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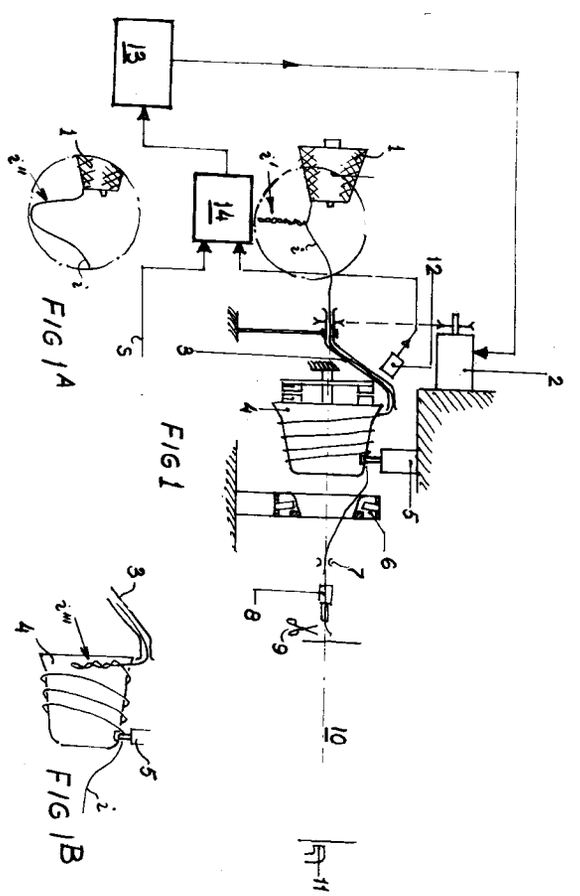
(54) A device for feeding a periodically operating yarn-consuming device.

(57) A device for feeding a periodically operating yarn-consuming device, such as a shuttleless weaving machine, of the type adapted to shape the yarn to be consumed into a supply coil and to periodically release - with the aid of a release means - from said coil a number of windings corresponding with a predetermined yarn length to be drawn off and supplied to the yarn consuming device.

In accordance with the invention means are provided in the drive control (13) of the winding element (3) to keep the winding element (3), before coming to a complete standstill - rotating through a certain angle at a substantially lower speed so as to avoid loop forming in the path of the yarn (i) between the yarn package (1) and the winding element (3).



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The invention relates to a device for feeding a periodically operating yarn-consuming device, of the type adapted to shape - with the aid of a rotating winding element - the yarn to be consumed into a supply coil and to periodically release - with the aid of a release means - from said coil a number of windings corresponding with a predetermined yarn length to be drawn off and supplied to the yarn consuming device, the drive of the winding element comprising means adapted to bring the winding element to a quick standstill in case of a halting release means.

Such devices are well-known and are particularly utilized as yarn preparing device with shuttleless weaving machines. In case the weaving machine in operation is consuming weft yarn of one type (or colour) the yarn preparing device will operate in a continuous mode and the weft yarn to be consumed will be continuously drawn from a stationary yarn package, whereby a substantially constant low yarn tension will occur in the yarn trajectory between the yarn package and the yarn preparing device up to the release means.

When weft yarn of different sorts (or colours) are to be consumed, in which case the weaving machine has a separate yarn preparing device for each type (or colour) of weft yarn, the supply of weft yarn from the individual yarn preparing devices to the weft yarn-inserting device of the weaving machine will have to be interrupted from time to time. A signal produced by the weft insertion program causes the releasing means of the respective yarn preparing device to halt so as to prevent a weft yarn length (which is not wanted at such moment) from being released. With modern high-speed weaving machines producing 800 and more picks per minute it is essential, that the yarn supply from the stationary yarn package to the winding element of the yarn preparing device may be quickly come to a standstill. Therefore, in addition to the signal for halting the release means, a stop signal is simultaneously supplied to the drive control of the winding element so as to cause the latter to be brought to a quick standstill and to thereby prevent the drum carrying the supply coil from being loaded excessively.

In practice, when a yarn preparing device is brought substantially abruptly to a standstill, loop forming occurs in the yarn course between the stationary yarn package and the winding element, said loop forming being due to the inertia yarn which is unwinding at a high speed from the yarn preparing device in operation. Moreover, in case of strongly twisted yarns, the legs of the loop may get entangled.

When putting the yarn preparing device into operation again the yarn length in the trajectory between the yarn package and the winding element is accelerated and thereby stretched in an abrupt manner due to which yarn tensions may occur which exceed the acceptable ones and which may affect the (normal) development of the yarn tension in the further yarn course towards the weft inserting device and through the weaving shed in such a way, that weaving defects oocur.

Up to now in such cases one tries to avoid loop forming by applying a yarn brake in the yarn course between the yarn package and the winding element or to surround the yarn package by a braking "socket".

Such a brake, however, has a harmful effect on the yarn tension during normal operation.

It is an object of the invention to overcome said drawback. According to the invention this aim is achieved in that measures have been taken in the drive control of the winding element to keep the winding element - before coming to a complete standstill - rotating through a certain angle at a substantially lower speed. In this manner, the yarn loop produced during the initial phase of the stopping procedure will be rectified during the last phase of said procedure.

More particularly the device according to the invention is characterized in that the drive control of the winding element is controlled by a precontrol unit, to which - in addition to the stopping signal - also a signal is supplied that is produced by a position sensor cooperating with said winding element.

In a practical embodiment the precontrol unit is designed to cause the winding element - upon receiving the last detection signal of the position sensor - to keep rotating up to the angular position corresponding with the detection location. By a suitable selection of the position detection location the winding element may be caused to come to a standstill in a position, in which the weaver has the best sight on the yarn course through the device.

The invention will be hereinafter further explained by way of example with reference to the drawing.

Fig. 1 shows a diagrammatic arrangement of the major parts of the weft insertion (preparing) portion of a pneumatic weaving machine designed in accordance with the invention;

fig. 1A and 1B show other types of loop forming as distinguished from the loop forming within the encircled area in fig. 1 and

fig. 2 shows a rather diagrammatic alternative for the yarn preparing device used with the weaving machine according to fig. 1.

In the diagram of fig. 1, as seen from the left to the right, into the main travelling direction of the weft yarn, there are the following parts and devices respectively: a stationary (weft) yarn package 1, a winding arm 3 driven by an electric motor 2, a stationary supported drum 4 adapted to collect the yarn supplied by the winding arm 3 in the form of a plurality of windings, an electromagnetically operating stopper pin 5, a winding counter 6, a yarn guiding eyelet 7, an air pressure operated main injector 8 functioning as a

weft inserting device, a cutting member 9, the weaving shed 10 and a stretching injector 11 provided with a weft detection means.

With the exception of the position sensor 12 to be described hereinafter and the special control of the electric motor 2 connected therewith, this arrangement corresponds with that of a well-known pneumatic weaving machine (vide e.g. U.S. patent specification 4,848,417). In the diagram shown a weft preparing device 2-5 of the drum type is taken as an example and comprises a rotating winding arm 3 (the so called "flyer") provided with a guiding passage for the weft yarn, and a stationary supported winding drum 4 with a periodically operating stopper pin 5.

In normal use the weft yarn i is continuously drawn from the yarn package 1 at a speed of e.g. 30-40 m/sec and passed towards and through the guiding passage within the winding arm 3 that winds the yarn onto the drum 4 at a speed of e.g. 5000-6000 rpm.

A proportion of the yarn supply thus collected on the drum is periodically released for withdrawal and supply to the yarn inserting device by causing the stopper pin 5 to retract from the drum surface.

The windings withdrawn from the drum pass the winding counter 6. As soon as the counted number of windings corresponds with the desired yarn length - in this case the weft length - the withdrawal of yarn is interrupted by causing the stopper pin 5 to return to the drum surface. Normally the stopper pin 5 is retracted again when the weft thread has been completely inserted into the shed and has been detected, stretched and (substantially) beaten up into the kloth, so that a following weft insertion is to be started.

When weaving with weft yarns of different type or colour each change from one type (colour) to another type (colour) involves an interruption in the need for yarn of that particular type (colour) with the respective inserting device (injector). On the moment the stopper pin 5 would normally retract it is now remaining in its stop position. On the same moment - which e.g. corresponds with the moment on which the last insert of one type (colour) is detected - the drive of the winding arm 3 is rapidly switched off to prevent the drum 4 to be overloaded with weft yarn. Bringing the winding arm 3 to a standstill in an abrupt manner, i.e. in less than 0.1 sec., however, leads to loop forming in the yarn course between the yarn package 1 and the inlet of the guiding passage within the winding arm 3 (vide the entangled loop i' with a strongly twisted yarn in fig. 1 and the loop i" in fig. 1a) or at the outlet of the guiding passage of the winding arm (vide the entangled loop i"' in fig. 1B).

To avoid or compensate for such loop forming the drive control 13 of the winding arm 3 is driven by a precontrol unit 14. The stop signal S which may e.g. be initiated by the detection signal representative of the latest weft insertion, as well as a signal produced by the position sensor indicated at 12, are supplied to this precontrol unit. The position sensor may be an optical sensor and detects the turns of the winding arm which still occur during the stopping phase.

The precontrol unit 14 is so designed that after the latest detection signal of the sensor 12 the motor keeps rotating through a certain angle (or a number of turns) at a reduced speed (e.g. not higher than 50 rpm) to consume the yarn length of the formed loop(s) in a flexible manner, so that no peak tensions will occur when the respective yarn preparing device is put into operation again. Preferably the precontrol unit 14 is designed in such a way that it causes the winding element - upon receipt of the latest detection signal of the position sensor - to keep rotating until reaching the angular position corresponding with the detection location.

This enables to have the winding element - in response to each interruption in the yarn delivery to the respective weft insertion device - come to a standstill in a position, in which the weaver has a good sight on the yarn course through the yarn preparing device.

In the modification according to fig. 2 use is made of a rotating winding drum 4', which is driven by a motor 2'. In this case the yarn i is supplied from the stationary yarn package 1 via a yarn guiding element 15 directly, tangentially to the drum 4'. The release means is schematically represented as a (periodically operating) yarn brake 5', but may also be a guide arm, which rotates along with the winding drum 4' at a varying speed, as e.g. disclosed in DE-3.142.710 and 3.417.786. In this case a "position sensor" is formed by a disc 1 attached on the shaft of the rotating winding drum 4', said disc cooperating with an optical sensor (not shown), which is adapted to detect one or more marks on the disc. In a way similar to fig. 1, the motor 2' is controlled by a precontrol unit (not shown) to which the stopping signal S and the detection signal from the position sensor 12' are supplied.

Claims

1. A device for feeding a periodically operating yarn-consuming device, of the type adapted to shape - with the aid of a rotating winding element - the yarn to be consumed into a supply coil and to periodically release - with the aid of a release means - from said coil a number of windings corresponding with a predetermined yarn length to be drawn off and supplied to the yarn consuming device, the drive of the winding element comprising means adapted to bring the winding element to a quick standstill in case of a halting release means, characterized in that measures have been taken in the drive control of the winding element to keep the winding element - before coming to a complete standstill - rotating through a

certain angle at a substantially lower speed.

2. A device according to claim 1, characterized in that the drive control of the winding element is controlled by a precontrol unit, to which - in addition to the stopping signal - also a signal is supplied that is produced by a position sensor cooperating with said winding element.

3. A device according to claim 2, characterized in that the precontrol unit is designed to cause the winding element - upon receiving the last detection signal of the position sensor - to keep rotating up to the angular position corresponding with the detection location.

4. A device according to claims 1-3, characterized in that the winding element comprises a winding arm cooperating with a stationary supported winding drum, the release means being formed by a stopper pin cooperating with the stationary drum at the withdrawal end of the latter.

5. A device according to claims 1-3, characterized in that the winding element is formed by a rotatable winding drum which cooperates with a release means positioned in the withdrawal path of the latter.

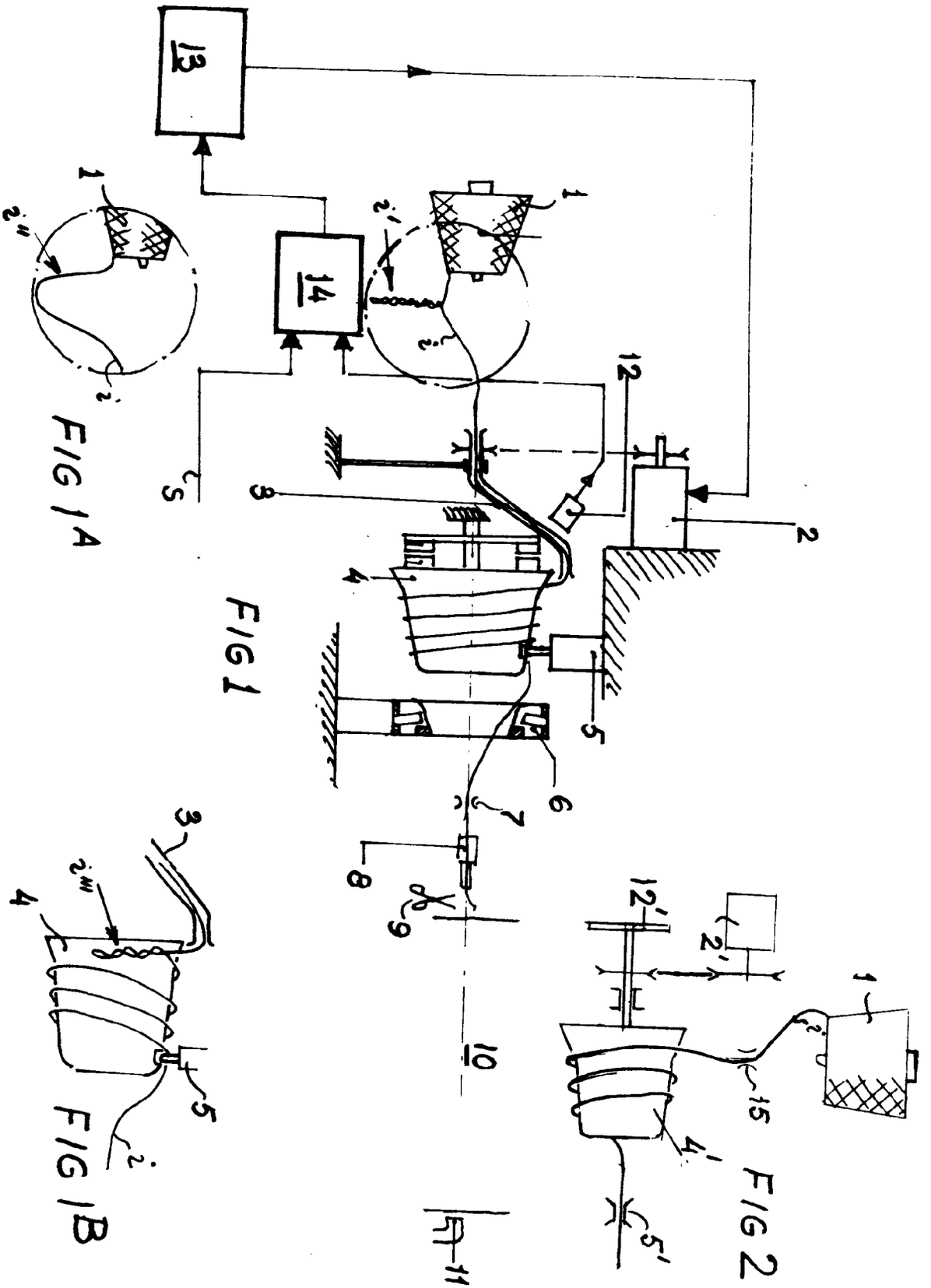

FIG 1A

FIG 1

FIG 1B

FIG 2

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EUROPEAN SEARCH REPORT

Application Number
EP 93 20 2224

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	FR-A-2 548 693 (SAURER-DIEDERICHS) * page 1, line 23 - page 2, line 7; figures 1,3 * * page 2, line 32 - page 4, line 21 * * page 5, line 33 - page 6, line 32 * * page 7, line 29 - page 9, line 18 *	1-4	D03D47/34
A,D	EP-A-0 286 584 (SULZER) * column 4, line 53 - column 5, line 8; figure 1 *	1,4	
A,D	DE-A-31 42 710 (ELITEX) * figures 1-3 *	5	
A,D	DE-A-34 17 786 (ELITEX) * figures 1-3 *	5	
A	NL-A-7 908 901 (KABUSHIKI KAISHA TOYODA JIDOSHOKKI SEISAKUSHO)		
A	EP-A-0 261 683 (TSUDAKOMA)		

TECHNICAL FIELDS SEARCHED (Int.Cl.5)
D03D B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 October 1993	BOUTELEGIER, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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