertical full rotary hook;
FIG. 4 is a front view of a bobbin case;
FIG. 5 is a side view of the bobbin case during a sewing operation;
FIG. 6 is a partially enlarged perspective view of a lower end of sewing needle;
FIG. 7 illustrates perfect stitches and hitch stitches formed when the bobbin case of the first embodiment is used;
FIG. 8 is a plan view of a label to be sewn and work-
A first embodiment of the invention will be described with reference to FIGS. 1 to 10. Firstly, a vertical rotary hook 1 provided on a sewing machine will be described. The vertical rotary hook 1 includes an outer rotating hook 2, an inner bobbin case holder 3 which is fitted in the rotating hook 2 thereby to be supported so as to be rotatable with respect to the rotating hook 2, and a bobbin case 4 attached to the bobbin case holder 3. The rotating hook 2 includes a rotating hook body 10 and a rotational shaft 11 secured to the body 10. A lower shaft 7 from the lower shaft 7 to the rotational shaft 11 is transmitted to the vertical full rotary hook 1, the rotating hook body 10 is rotated clockwise in synchronization with the vertical movement trajectory of a sewing needle 6. The rotating hook body 10 is formed with a loop seizing beak 12 directed clockwise. Accordingly, when the sewing needle 6 descends toward the lower thread guide hole 20a or the lower thread DT extending from the lower thread guide hole 20a into which the lower thread DT is insertable. The thread guide hole 20a serves as a lower thread guide. In this case, the lower thread DT is tightened up by a thread take-up lever (not shown), whereinupon stitches are formed.

The bobbin case 4 has an outer peripheral wall 4a including an upper right-hand portion on which a thread tension spring 18 is provided as shown in FIG. 9. A left side of the wall 4a is referred to as "front" as viewed in FIG. 9. The thread tension spring 18 imparts thread tension to the lower thread DT coming out of the bobbin case 4. The thread tension spring 18 is constructed so that the thread tension thereof is adjustable. Accordingly, the lower thread DT passes between the thread tension spring 18 and the wall 4a, coming out of the bobbin case 4 through a lower thread exit 19 located at the distal end of the thread tension spring. More specifically, the lower thread exit 19 is formed on the right of an extended line of the vertical movement trajectory of the sewing needle 6.

A thread guide member 20 will now be described. The thread guide member 20 is secured to the front of the bobbin case 4. The thread guide member 20 is substantially elliptic as viewed in FIGS. 1 and 3 to 5 and is located on the left of the vertical movement trajectory N of the sewing needle 6 on the front of the bobbin case 4. The thread guide member 20 includes a lower half secured to the front of the bobbin case 4 and an upper half bent forwardly by a predetermined angle. A right side as viewed in FIG. 5 is referred to as the front. An upper half of the thread guide member 20 is formed with a lower thread guide hole 20a into which the lower thread DT is insertable. The thread guide hole 20a serves as a lower thread guide. In this case, the lower thread guide hole 20a is located lower than the lower thread exit 19 as shown in FIG. 4. The bobbin case 4 includes a front formed with a linear guide groove 22 extending from the lower thread exit 19 toward the upper half of the thread guide member 20 as shown in FIGS. 1 and 5. The lower thread DT drawn out of the lower thread exit 19 passes through the guide groove 22 and thereafter extends through the lower thread from the rear to the front. The lower thread DT further passes through the needle hole 5a of the needle plate 5, reaching the workpiece cloth W. More specifically, as shown in FIGS. 1 and 2, during the sewing operation, the lower thread DT extending to the workpiece cloth W passes through the needle hole 5a and further through the lower thread guide hole 20a while being directed obliquely downward and leftward. Accordingly, when the sewing needle 6 descends through the needle hole 5a below the needle plate 5, the lower thread DT extending from the needle hole 5a to the lower thread guide hole 20a or the lower thread DT entangled with the upper thread UT is necessarily located on the left of the sewing needle 6. Moreover, a thread guide groove 6b is formed in the sewing needle 6 so as to be located right below the needle eye 6a. The upper thread UT coming out of the needle eye 6a is guided leftward as viewed from the operator side. Accordingly,
as shown in FIG. 7, in the case where the positive Y direction in X-Y coordinates represents 0°, perfect stitches (PS) are formed when a stitch forming direction θ (cloth feed direction and direction opposite to the cloth feed direction) is in the ranges shown as 0° ≤ θ < 200° and 220° < θ ≤ 360°. Furthermore, hitch stitches (HS) are formed when the stitch forming direction θ is in a range shown as 200° ≤ θ ≤ 220°.

[0017] The above-described bobbin case 4 will operate as follows. As described above, the lower thread DT of the lower-thread bobbin housed in the bobbin case 4 is drawn out of the exit 19 and passes through the guide groove 22 and the lower-thread guide hole 20a of the thread guide member 20, thereafter extending through the needle hole 5a to the workpiece cloth W over the needle plate 5. The upper thread UT is drawn from a thread spool (not shown) through a thread take-up lever (not shown), extending through the needle eye 6a from the rear to the front. Accordingly, the stitch forming direction θ in which hitch stitches are formed ranges as 200° ≤ θ ≤ 220° shifted from 180° (negative Y direction) as shown in FIG. 7.

[0018] FIG. 8 illustrates a case where an outer periphery of a rectangular label 22 is sewn into a rectangular shape and is sewn onto the workpiece cloth W. Sewing starts at left inner first stitch S1 in this rectangular sewing. Sewing is then carried out from positive feed a (arrow A designates a stitch forming direction), leftward feed b (arrow B designates a stitch forming direction), reverse feed c (arrow C designates a stitch forming direction), and rightward feed d (arrow D designates a stitch forming direction) sequentially in this order. In this case, the stitch forming direction of positive feed a is represented as 180°. The stitch forming direction of leftward feed b is represented as 90°. The stitch forming direction of reverse feed c is 0°. The stitch forming direction of rightward feed d is represented as 270°. Accordingly, the stitch forming section θ in each of the four stitch forming directions A to D is outside the range of 200° ≤ θ ≤ 220° in which the hitch stitches are formed.

[0019] Firstly, the following describes the case where first to fifteenth stitches S1 to S15 are sewn in the stitch forming direction A. In the case of a second stitch S2 subsequent to the first stitch S1, when the sewing needle 6 is caused to stitch through the label 22 and workpiece cloth W and then lifted upward slightly from the lowermost position, the loop UTa of upper thread UT formed in front of the needle eye 6a is seized by the beak 12 while the beak 12 is moved clockwise. In this case, since the lower thread DT is laterally pulled by the guide hole 20a at the exit 19, even if pulled to the workpiece cloth side during cloth feed for every stitch, the thread tension spring 18 can normally exert the spring force thereof, and well-looking stitches can be formed.

[0020] Furthermore, the beak 12 is rotated clockwise as viewed at the front so that the upper thread loop UTa formed in front of the needle eye 6a is seized by the beak 12. In this case, since the lower thread DT is entangled with the upper thread loop UTa from the left, a perfect stitch is formed. Subsequently, stitches S3, ··· S14 and S15 are formed in the same manner as described above. These are perfect stitches. Moreover, the lower thread DT is laterally pulled by the guide hole 20a at the exit 19, even if pulled to the workpiece cloth side during cloth feed for every stitch. Accordingly, since thread tension applied to the lower thread DT is rendered stable, the thread tension spring 18 provided in the lower thread exit 19 is prevented from inadvertently floating. Consequently, the thread tension spring 18 can normally exert the spring force thereof, and well-looking stitches can be formed.

[0021] Next, the following describes the case where fifteenth to thirty-sixth stitches S15 to S36 are sewn in the stitch forming direction B. In the case of a sixteenth stitch S16 subsequent to the fifteenth stitch S15, when the sewing needle 6 is caused to stick through the label 22 and workpiece cloth W and then lifted upward slightly from the lowermost position, the upper thread loop UTa formed in front of the needle eye 6a is seized by the beak 12 while the beak 12 is moved clockwise. In this case, since the lower thread DT entangles the upper thread loop UTa from the left without the upper thread loop UTa intersecting the sewing needle 6, a perfect stitch is formed. Subsequently, stitches S17, ··· S35 and S36 are formed in the same manner as described above. These are perfect stitches.

[0022] Subsequently, the following describes the case where thirty-sixth to fifthtieth stitches S36 to S50 are sewn in the stitch forming direction C. In the case of a thirty-seventh stitch S37 subsequent to the thirty-sixth stitch S36, when the sewing needle 6 is caused to stick through the label 22 and workpiece cloth W and then lifted upward slightly from the lowermost position in the same manner as described above, the upper thread loop UTa formed in front of the needle eye 6a is seized by the beak 12 while the beak 12 is moved clockwise. In this case, since the lower thread DT entangles the upper thread loop UTa from the left without the upper thread loop UTa intersecting the sewing needle 6, a perfect stitch is formed. Subsequently, stitches S38, ··· S49 and S50 are formed in the same manner as described above. These are perfect stitches.

[0023] Furthermore, the following describes the case where fifthtieth to seventy-first stitches S50 to S71 are sewn in the stitch forming direction D. In the case of a fifty-first stitch S51 subsequent to the fiftieth stitch S50, when the sewing needle 6 is caused to stick through the label 22 and workpiece cloth W and then lifted upward slightly from the lowermost position in the same manner as described above, the upper thread loop UTa formed in front of the needle eye 6a is seized by the beak 12 while the beak 12 is moved clockwise. In this case, the upper
thread UTa is guided by the groove 6b of the sewing needle 6. Accordingly, since the upper thread loop UTa is formed in the left front of the sewing needle 6 and entangled with the lower thread DT from the left, a perfect stitch is formed. Subsequently, stitches S52, ··· S70 and S71 are formed in the same manner as described above. These are perfect stitches.

[0024] The lower thread DT extending from the lower thread exit 19 to the lower thread guide hole 20a is fitted in the guide groove 22. Accordingly, the beak 12 engages the upper thread loop UTa such that the loop UTa is enlarged. As a result, when sliding on the front of the bobbin case 4, the upper thread loop UTa can be prevented from interfering with the lower thread DT. Thus, the upper thread loop UTa can smoothly slide on the front of the bobbin case 4. Furthermore, at a first stitch, the lower thread DTa extending from the bobbin case 4 further extends through the lower thread guide hole 20a of the thread guide member 20 and is spaced forward from the front of the bobbin case 4 by a predetermined slight distance (3 mm, for example), as shown in FIG. 10. Accordingly, since the upper thread loop UTa is necessarily entangled with the lower thread DT, stitches can reliably be formed from a first one.

[0025] As obvious from the foregoing, the vertical full rotary hook 1 is provided below the needle plate 5 of the sewing machine and forms stitches in cooperation with the sewing needle 6. The bobbin case 4 in which the lower thread bobbin is housed is detachably attached to the vertical full rotary hook 1. The outer peripheral wall 4a of the bobbin case 4 is provided with the lower thread exit 19 guiding the lower thread DT wound on the lower thread bobbin out of the bobbin case 4. The thread guide member 20 is provided on the front of the bobbin case 4 for guiding the lower thread DT extending from the lower thread exit 19. Furthermore, the thread guide member 20 is provided with the lower thread guide hole 20a which engages the lower thread DT with the thread guide member 20. Consequently, even if the lower thread DT is pulled to the workpiece cloth W side upon cloth feed, the lower thread DT at the lower thread exit 19 is pulled laterally by the lower thread guide hole 20a. Accordingly, the thread tension spring 18 provided at the lower thread exit 19 can be prevented from inadvertently floating. Consequently, since the thread tension applied to the lower thread DT is rendered stable, the thread tension spring 18 can normally exert sufficient spring force and form well-looking stitches.

[0026] The lower thread guide hole 20a is provided at the location away from the extension line of the vertical movement trajectory N of the sewing needle 6, that is, on the left of the extension line of the vertical movement trajectory N. Consequently, the stitch forming direction in which hitch stitches are formed can be set at a location shifted on the left of the Y axis of X-Y coordinate. Furthermore, since the lower thread guide hole 20a is provided at the lower position than the lower thread exit 19, the direction of the lower thread DT moving from the guide hole 20a toward the needle plate 5 approaches to a vertical direction which is the trajectory of vertical movement of the sewing needle 6. Accordingly, the probability of the needle 6 sticking to the lower thread DT upon downward movement of the sewing needle 6 can be reduced, whereupon rejection of products can be reduced in the quality inspection. Furthermore, the lower thread guide hole 20a is located on the left of the extension line of the vertical movement trajectory N of the sewing needle 6, that is, opposite to the lower thread exit 19. Consequently, stitches can be rendered stable since the lower thread loop UTa in engagement with the beak 12 of the vertical full rotary hook 1 is entangled with the lower thread DT after having passed through the lower end of the bobbin case 4.

[0027] Furthermore, the guide groove 22 is formed in the front of the bobbin case 4 to guide the lower thread DT from the lower thread exit 19 into the lower thread guide hole 20a. Accordingly, the lower thread DT passing from the right lower thread exit 19 to the leftward lower thread guide hole 20a is fitted into the guide groove 22 but not the front of the bobbin case 4. Consequently, when the upper thread loop UTa in engagement with the beak 12 is enlarged and slides on the front of the bobbin case 4, the upper thread loop UTa can be prevented from interfering with the lower thread DT. Thus, the upper thread loop UTa can smoothly slide on the front of the bobbin case 4.

[0028] FIGS. 11 and 12 illustrate a second embodiment of the invention. Identical or similar parts in the second embodiment are labeled by the same reference symbols as those in the first embodiment. In the second embodiment, the thread guide member 20A is located at a right upper position corresponding to the lower thread exit 19 of the bobbin case 4A. In this case, however, the upper thread UT passing through the eye 6a of the sewing needle 6 is entangled on the right of the sewing needle. In this case, too, even if the lower thread DT is pulled to the workpiece cloth W side upon cloth feed, the lower thread DT at the lower thread exit 19 is pulled laterally by the lower thread guide hole 20A. Accordingly, well-looking stitches can be formed in the second embodiment in the same manner as in the first embodiment. Moreover, perfect stitches (designated by "PS") are formed when the stitch forming direction θ ranges as 0°≤θ≤140° and 160°<θ<360°. In other words, the range of hitch stitches (designated by "HS") can be changed from the range of 200°≤θ≤220° to the range of 140°≤θ≤160° which is opposed to the former with respect to the y-axis.

[0029] FIG. 13 illustrates a third embodiment of the invention. Identical or similar parts in the third embodiment are labeled by the same reference symbols as those in the first embodiment. In the third embodiment, the thread guide members 20 and 20A are provided on the left and right upper portions of the bobbin case 4B respectively as shown in FIG. 13. In this case, either thread guide member 20 or 20A is selectively used on the basis of the cloth feed direction θ so that occurrence of hitch stitch is
prevented. The range in which hitch stitch is formed can be changed to the left or right side with respect to the y-axis of the X-Y coordinate.

[0030] FIGS. 14 and 15 illustrate a fourth embodiment of the invention. Identical or similar parts in the fourth embodiment are labeled by the same reference symbols as those in the first embodiment. In the fourth embodiment, a thread guide member 24 is provided on an upper portion of the front of the bobbin case 4 so as to protrude upward as shown in FIGS. 14 and 15. The thread guide member 24 is formed with a lower thread guide hole 24a through which the lower thread DT is caused to pass. The front of the bobbin case 4 is formed with a substantially horizontal guide groove 26 which guides the lower thread DT passing from the lower thread exit 19 into the lower thread guide hole 24a. The other construction of the fourth embodiment is the same as that of the first embodiment. Consequently, the fourth embodiment can achieve the same effect as the first embodiment.

[0031] Although the thread guide members 20, 20A and 24 include the lower thread guide holes 20a and 24a as the lower thread guides in the foregoing embodiments, any other type that can change a path of the lower thread may be provided. For example, the thread guide may be hook-shaped, instead.

### Claims

1. A bobbin case (4) which is detachably attachable to a full rotary hook (1) forming stitches in cooperation with a sewing needle (6) of a sewing machine and which houses a lower thread bobbin on which a lower thread (DT) is wound, the bobbin case:

   - having an outer peripheral wall (4a) formed with a lower thread exit (19) through which the lower thread (DT) is introduced outwards and a thread tension spring (18) imparting tension to the lower thread (DT) which has come out of the lower thread exit (19), the bobbin case (4) having a front; and
   - a lower thread guide (20a) provided at a location spaced away both from the front of the bobbin case (4) and from an imaginary line extended from a vertical movement trajectory (N) of the sewing needle (6), the lower thread guide (20a) guiding the lower thread (DT) extending out of the lower thread exit (19);

characterized in that

the lower thread guide (20a) is located on an opposite side to the lower thread exit (19) relative to an imaginary plane through the vertical movement trajectory (N) and being perpendicular to the front of the bobbin case (4).

2. The bobbin case of claim 1, wherein the lower thread guide (20a) is comprised of a hole (20a, 20A) into which the lower thread (DT) is insertable.

3. The bobbin case of claim 2, including an upper portion thereof provided with a protrusion protruding upward, wherein the lower thread guide (20a) is provided on the protrusion.

4. The bobbin case of any one of claims 1 to 3, wherein the front of the bobbin case (4) is formed with a guide groove (20) guiding the lower thread (DT) from the lower thread exit (19) to the lower thread guide (20a).

### Patentansprüche

1. Spulenkörpergehäuse (4), das an einem Vollumlaufgreifer (1) losbar anbringbar ist, der in Zusammenwirkung mit einer Nähnadel (6) einer Nähmaschine Stiche bildet, und das einen Unterfadenspulenkörper aufnimmt, an dem ein Unterfaden (DT) gewickelt ist, wobei das Spulenkörpergehäuse:

   - eine Außenumfangswand (4a) hat, die mit einem Unterfadenausgang (19), durch den der Unterfaden (DT) nach außen eingeführt wird, und einer Fadenspannungsfeder (18) ausgebildet ist, die eine Spannung auf den Unterfaden (DT) ausübt, der aus dem Unterfadenausgang (19) gelangt ist, wobei das Spulenkörpergehäuse (4) eine Front hat; und
   - eine Unterfadenführung (20a), die an einem Ort vorgesehen ist, der sowohl von der Front des Spulenkörpergehäuses (4) als auch von einer imaginären Linie räumlich beabstandet ist, die sich von einer Vertikalbewegungsbahn (N) der Nähnadel (6) erstreckt, wobei die Unterfadenführung (20a) den Unterfaden (DT) führt, der sich aus dem Unterfadenausgang (19) er- streckt;

   - dadurch gekennzeichnet, dass

   - sich die Unterfadenführung (20a) an einem der Unterfadenausgang (19) entgegengesetzten Seite bezüglich einer imaginären Ebene durch die Vertikalbewegungsbahn (N) der Nähnadel (6) erstreckt, wobei die Unterfadenführung (20a) den Unterfaden (DT) führt, der sich aus dem Unterfadenausgang (19) er- streckt;

   - Spulenkörpergehäuse gemäß Anspruch 1, wobei die Unterfadenführung (20a) ein Loch (20a, 20A) aufweist, in das der Unterfaden (DT) einfügbbar ist.

3. Spulenkörpergehäuse gemäß Anspruch 2, dessen oberer Abschnitt mit einem Vorsprung versehen ist, der nach oben vorsteht, wobei die Unterfadenführung (20a) an dem Vorsprung vorgesehen ist.
4. Spulenkörpergehäuse gemäß einem der Ansprüche 1 bis 3, wobei die Front des Spulenkörpergehäuses (4) mit einer Führungsnut (20) ausgebildet ist, die den Unterfaden (DT) von dem Unterfadenausgang (19) zu der Unterfadenführung (20a) führt.

Revendications

1. Boîte à canette (4) qui est fixable de façon amovible à un crochet rotatif complet (1) formant des points en coopération avec une aiguille à coudre (6) d’une machine à coudre et qui reçoit une canette de fil inférieur sur laquelle un fil inférieur (DT) est enroulé, la boîte à canette :

   ayant une paroi périphérique extérieure (4a) formée avec une sortie de fil inférieur (19) à travers laquelle le fil inférieur (DT) est introduit vers l’extérieur et un ressort de tension de fil (18) communiquant une tension au fil inférieur (DT) qui est sorti de la sortie de fil inférieur (19), la boîte à canette (4) ayant une partie avant ; et

   un guide de fil inférieur (20a) prévu en un emplacement éloigné à la fois de la partie avant de la boîte à canette (4) et d’une ligne imaginaire s’étendant depuis une trajectoire de déplacement vertical (N) de l’aiguille à coudre (6), le guide de fil inférieur (20a) guidant le fil inférieur (DT) s’étendant hors de la sortie de fil inférieur (19) ;

   caractérisée en ce que

   le guide de fil inférieur (20a) est situé sur un côté opposé à la sortie de fil inférieur (19) par rapport à un plan imaginaire à travers la trajectoire de déplacement vertical (N) et étant perpendiculaire à la partie avant de la boîte à canette (4).

2. Boîte à canette selon la revendication 1, dans laquelle le guide de fil inférieur (20a) est composé d’un trou (20a, 20A) dans lequel le fil inférieur (DT) est insérable.

3. Boîte à canette selon la revendication 2, comportant une portion supérieure pourvue d’une saillie faisant saillie vers le haut, dans laquelle le guide de fil inférieur (20a) est prévu sur la saillie.

4. Boîte à canette selon l’une quelconque des revendications 1 à 3, dans laquelle la partie avant de la boîte à canette (4) est formée avec une rainure de guidage (20) guidant le fil inférieur (DT) de la sortie de fil inférieur (19) vers le guide de fil inférieur (20a).
FIG. 10

FIG. 11
FIG. 12

FIG. 13
REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader’s convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4275675 A [0005]
- US 2098270 A [0006]