

# PATENT SPECIFICATION

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## (54) IMPROVEMENTS IN THREAD STORAGE AND DELIVERY DEVICES

(71) We, SOBREVIN SOCIETE DE BREVETS INDUSTRIELS-ETABLISSEMENT, an Etablissement of Liechtenstein, of FL 9490 Vaduz, Aeule Strasse 151, Furstentum, Liechtenstein, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a thread storage and delivery device, sometimes known as a thread feeder having a support for a single layer coil of thread which can be replenished by winding at one end, pushed along the support, and depleted by thread withdrawal at the other end.

Such a construction is known from German Patent Specification No. 1,262,847. In this case, the support is in the form of a converging frusto-conical coil-forming section which leads into a cylindrical coil-supporting section. The thread delivered onto the coil-forming section slides down and pushes the thread turns, which have previously been formed forwards by forcing its way into the angular channel at the intersection of the frusto-conical section and the cylindrical section.

Corresponding devices are used, for example, as intermediate stores for weft threads on looms with a stationary weft-thread supply bobbin. A control, associated with the device, ensures that the particular length of thread to be withdrawn is present as a rewound supply. Not only can a high throughput be achieved with such devices, but also a great constancy in the thread withdrawal tension. Such devices are known both with a rotating coil support and stationary thread guide and with a rotating thread guide and stationary coil support.

Difficulties are involved in handling on these known devices, all the different qualities of yarn which are on the market

today, always with the same high throughput and clean thread withdrawal. This applies in particular when it is a question of devices with a stationary coil support and a rotating thread guide. With certain yarns, the centrifugal force, which plays a greater part and acts on the oncoming yarn, leads to certain irregularities in the formation of the rewound supply and to further disturbances in the mode of operation of the device.

The most varied attempts have already been made to improve the suitability of such devices for a wider range of the yarns on the market. Thus, German Specification No. 1,760,738 proposes to make the thread guide displaceable and adjustable in relation to the coil support in the axial direction. This permits a variation in the entry angle of the thread into the angular channel between the frusto-conical and cylindrical sections. Even this solution does not enable the handling of yarns of the most varied qualities and types. The angle for forcing in the thread can admittedly be altered; but the line of the first thread turn which has run on always remains the same and corresponds precisely to the line of the angular channel.

In another attempt to overcome the indicated disadvantages advance of the rewound coil along the coil support exclusively by the thread feed has been dispensed with. Instead, active advancing means with a ram-like action are provided (c.f. German Auslegeschrift No. 1,635,899 and British Patent Specification No. 1,306,053). In the construction according to No. 1,306,053 the coil support is formed by rods situated at the corners of a polygon and the feed ram acts in between. These constructions are expensive from the structural point of view and they require a moving part for advancing the coil. However, they bring the advantage of lower

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displacement friction because the thread turns do not bear against the whole periphery of the coil support.

5 An attempt has already been made to increase the possibility of using devices of the kinds referred to for the most varied types of yarn and qualities of yarn by selecting different coil supports according to the nature of the yarn to be processed, particularly according to its resilience. The coil supports can be so shaped that between the frusto-conical section and the cylindrical section is a further section which converges with a smaller taper than the first frusto conical section (c.f. German Auslegeschrift No. 1,535,642). This solution is extremely disadvantageous both from the production point of view and from the need to store parts. The angle of the slightly tapered portion must be adapted relatively precisely to the particular yarn and the thread feed tension. Each device is substantially provided only for a specific yarn. For other yarns other coil supports must be selected with a different angle of convergence of the slightly tapering intermediate section. With these devices, the run-on is the line of intersection between the frusto-conical and intermediate sections and each thread turn bears against the coil support all round. Thus, particularly with non-resilient and thin yarns, the risk arises that the yarn turns, which have formed the rewound supply on the cylindrical section, may slide one over the other, which in turn can lead to withdrawal difficulties.

40 It is the object of the invention to develop a device of the type in question so that the optimum geometrical conditions are present in the region of the winding line with a form of construction which is favourable from the manufacturing point of view and advantageous in use.

45 According to the invention, a storage and delivery device has a support for a single layer coil of thread which can be replenished by winding at one end, pushed along the support, and depleted by thread withdrawal at the other end, the support being formed by a frusto-conical coil-forming section which leads into a substantially cylindrical coil-supporting section at an angular intersection and at least one web which leads from the coil-forming section to the coil-supporting section bridging over the angular intersection, and a thread guide for delivering thread tangentially onto the webs and coil-forming section the web projecting outwardly of the angular intersection to an adjustable extent to vary the length of thread section engaging the frusto-conical surface of the coil-forming section.

65 With this construction, each thread turn

is divided, during the winding, into advance and slide-off portions where the thread lies in contact with the coil-forming section and is raised above the coil-forming section by the webs respectively. These portions follow one on the other in the peripheral direction of the turn. The advance portions, which are situated side by side at the same height and the length of which can be determined by the position of webs, ensure that layers of yarn which are always situated precisely side by side are fed onto the coil-supporting section. The turns of yarn cannot slip one over the other because, as a result of the bridging arrangement of the webs, the first thread turn wound does not tend to slip down between the webs. On the other hand, the slide-off portions facilitate a uniform advance of the yarns turns. The length of the advance portions can be adapted relatively to that of the slide-off portions by adjustment of the extent to which the webs project outwardly of the angular intersection. By such adjustment, a single device can be used with various qualities of yarn and types of yarn. The peripheral length of the coil support is thus variable in the region of the thread feed line. This also leads to considerable economic advantages. The variation of the relative lengths of the advance and slide-off portions, which can be effected by the manufacturer using a different assembly of the same basic components, or by the user if a user adjustment is provided always provides the favourable prerequisites for reliable storage of the layers of yarn on the feeder support without disturbance, and for withdrawal. The conveying coil-forming section beyond the web or webs or the part of that section between two webs serves, depending on the position of the webs, only partially as an active advance surface for the displacement of the yarn turn delivered on the thread feed line. The webs do not have a hampering effect on the thread advance because the ends of the webs lead into the support sections. It is advisable to provide a number of webs in a uniform peripheral distribution, forming an equilateral polygon. The effective length of the advance surface of the coil-forming section can be additionally determined by an appropriate choice of polygon corners.

The extent to which the webs project can be adjusted in a simple manner by axial displacement of a carrier on which the webs are mounted, for example by means of a screw spindle acting on the carrier. Instead of axial displacement of the webs in order to alter the thread feed line, a radial adjustment of the webs is likewise possible. In the latter case, on adjustment, the angle of inclination of the webs in relation to the

coil-forming section is altered but within such limits that the angle of inclination of the webs is less than that of the coil-forming section. If required, by means of the adjustments described above, the webs can be brought into an inactive position so that the thread feed line then coincides with the angular intersection between the coil-forming and coil-supporting sections. The feeder then works precisely like that according to German Patent Specification No. 1,262,347.

Two examples of devices in accordance with the invention are illustrated in the accompanying drawings, in which:—

Figure 1 shows diagrammatically, in elevation, a first example;

Figure 2 is an axial section through the coil support of the Figure 1 example;

Figure 3 is a section taken on the line III—III in Figure 2;

Figure 4 is a section, to a larger scale, taken on the line IV—IV in Figure 3;

Figure 5 is a plan view corresponding to Figure 4; and,

Figure 6 shows a diagrammatically longitudinal section through the coil support of the second example.

The device illustrated in Figures 1 to 5 has a housing 2 carried by a base plate 1. Accommodated in the housing 2 is an electric motor 3, a motor shaft 4 of which receives a disc-shaped thread guide carrier 5, outside the housing 2. There is a frictional connection between the motor shaft 4 and thread guide carrier 5. For this purpose, the thread guide carrier 5 has a slotted cone 6 over which there engages a disc 7 with a tapered inner opening. The frictional connection is brought about by means of screws 8.

The thread guide carrier 5 comprises a tapered wall 5'. A thread guide 9 guides the thread onto a tapered wall 5' of the thread guide carrier 5.

The tapered wall 5' of the thread guide carrier 5 is in alignment with a frusto-conical coil-forming section 10 at the end of a support 11. This section leads into a cylindrical coil-supporting section 12 of the support 11. An angular channel 13 is formed at the intersection of the sections 10 and 12.

The wall of the section 12 is continued, at the end adjacent to the housing 2, in an inwardly directed collar 14. The latter serves to secure the support 11 to the housing, using distance pieces 15 arranged in uniform peripheral distribution.

Mounted for longitudinal displacement in the support 11 is a hollow cylindrical carrier 16. Secured in the carrier is a screw spindle 17 which carries an adjusting nut 18 in the space between the collar 14 and housing 2. An axial variation in position of

the carrier 16 can be brought about by turning this nut.

At its end adjacent to the thread guide carrier 5, the carrier 16 merges into a cone-shaped section 19 which enters a matching conical recess in the package former.

Bores 20, which are aligned inclined at an acute angle to the axial line of the section 12 and which serve to receive ribs 21, which form webs, of correspondingly long dimensions, are provided in the carrier 16. According to the first example the ribs 21 are constructed in the form of cylindrical bodies. These ribs 21 pass through corresponding slots 22 in the section 12. The slots extend over the region between the section 10 and the section 12. This means that the ribs 21 lie across the angular channel 13. As shown, the carrier 16 is in a position in which the ribs project to a certain extent outwardly of the angular channel 13. As Figures 2 and 4 show in particular, the one ends 21' of the ribs 21 enter the section 10 and the other ends 21" enter the section 12, thus avoiding sharp projections.

The thread guide carrier 5, which is aligned coaxially with the support 11, is provided at the exit side of the thread guide 5 with a groove 23 which forms a supporting edge 23' for the thread F to be applied to the support 11.

The thread F is withdrawn from a supply bobbin 24 mounted on the base plate 1. It runs through a thread brake 25 which is at the opposite side of the housing. From there, the thread passes through a bore 26 in the motor shaft 4 into the thread guide 9 and from there it is delivered to the support 11. The withdrawal of the thread from the support is effected over rounded marginal edge R of the thread guide carrier 5, associated with which marginal edge is a brake ring 27, the bristles of which come to bear against the marginal edge of the thread guide carrier 5. The brake ring 27 is itself mounted coaxially with the support 11 for displacement on guide pins 28 extending freely from the housing 2 and can be located in any position by means of gripping members not illustrated. From the brake ring 27, the thread passes into a thread withdrawal eye 50.

As can be seen from Figures 1 and 2, the thread withdrawal direction is counter to the direction of advance of the yarn turns.

During the application of the yarn, the thread leaving the thread guide 9 arrives on a thread feed line x—x. The latter is formed by a channel K between the ribs 21 and the frusto-conical section 10. On further rotation of the thread guide carrier 5 in the direction of the arrow y, an advance portion z forms on the part of the section 10 situated between the corresponding ribs 21

and displaces the corresponding section of the yarn turn in the direction of the angular channel 13. Thus in the winding zone the yarn turns are applied approximately polygonally. The corners of the polygon are formed on the one hand by the ribs 21 and on the other hand by the corresponding wall parts of the section 10. The yarn turns thus applied in the winding zone are accordingly divided into advance sections F1, resting on the section 12, and slide-off sections F2 on the ribs 21. In this manner, the effect is achieved that layers of yarn lying precisely side by side are obtained, regardless of the material concerned. If the thread feed line x—x is to be displaced for example, then the carrier 16 with the ribs 21 can be displaced in the direction of the arrow u by means of the adjusting nut 18, in the course of which the corresponding end section of the carrier 16 penetrates into a recess 29 in the thread guide carrier 5.

As an alternative, the support 11 could be formed by rods disposed in polygonal form and angularly offset in relation to one another to provide the support and ribs.

According to the second example shown in Figure 6, a radial adjustment of ribs 39 is possible. For this purpose, the ends of the ribs, remote from the coil-forming section of the support, are mounted with uniform peripheral distribution, on a non-displaceable annular member 40. The wall surface of the support and the tapered widened portion are slotted. The ribs 39 are each loaded in the radial inward direction by a compression spring 43. A cone 41, on which there acts a spindle 42, serves to control the pivotal movement of the ribs.

According to both examples it is possible to set the ribs back out of their bridging position in relation to the angular channel 13.

With both examples a mechanical control device or one working in the form of a light barrier for example can be associated with the coil support, its purpose being to scan the rewound supply on the support 11 and to control a drive so that a predetermined rewound supply is always present on the support.

In the examples illustrated, the coil support is stationary and the thread guide

rotates. The invention is also applicable however, to feeders in which the thread guide is stationary and the coil support rotates.

#### WHAT WE CLAIM IS:—

1. A thread storage and delivery device having a support for a single layer coil of thread which can be replenished by winding at one end, pushed along the support, and depleted by thread withdrawal at the other end, the support being formed by frusto-conical coil-forming section which leads into a substantially cylindrical coil-supporting section at an angular intersection and at least one web which leads from the coil-forming section to the coil-supporting section bridging over the angular intersection, and a thread guide for delivering thread tangentially onto the webs and coil-forming section, the webs projecting outwardly of the angular intersection to an adjustable extent to vary the length of thread section engaging the frusto-conical surface of the coil-forming section.

2. A device according to claim 1, in which a plurality of the webs are positioned at the corners of an equilateral polygon.

3. A device according to claim 1 or claim 2, in which the web is mounted, inclined at an acute angle to the axis line of the support, on a carrier which is adjustable in the axial direction of the support and is disposed in the support.

4. A device according to claim 1 or claim 2, in which the web can be advanced in the radial direction of the support.

5. A device according to claim 4, in which the radial advance is effected by pivoting the web which is pivotally mounted at one end.

6. A thread feeder according to Claim 1, substantially as described with reference to Figures 1 to 5, or to Figure 6, of the accompanying drawings.

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