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(54) System to control the tension of the weft fed to a loom with continuous weft feed.

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Description

It is known that economy of production in modern weaving is essentially based on two factors:

1 - high productivity of the machines (looms);

2 - the shortest possible dead times for changing the articles and for preparing the changed articles.

Both these factors are influenced by the adjustment of the weft yarn tension. In fact, the efficiency and thus the productivity of a loom - especially in the case of a high-performance loom - strongly feel the effects of the various weft tension adjustments, as well as of the weft tension variations in relation to the desired, but inexistent, steady characteristics as far as dyeing pigments, spooling oils and productive processes in general. Furthermore, a loom working with a new yarn, or with a yarn belonging to a different lot, may require - and it usually does - a new tension adjustment; this is now done by attempts and the rapidity of the adjustment depends on the skill of the technician.

In trying to automate the adjustment of the weft yarn tension in the looms, DE-U-8713752 suggests to generically associate a tension sensor to a yarn brake, while FR-A-2568595 suggests the use of a tension sensor placed between the brake means and the weft yarn feeder of the loom. A signal from the tension sensor can be fed back to the brake control means. None of these systems solves efficaciously the problem to automate the process of weft yarn tension adjustment in weaving looms. Problem that instead the present invention solves efficaciously.

It is known that most of these looms and, above all, the modern looms with continuous weft feed, are equipped with a weft feeder having yarn brake means, with a weft yarn changing device and with a sensor controlling the weft picking, or weft stop motion device, usually positioned downstream of the weft feeder and of the brake means and upstream of the weft yarn changing device.

In a loom thus equipped, the present invention provides for a system to automatically control the tension of the weft yarns fed thereto, characterized in that the weft stop motion device serves therein as a tension sensor, the signals from said weft stop motion device (representing the value of weft yarn tension) being suitably processed into an electronic interface circuit and sent to an actuator for controlling the brake means of the weft feeder to maintain a desired weft yarn tension.

The desired tension can be a reference tension preset in the electronic interface circuit, or it can be a tension already prearranged to be variable in the loom working cycle, in which case it is modulated by means of the signals from the weft stop motion device.

In order to control weft yarn braking, the actuator may act on the brake means already provided at the outlet of the weft feeder, or on a braking device provided for the purpose downstream of the weft feeder.

The invention is now described in further detail, with reference to the accompanying drawing, in which:

Figs. 1 and 2 are diagrams illustrating two different embodiments of the system according to the invention.

The diagram of fig. 1 illustrates a continuous weft feed loom 1, to which the weft yarn is fed by a weft feeder 2 having a weft yarn winding drum 3 onto which act brake means 4.

A weft stop motion device 5 is arranged between the weft feeder 2 and the loom 1, upstream of the yarn-changing device.

According to the invention, the weft stop motion device is of the type apt to send a signal of intensity proportional to the rubbing of the weft being picked onto a specially prearranged element 6 thereof, that is, a signal proportional to the tension of said weft.

Always according to the invention, said signal - suitably processed in a special electronic interface circuit 7 - is sent to an actuator 8 provided to control, by means of suitable leverages 9, the brake means 4 of the weft feeder 2. The braking action imparted by said means will thus depend on the weft yarn tension detected by the weft stop motion device 5.

The diagram of fig. 2 illustrates a continuous weft feed loom 1, to which there are still associated a weft feeder 2, a weft stop motion device 5 of the same type as the previous one, an electronic circuit 7 to process the signals sent from the weft stop motion device, and an actuator 8, but this latter, instead of controlling the brake means of the weft feeder 2, acts on an independent brake 10, provided for the purpose downstream of said feeder 2.

In either cases, once a reference tension value - deemed optimal for the working being carried out on the loom - has been preset in the interface circuit 7, any variation in respect of said value of the tension of the yarn f, detected by the weft stop motion device 5, produces a control on the brake means by the actuator 8, which is apt to restore the tension to the desired reference value. Whereby, if there is less tension, the braking action will be increased (thereby to increase the tension of the yarn f). Whereas, if the tension is higher, the braking action will be reduced (in order to reduce the tension of the yarn f).

With the system according to the invention - according to the nature and type of interaction being realized between the actuator and the brake

means (usually mechanical or magnetic) - it will be possible to rely on different response times, such as to obtain adjustments already during the actual working cycle of the loom in which the working is carried out, or to base the adjustment on statistical concepts and thus obtain the adjustment after a certain number of cycles.

According to the weft picking characteristics, which are quite different between simple-width and double-width looms, it is even possible to select between an immediate and a statistic adjustment, according to loom width.

In the event of the brake means operating in a variable way during the loom working cycle, it will not be possible to fix a reference value of the tension with which to compare the instantaneous value taken by the weft stop motion device, but a modulation of the ordinary signal controlling the action of the actuator 8 will be carried out by the signals sent from the weft stop motion device 5.

It is understood that each of the weft yarns to be picked in the loom shed has to be in a position to self-adjust its own tension in the way explained above. The sensor may however be a single sensor, if it has more possibilities of control.

The electronic interface circuit 7 will have to provide for a digiting member, for a monitoring member and for a logic.

Said circuit should perform the following functions:

1 - take from the code of the article being produced, containing all the working parameters of the loom for that article, the tension reference value; alternatively, said value may be digited directly by the operator;

2 - visualize, in an "explorative" function, the tension values, even in different positions of the picking cycle: the operator selects the value which he deems more appropriate as reference value (according to loom behaviour and to the quality of the fabric). Said value is reproduced on the other yarns if they have the same characteristics (the information being supplied by a code or by the operator) on the same loom and/or (by connection to the mains) also on other looms;

3 - if braking requires to be modulated during the cycle, the tension parameters can be defined in various positions and each of them constitutes the reference for each cycle: this means that the actuator will modulate its cycle even in a different way for each position;

4 - the loom can also be supplied with a Data-Base through which, having indicated the type of weft, the loom speed and width, it is possible to choose the reference value of the tension of the yarn f;

5 - it is also possible to provide for a connection between the reference parameter and the working of the loom: this means that, upon weft breakage in certain steps, it is possible to operate a change in the reference tension, which will thus be continuously optimized on each yarn, in order to compensate any relative differences between the systems. In this case, a so-called "open system" will be realized.

Claims

1. System to control the tension of weft yarns fed to a continuous weft feed loom, of the type equipped with a weft feeder (2) having yarn brake means (4), with a weft yarn changing device and with a weft stop motion device (5) arranged downstream of the weft feeder (2) and of the brake means (4) and upstream of the yarn changing device whereby the weft stop motion device (5) serves as a tension sensor, the signals from said weft stop motion device (5) (representing the value of weft yarn tension) being suitably processed into an electronic interface circuit (7) and sent to an actuator (8) for controlling the brake means (4) of the weft feeder (2), to maintain a desired weft yarn tension.

2. Control system as in claim 1), wherein the desired tension is a reference tension preset in the electronic interface circuit (7).

3. Control system as in claim 2), wherein the desired tesion is a tension prearranged to be variable in the loom working cycle, said tension being modulated by means of the signals from the weft stop motion device (5).

4. Control system as in claims 1) to 3), wherein the actuator (8) controls the braking action of an independent brake (10) provided for the purpose downstream of the weft feeder (2).

Patentansprüche

1. System zum Steuern der Spannung von Schußfäden, die einer Webmaschine mit ununterbrochener Schußfadenzufuhr zugeführt werden von der Art, die mit einem Schußfadenspeiser (2) ausgerüstet ist, der ein Fadenbremsmittel (4) aufweist, mit einer Schußfadenwechseleinrichtung und mit einer Schußfadenstoppantriebsrichtung (5), die stromabwärts des Schußfadenspeisers (2) und des Bremsmittels (4) und stromaufwärts der Fadenwechseleinrichtung angeordnet ist, wobei die Schußfadenstoppantriebseinrichtung (5) als ein

Spannungssensor dient, die Signale von der Schußfadenstoppantriebseinrichtung (5) (die den Wert der Schußfadenspannung darstellt) geeignet in einem elektronischen Schnittstellenschaltkreis (7) verarbeitet werden und zu einem Betätigungselement (8) gesandt werden, um das Bremsmittel (4) des Schußfadenspeisers zu steuern, um eine gewünschte Schußfadenspannung zu erhalten.

2. Steuersystem nach Anspruch 1, wobei die gewünschte Spannung eine Bezugsspannung ist, die in der elektronischen Schnittstellenschaltung (7) voreingestellt ist.

3. Steuersystem nach Anspruch 2, wobei die gewünschte Spannung eine Spannung ist, die vorgewählt ist, um in dem Arbeitszyklus der Webmaschine variabel zu sein, wobei die Spannung mittels der Signale von der Schußfadenstoppantriebseinrichtung (5) moduliert ist.

4. Steuersystem nach einem der Ansprüche 1 - 3, wobei das Betätigungselement (8) die Bremswirkung einer unabhängigen Bremse (10), die zu diesem Zwecks stromabwärts des Schußfadenspeisers (2) angeordnet ist, steuert.

Revendications

1. Système de contrôle de la tension des fils de trame distribués à un métier à alimentation en trame continue, du type comprenant un fournisseur de trame (2) comportant un moyen de freinage de fil (4), avec un dispositif de changement de fil de trame et avec un dispositif de butée de trame (5) généralement positionné en aval du fournisseur de trame (2) et du moyen de freinage (4) et en amont du dispositif de changement de fil de sorte que le dispositif de butée de trame (5) serve de capteur de tension, les signaux issus dudit dispositif de butée de trame (5) (représentant la valeur de la tension du fil de trame) étant traités de manière appropriée dans un circuit d'interface électronique (7) et envoyés jusqu'a un dispositif d'actionnement (8) pour commander le moyen de freinage (4) du fournisseur de trame (2) afin de maintenir une tension de fil de trame souhaitée.

2. Système de contrôle selon la revendication 1, dans lequel la tension souhaitée est une tension de référence prédéterminée dans le circuit d'interface électronique (7).

3. Système de contrôle selon la revendication 2, dans lequel la tension souhaitée est une tension prévue pour être variable dans le cycle de fonctionnement du métier, ladite tension étant modulée au moyen des signaux issus du dispositif de butée de trame (5).

4. Système de contrôle selon les revendications 1 à 3, dans lequel le dispositif d'actionnement (8) commande l'action de freinage d'un frein indépendant (10) positionné à cette fin en aval du fournisseur de trame (2).

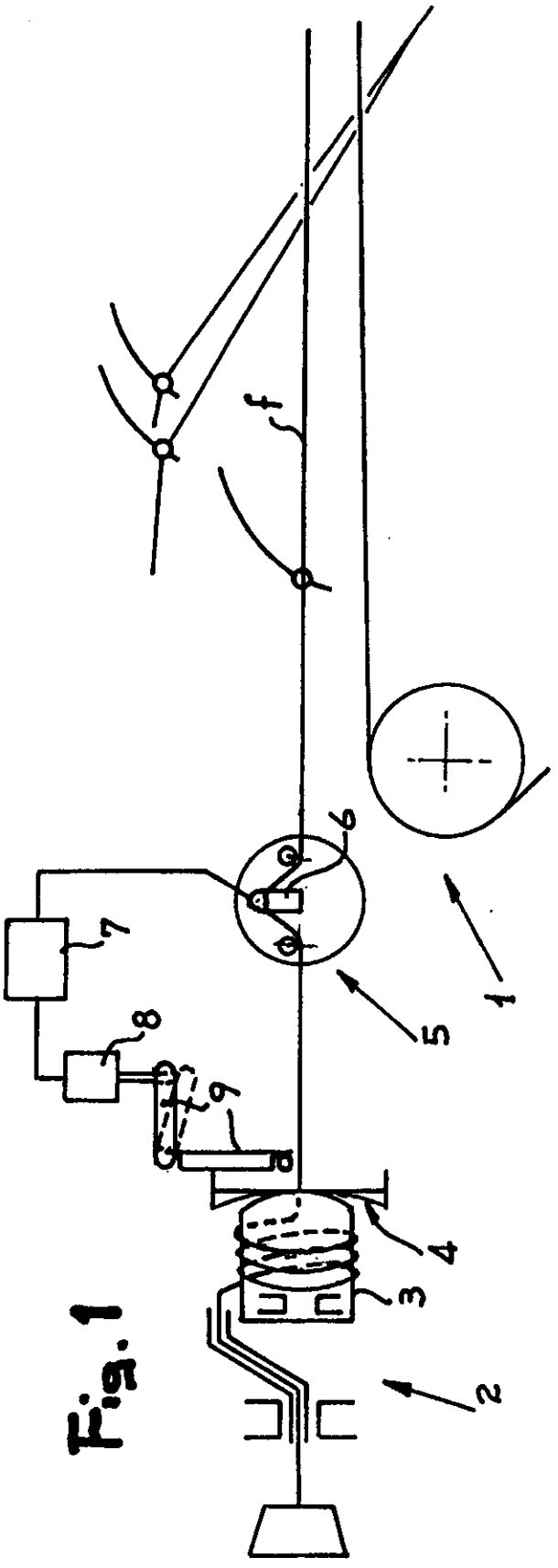

Fig. 1

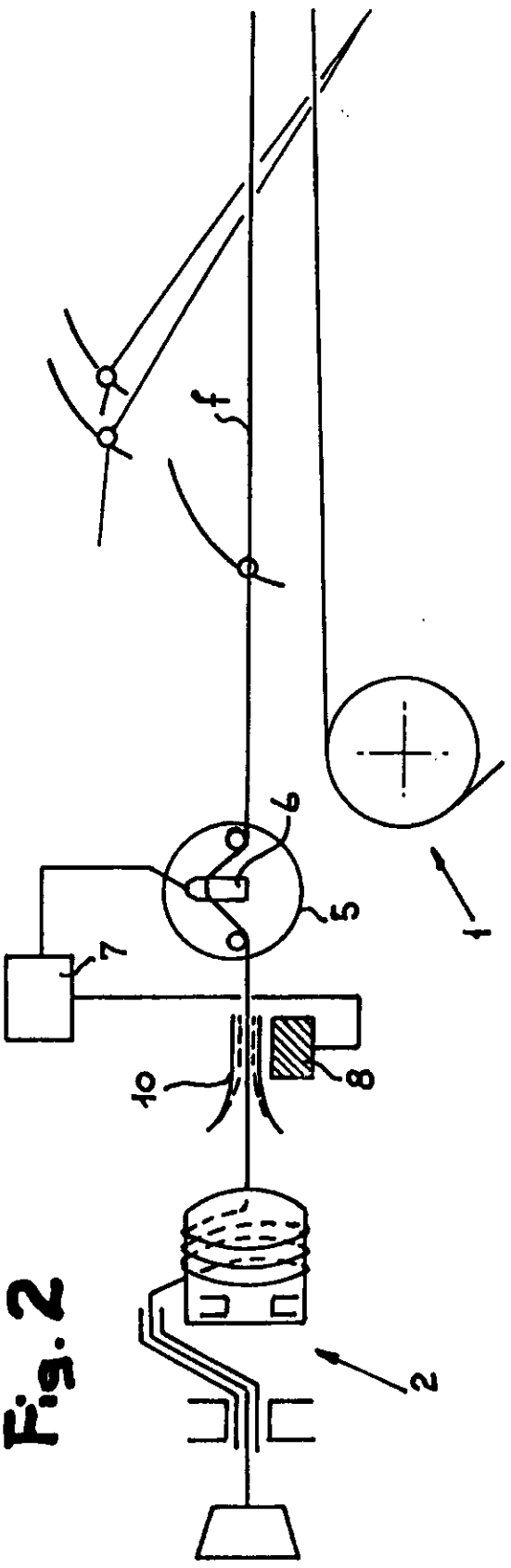

Fig. 2

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Title SYSTEM TO CONTROL THE TENSION OF THE WEFT FED TO A LOOM WITH CONTINUOUS WEFT FEED.

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