DEVICE FOR HOOKING A YARN ON A ROTATING SUPPORT

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Abstract
Device for hooking a yarn on a rotating support comprising a hooking member mounted near an extremity of the support, the hooking member comprising a finger having a spherical and polished end, and an elastic element adjacent the finger, such elastic element being deformable under the action of the centrifugal force and, therefore, is caused to grip the yarn between itself and the finger during the rotation of the support and to release the yarn during the deceleration of the support.

7 Claims, 4 Drawing Figures
DEVICE FOR HOOKING A YARN ON A ROTATING SUPPORT

The present invention relates to a device for hooking a textile yarn on a support driven in rotation in the course of a winding operation. It is well known, in winding devices, especially for automatic winding, that hooking means may be provided that intercept and grasp the yarn, driving the yarn and causing the starting of the winding on the tube or spool. The hooking means then hold the yarn throughout the winding phase and the braking that occurs at the completion of the winding: they must then release the yarn at the moment at which the full spool is withdrawn.

For a hooking device, a simple finger called a hooking catch is generally used at present. This finger is rigidly fixed on a rotating part near one end of the winding support. For example, when the yarn support is mounted on a stirrup that holds it by its ends, e.g., by means of two cheeks, the catch is fixed on one of the two cheeks. Although the device looks simple, the management and control of the functions required of the hooking device entails some problems.

Before the hooking, the catch, fixed on a turning part, describes a circular path. The moving yarn, e.g., blown by a pneumatic gun, describes a trajectory that passes near the path of the catch. To cause the hooking, a movable element deflects the yarn onto a second trajectory so that the moving catch will intercept the yarn on the second trajectory. At the high rates of rotation (of the order of 250 turns to the second) commonly used, it is difficult to visualize the position of the catch, hence the synchronizing of the passage of the yarn from the first to the second trajectory with the movement of the catch becomes very difficult. Also, it may happen that the catch comes into contact with the yarn before the yarn has been precisely positioned on its second trajectory. A shock results, between the yarn and the end of the catch.

Multi-strand yarn with low cohesion (“no twist” yarn), because of the violence of this shock, and because the end of the catch presents either a pointed configuration or projecting angles, the catch penetrates through the strands that comprise the yarn, and the strands tend to become separated into two equal or unequal parts. This anomaly often has the effect that in the ensuing traction (to break the yarn downstream, for example), the part that has been engaged may only comprise a few strands and it will break, releasing the unengaged yarn.

On the other hand, when the yarn has been intercepted and engaged by the catch, this latter element must hold it firmly throughout the winding phase, especially right after prehension, at the moment of the downstream cutting of the yarn, which causes excess tension. On the other hand, the catch must totally free the yarn when the spool stops rotating so that when the spool is removed the end of the yarn will not remain caught, which would destroy the first loops wound as a piecing end.

It is, therefore, an object of the present invention to eliminate the above defects of conventional hooking devices using a simple and economical hooking device consisting of only a few durable and inexpensive parts.

It is a further object of the present invention to provide a hooking device which will always catch the moving yarn without creating weak points in the yarn and which will firmly hold the yarn during rotation of the yarn support yet will totally release the yarn when the support stops rotating.

It is still a further object of the present invention to provide a hooking device in which the hooking catch has no sharp points or angularities which could cause damage to the yarn.

These and other objectives of the present invention will become better understood when considered in connection with the following examples and drawings in which

FIG. 1 shows a front view of the mounting device of a textile yarn support with a yarn hooking device according to the invention.

FIG. 2 is an end view of the device of FIG. 1.

FIG. 3 shows a hooking catch of the invention in detail, the mounting device for the yarn support being stopped, and

FIG. 4 shows the catch of FIG. 3, the mounting device of the yarn support being in rotation.

According to the present invention, the above objectives are achieved with a device for hooking a textile yarn on a rotatable support, such device comprising a hooking catch mounted in close proximity to an end of the support. The hooking catch comprises a finger element which carries as a substantially spherical polished tip and an elastic element adjacent to the finger; the elastic element is one which deforms when subjected to centrifugal forces, and is adapted, during rotation of the support, to compress the yarn between itself and the finger element, and during deceleration of the support to regain its original shape and release the yarn.

The hooking catch is rigidly fixed on a rotatable part of the mounting device for the support on the side where the winding is to start on the support, designated as a spool. When the mounting device, for example, includes two rotatable cheek parts that grip the spool by its ends, the hooking catch is fixed on one of the cheek parts. The mounting device will typically also function directly or indirectly as the drive means for the rotatable support.

The finger element is preferably of cylindrical or flattened cross-section and carries a tip that is substantially spherical. The spherical tip is made in a simple and conventional manner, as by machining its end, which is referred to as a stem. The machining requires careful polishing of the stem to obtain a surface which is essentially free of snags or burrs since the yarn passes over the stem which functions as a yarn guide. Preferably the spherical tip has a diameter of at least 2.5 mm. With such a tip, having all angularities and points removed, the yarn, depending upon its position with reference to the catch, is either engaged or rejected in its totality.

There is thus no insertion of the finger through the bundle of filaments constituting the yarn in the case of multifilament yarns which can result in weakened yarns and premature breakage.

Preferably, the elastic element has an elongated configuration and may be, for example, a cylindrical rod or a tongue of rubber or other flexible material. It is fixed to the finger element at one of its ends; the other end may be fixed to the cheek part that bears the hooking catch. With reference to the finger element, the elastic element is disposed radially to the inside, so that centrifugal force, causing deformation toward the outside, will force the elastic element against the finger element, thereby forming a pincers that captures the yarn.
The yarn is subsequently released during the deceleration and stopping of the spool, while with decreasing and final disappearance of the centrifugal force, the elastic element resumes its original form. The method of fixation for the elastic element is such that deformation of the yarn is not prevented. Preferably, fixation is not rigid but is effected with play. The materials which may be used for the elastic element are of the type including rubber or plastic material. But steel may also be used, in the form of a wire or a fine tongue with the required flexibility.

The mounting device for a yarn support shown in FIGS. 1 and 2 is the stirrup type comprising two circular, coaxial cheek parts with external gripping of spool 20 by its ends. Only one of these cheeks is shown at 10. The cheek part is furnished with a hooking catch 12 according to the present invention, and the device is supplemented by a yarn deflector 14.

The hooking catch 12 illustrated in FIGS. 3 and 4 includes a finger 16, fixed by means of screws 18 on cheek 10 near its outer periphery. The axis of the finger is disposed substantially in a plane perpendicular to the axis of cheek 10. The finger has a slightly curved configuration, to be able to adapt substantially to the curve of the periphery of the cheek, and it carries tip 22 in the form of a sphere 3 mm in diameter, made by machining to a polished surface. The elastic element has the form of a rubber rod 24 which, in the inoperative position, is disposed substantially along a chord of cheek 10.

One end of the rod is seated, with play, in a hole 26 in the catch, the other end being fixed, likewise with play, in a hole 28 in the cheek 10.

The hooking operation is effected as follows.

Yarn 30, blown for example by a pneumatic gun, moves along trajectory xy (see FIGS. 1 and 2) while hooking catch 12 describes a circular movement at the same time as cheek 10, driven together in rotation. Elastic rod 24 is deformed as in FIG. 4. The deflector element 14 is moved in the direction of arrow F, which has the effect of causing yarn 30 to pass from xy to xy' which intersects the path of hooking catch 12. Hooking catch 12 intercepts the yarn which slips between spherical end 22 of the finger and rod 24 and becomes seated in the nip 32 formed by finger 16 and rod 24. Although rod 24, because of centrifugal force, is brought into contact with finger 16, the insertion of the yarn under the spherical end 22 between the finger 16 and rod 24 is possible because of the elasticity of rod 24 which offers only slight resistance to the yarn tension. The yarn can then be cut downstream of hooking catch 12, the yarn being held positively by the hooking catch. Winding is then started. When the winding is finished, the spool is braked and stopped. During the deceleration phase, before stopping, the centrifugal force diminishes and therefore rod 24 tends to resume its original shape. On stopping, with the disappearance of centrifugal force, rod 24 has resumed its original form as shown in FIG. 3, releasing the end of the yarn.

Of course, the invention is not limited to the above example. It is within the scope of the invention to modify the hooking catch without deviating from the principle of the present invention. For example, the hooking catch can be mounted on any type of engaging device for a rotatable support, e.g., mandrel, stirrup with gripping cheek acting from the inside, from the outside, etc.

The invention is applicable to the winding of simple, composite or twisted yarns, made of continuous and/or discontinuous fibers, prepared from chemical or natural fibers.

What is claimed is:

1. A device for hooking a moving yarn on rotatable support means comprising a rotatable mounting means, a hooking catch mounted on said mounting means in close proximity to an end of the support means and responsive to centrifugal force to hold the yarn during rotation of the rotatable mounting means and release the yarn when the rotatable mounting means ceases to rotate, said hooking catch including a finger element and an elongated elastic element adjacent to the finger element held with play at each of its ends, said finger element and said elastic element forming a yarn receiving recess therebetween such elastic element deforming when subjected to a centrifugal force and resuming its original form when the centrifugal force dissipates, said elastic element being adapted to compress said yarn between itself and said finger element during rotation of said mounting means and to release the yarn during deceleration of said mounting means, said finger carrying a substantially spherical polished tip adapted to catch the totality of filament of a multifilament yarn.

2. The device of claim 1 wherein said substantially spherical polished tip has a diameter of at least 2.5 mm.

3. The device of claim 1 wherein said elastic element is a cylindrical rubber rod.

4. The device of claim 1 wherein said elastic element is a cylindrical plastic rod.

5. The device of claim 1 wherein said elastic element has a flat cross section.

6. The device of claim 1 wherein said rotatable support means is in the form of a spool.

7. The device of claim 6 wherein said spool is mounted on its ends by a stirrup mount comprising two rotatable circular coaxial cheek parts with external gripping means adapted to grip the ends of said spool, wherein said hooking catch is mounted on one of said rotatable cheek parts and wherein one end of the elastic element is fixed, with play, in a hole in said hooking catch and the opposite end is fixed, with play, in a hole in said rotatable cheek part.

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