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⑤④ **Yarn storing and feeding device.**

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Description

The present invention relates to a yarn storing and feeding device in accordance with the prior art portion of claim 1.

DE—A—31 23 760 discloses a yarn storing and feeding device comprising a stationary storage drum onto which an intermediate yarn store is wound by a winding-on device and from which the yarn is withdrawn spiralling through a gap around the withdrawal end of the storage drum. This prior art yarn storing and feeding device comprises a yarn stopping device consisting of a yarn stopping element and an actuator means for actuating said yarn stopping element such that it can be moved into a gap or space located between the stopping device and the withdrawal end of the storage drum. The actuator means of this prior art yarn storing and feeding device is formed by an electromagnetic coil for actuating said stopping element having the form of a pin. When feeding an actuating current to said electromagnetic coil, the magnetic field of said coil urges the pin-like stopping member radially inwardly against the surface of the storage drum. In this position of the pin-like member forming the stopping element, a further withdrawal of the intermediate yarn store wound on the storage drum is prevented. In recent times, the design of yarn storing and feeding devices of the above-mentioned kind has become more and more complicated due to the fact that these devices are provided with a greater number of stopping devices for achieving a better adaption of the length of the weft yarn withdrawn from the storage drum during one shot of the weaving machine to the desired weft yarn length, while maintaining the compact design of the yarn storing and feeding device.

Yarn storing and feeding devices as known from EP—A1—0 024 561 and EP—A1—0 051 811 are provided with a rotatable hollow storage drum rotating in synchronization with the yarn consuming textile machine. In the interior of the storage drum yarn catching elements and their actuating means are mounted for a common rotation with the storage drum. When actuated the yarn catching elements project beyond the surface of the storage drum and catch the yarn. The actuation and deactivation of the yarn catching elements are remotely controlled from the exterior of the storage drum.

Hence, the present invention is based on the technical task of how to provide a yarn storing and feeding device in accordance with the prior art portion of claim 1 having a compact design.

This technical task is solved by a yarn storing and feeding device in accordance with the prior art portion of claim 1 having the characterizing features thereof.

In accordance with the teaching of the present invention, only the actuator means of the stopping device is located radially outwardly with respect to the gap between the actuator means and the drum, while the stopping element is

arranged radially inwardly with respect to this gap.

Such a design enables a very compact structure of the stopping device as the part of the stopping device located outwardly of the gap only comprises the actuator means preferably being an electromagnetic coil. Such a design results in a more reduced length of the stopping device in the axial direction of the yarn storing and feeding device when compared with the design of the prior art yarn storing and feeding device.

Preferably, the stopping element is movably disposed in a radial bore provided in a guiding portion located close to the withdrawal end of the storage drum. When feeding an actuating current to the electromagnetic coil located outside with respect to the gap, the stopping element located in the radial bore opposite to said electromagnetic coil is attracted by the magnetic force thereof so that it becomes moved into said gap.

When switching off the actuating current, a permanent magnet located at the inner end of the bore retracts the stopping element.

Preferably, the stopping element has a rounded edge or spherical form at its end directed to the gap.

Hereinafter, a preferred embodiment of the present invention will be described with reference to the attached drawings.

Figure 1 shows a side view of a yarn storing device comprising a yarn stopping device in accordance with the present invention, partially in cross-sectional representation;

Figure 2 shows a front view of the yarn storing device in accordance with Figure 1; and

Figures 3 and 4 show details of the yarn stopping devices as shown in Figures 1 and 2.

Referring now to Figure 1, a feeding device 1 consists of a storage drum 2, a winding-on device 3 or orbiting feeder tube 3 and an electric motor 4. A yarn F being supplied to the orbiting feeder tube 3 driven by the electric motor 4 is wound onto the storage drum. This storage drum is a stationary storage drum being maintained in a stationary position with respect to its environment by a magnetic means (not shown here). Devices of the above-mentioned type are known per se in the art. For purposes of the present disclosure, it should be noted that this art is exemplified by US—A—34 55 341 and by US—A—42 26 379.

The feeding device is provided with a storage sensor being located close to the generally cylindrical surface of the storage drum 2. The storage sensor 5 can be a so-called maximum sensor preferably consisting of a light-emitting device and a light sensing device. This storage sensor 5 generates a signal indicating the amount of yarn stored on the drum, i.e. the number of turns of yarn wound onto the drum. Based on this signal, a storage control unit 7 controls the operation of the electric motor 4 in such a way that there is continuously a sufficient amount of yarn available on the yarn storage drum 2.

Storage control units 7 are per se known in the

art. For purposes of the present disclosure, it should be noted that this art is exemplified by DE—A—2908743, FR—A—1562223 and PCT/EP83/00121 (applicant's own).

As shown in Figure 1, there is disposed a yarn sensing means 6 at the withdrawal end of the yarn storage drum arranged such that the yarn is passing its detection area during withdrawal from the drum 2. Regarding details of the yarn sensing means, reference is made to the main application EP—A—0107110.

The yarn sensing means preferably consists of a single yarn sensor 6 producing pulse signals, each pulse signal indicating that the yarn F passes a detection area of the yarn sensor 6. This sensor 6 could also be located in front of the withdrawal end of the storage drum, but has to be arranged such that the yarn is passing its detection area during withdrawal from the storage drum 2. The yarn stopping device 10 located at the withdrawal end of the storage drum 2 consists of an actuator means 11 comprising a plurality of electromagnetic coils 11, a plurality of coil cores 12, each of the electromagnetic coils 11 being wound around a coil core 12 supported of a balloon limiting ring 13 consisting of two U-shaped rings covering said plurality of electromagnetic coils 11. Said balloon limiting ring 13 is fixedly secured to the environment of the feeding device 1, for example, to a base plate thereof. A ring-shaped guiding portion 16 is connected to the withdrawal end of the storage drum 2. Said guiding portion 16 supports a plurality of yarn stopping elements 14, each of said yarn stopping elements 14 consisting of a metal ball 14 being movably disposed in a radial bore 15 provided in the guiding portion 16.

As shown in Figures 3 and 4, the respective electromagnetic coils 11 and associated cores 12 are arranged opposite to said bores 15. The balloon limiting ring 13 and the guiding portion 16 define a gap 18 being preferably in the order of 1—2 millimeters. The yarn F passes said gap when being withdrawn from the storage drum. A permanent magnet 17 is located at one end of each bore 15 for moving back said metal ball 14 into said bore 15 after switching off an actuation current fed to the respective electromagnetic coils 11. As shown in Figures 3 and 4, the ball 14 is attracted by the magnetic force of coil 11 when switching on the actuation current fed to coil 11. The width of the gap 18 corresponds to the radius of the metal ball 15. When the coil 11 is not activated, the permanent magnet 17 will attract the metal ball 14, so that the ball will be completely positioned inside the bore 15, so that the yarn F can be freely withdrawn in the axial direction from the storage drum 2.

The magnetic force of each electromagnetic coil 11 is chosen such that this force will overcome the attraction force of the permanent magnet 17 when feeding the actuation current to the coil 11. The metal ball 14 will thereby move outwardly in the radial direction of the bore 15 and come into contact with the free end of the coil core 12. In this condition, approximately half of the metal ball

locks the gap 18 for the passage of the yarn F in such a way that the withdrawal of the yarn F from the storage drum 2 is terminated. When switching off the actuation current fed to the coil 11, the tension in the yarn F being pulled at the beginning of the weft yarn insertion co-acts with the magnetic force of the permanent magnet 17 such that the metal ball 14 will return to its starting position so as to come into contact with the permanent magnet 17. As the tension of the yarn co-acts with the magnetic force of the permanent magnet 17 due to the shape of the metal ball 14, the holding force of the permanent magnet 17 can be relatively low. Hence, only a small portion of the attracting force generated by the electromagnetic coil 11 is required for overcoming the magnetic force of the permanent magnet 17. For this reason the yarn stopping device 10 in accordance with the present invention is working faster than prior art devices using stopping elements 14 which are needle-shaped or pin-shaped. For further enhancing the operation of the yarn stopping device 10, a thin plate of non-magnetic material can be positioned at the outer end of the permanent magnet 17 and/or on the free end of the coil core 12 for eliminating a magnetic sticking or "adhesion" between the metal ball 14 and the permanent magnet 17 and/or the coil core 12.

The stopping element 14 can also have the form of a short-cylindrical pin with a plane inner end directed to the permanent magnet 17 and a rounded, preferably semi-spherical outer end.

Claims

1. Yarn storing and feeding device comprising a stationary storage drum (2) onto which an intermediate yarn store is wound by a winding-on device (3) and from which the yarn (F) is withdrawn spiralling through a gap (18) around the withdrawal end of the storage drum (2), at least one yarn stopping device (11 to 17) each comprising a yarn stopping element (14) and an actuator means (11) for actuating said yarn stopping element (14) such that it can be at least partially moved into said gap (18) for stopping the withdrawal of the yarn (F), said at least one actuator means (11) being arranged radially outwardly with respect to said gap (18), characterized in that said at least one stopping element (14) is arranged radially inwardly with respect to said gap (18).

2. Yarn storing and feeding device as claimed in claim 1, characterized in that said actuator means comprises an electro-magnetic coil (11).

3. Yarn storing and feeding device as claimed in claims 1 or 2, characterized in that said yarn stopping element (14) comprises a short-cylindrical pin.

4. Yarn storing and feeding device as claimed in claims 1 or 2, characterized in that said stopping element is a ball (14).

5. Yarn storing and feeding device as claimed in one of claims 1 to 4, characterized in that said stopping element (14) is movably disposed in a

radial bore (15) provided in a guiding portion (16) located close to the withdrawal end of the storage drum (2).

6. Yarn storing and feeding device as claimed in one of claims 1 to 5, characterized in that there is provided a permanent magnet (17) located at one end of said bore (15).

7. Yarn storing and feeding device as claimed in one of claims 1 to 6, characterized in that said stopping element (14) has a rounded edge at its end directed to the gap (18).

Patentansprüche

1. Fadenspeicher- und -liefervorrichtung mit einer stationären Speichertrommel (2), auf die mittels einer Aufwickelvorrichtung (3) ein Faden zwischenspeicher aufwindbar und von der der Faden (F) spiralförmig umlaufend durch einen Spalt (18) über das Abzugsende der Speichertrommel (2) abziehbar ist, mit wenigstens einer Fadenstopvorrichtung (11—17), die ein Fadenstopelement (14) und ein Betätigungsmittel (11) zum Betätigen des Fadenstopelementes (14) aufweist und derart ausgebildet ist, daß das Fadenstopelement (14) zumindest teilweise in den Spalt (18) bewegbar ist, um den Fadenabzug zu unterbrechen, wobei die Betätigungsmittel (11) in bezug auf den Spalt (18) radial außen angeordnet sind, dadurch gekennzeichnet, daß das wenigstens eine Stopelement (14) in bezug auf den Spalt (18) radial innenliegend angeordnet ist.

2. Fadenspeicher- und -liefervorrichtung gemäß Anspruch 1, dadurch gekennzeichnet, daß die Betätigungsmittel eine elektromagnetische Spule (11) aufweisen.

3. Fadenspeicher- und -liefervorrichtung nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, daß das Fadenstopelement (14) einen kurzen zylindrischen Stift aufweist.

4. Fadenspeicher- und -liefervorrichtung gemäß den Ansprüchen 1 oder 2, dadurch gekennzeichnet, daß das Fadenstopelement (14) eine Kugel ist.

5. Fadenspeicher- und -liefervorrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß das Fadenstopelement (14) in einer radialen Bohrung (15) beweglich angeordnet ist, die sich in einem Führungsabschnitt (16) nahe dem Abzugsende der Speichertrommel (2) befindet.

6. Fadenspeicher- und -liefervorrichtung nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß an einem Ende der Bohrung (15) ein Permanentmagnet (17) angeordnet ist.

7. Fadenspeicher- und -liefervorrichtung nach einem der Ansprüche 1 bis 6, dadurch gekenn-

zeichnet, daß das Fadenstopelement (14) an seinem zum Spalt (18) weisenden Ende eine gerundete Kante besitzt.

Revendications

1. Dispositif d'emmagasinage et d'amenée de fil, comportant un tambour fixe d'emmagasinage (2) sur lequel une réserve intermédiaire de fil est bobinée par un dispositif de bobinage (3) et duquel le fil (F) est extrait en décrivant une spirale dans un interstice (18) autour de l'extrémité d'extraction du tambour d'emmagasinage (2), comportant aussi au moins un dispositif (11 à 17) d'arrêt du fil comprenant chacun un élément (14) d'arrêt du fil et un moyen (11) formant actionneur pour actionner ledit élément (14) d'arrêt du fil de façon à pouvoir le déplacer au moins partiellement dans ledit interstice (18) pour arrêter l'extraction du fil (F), ledit moyen formant actionneur (11), dont il y a au moins un, étant disposé radialement à l'extérieur par rapport audit interstice (18), caractérisé par le fait que ledit élément d'arrêt (14), dont il y a au moins un, est disposé radialement à l'intérieur par rapport audit interstice (18).

2. Dispositif d'emmagasinage et d'amenée de fil comme revendiqué dans la revendication 1, caractérisé par le fait que ledit moyen formant actionneur est constitué d'une bobine électromagnétique (11).

3. Dispositif d'emmagasinage et d'amenée de fil comme revendiqué dans les revendications 1 ou 2, caractérisé par le fait que ledit élément (14) d'arrêt du fil est constitué d'une petite broche cylindrique.

4. Dispositif d'emmagasinage et d'amenée de fil comme revendiqué dans les revendications 1 ou 2, caractérisé par le fait que ledit élément d'arrêt est une bille (14).

5. Dispositif d'emmagasinage et d'amenée de fil comme revendiqué dans l'une des revendications 1 à 4, caractérisé par le fait que ledit élément d'arrêt (14) est disposé, avec liberté de déplacement, dans un alésage radial (15) prévu dans une portion de guidage (16) située près de l'extrémité d'extraction du tambour d'emmagasinage (2).

6. Dispositif d'emmagasinage et d'amenée de fil comme revendiqué dans l'une des revendications 1 à 5, caractérisé par le fait qu'il est prévu un aimant permanent (17) situé à l'une des extrémités dudit alésage (15).

7. Dispositif d'emmagasinage et d'amenée de fil comme revendiqué dans l'une des revendications 1 à 6, caractérisé par le fait que ledit élément d'arrêt (14) présente un bord arrondi à son extrémité dirigée vers l'interstice (18).

