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(54) **Thread-carrier apparatus for warpers**

(57) Thread-carrier apparatus for a warper of a type associated with a support (10) rotating about the axis of a drum (2) so as to drive a corresponding working thread (F) into a circular trajectory by winding it over the outer surface of the drum (2), the apparatus including a rod

(11) with a distal portion thereof intended to contact and guide the thread (F) as the latter winds up onto the drum (2) of the warper, apparatus (1) characterized in that a freely rotating roller (12) is attached on the distal portion of said rod (11) for coming in contact and guiding the said thread.

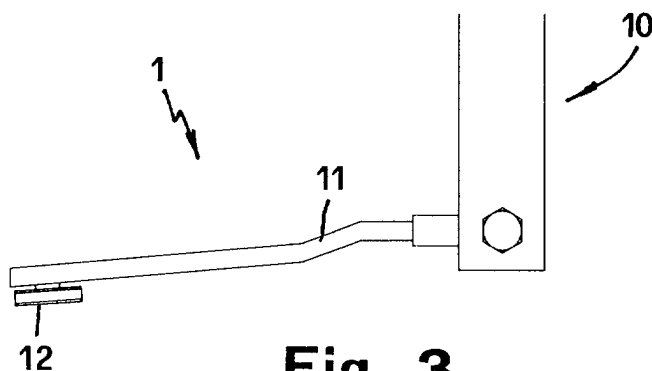


Fig. 3

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Description

[0001] The present invention relates to a thread-carrier for warpers.

[0002] It is known, according to a well established technique of preparing yarns to be woven, that the warp threads are collected onto a cylindrical beam in order to be unwound therefrom and suitably interwoven on the loom with the weft yarn to make the fabric.

[0003] Also known is the fact that the warpers are machines intended to prepare the warp beams for the loom and comprising at least two main parts, that is, the very warper, and the creel or frame holding the reels to feed the threads for the warping. Accordingly, the warping comprises the loading, that is, the placement of reels on the creel in a sequence corresponding to the selected warping; the very warping, that is, the joining of the ends of threads unwinding from the reels to form a set of parallel threads; and the beaming, that is, the transfer of threads from the warper on to the beam. In particular, in the warpers operating the so-called "thread-by-thread" warping, the threads are picked up individually, that is, once at a time in a sequence predetermined according to the desired effect, and then guided, that is, wound up in concentric turns, over the warper's drum by means of an apparatus having a thread-holder rod. The thread-holder rod is fixed to an arm rotating at a preset speed about the axis of said drum so that each thread will travel a substantially circumferential path.

[0004] The free end of said thread-holder rod is so shaped as to retain the thread rotating about the drum; in practice, this end is defined by a slightly bent portion of the rod.

During the warper's operation, the thread slides over the end of the thread-holder rod. Owing to the high speed of the thread (its peripheral speed, by way of example, being in the order of 1200 m/min) and to the friction taking place consequently, localized overstress may occur in the thread which may lead to a drastic reduction of its mechanical resistance or even to a breaking thereof.

[0005] The latter occurrence calls for the stopping of the production process to allow for the restart thereof only after the recovery and the re-knotting of the thread. To avoid the breaking of the thread, or at least to reduce the likelihood of such an event, provision is made for slowing down the machine when approaching the step in which the shedder operates the release of the thread. However, this implies a corresponding reduction of production, which is incompatible with the current work requirements.

[0006] Moreover, during the release of the working thread, the latter takes up a so-called "ballon" configuration the removal of which requires the use of a weights-recovery system associated to each thread. However, the said recovery weights may cause an excessive tension in the threads, which contributes to further increase their stress to the detriment to the warp quality.

[0007] The above problems which characterize negatively the "thread-by-thread" warping are to be found also in the multithread warping, which provides for the winding of more threads at a time, inasmuch as the friction due to the slipping of the threads onto the thread-carriers has anyway a negative effect on the formation of the warp.

[0008] The main object of the present invention is to overcome the said drawbacks.

[0009] This result has been achieved, according to the invention, by providing an apparatus having the features indicated in the characterizing part of claim 1. Further characteristics being set forth in the dependent claims.

[0010] The advantages deriving from the present invention lie essentially in the fact that the working threads make in practice no friction with the thread-carrier, so that the constructional and shape characteristics, as well as the mechanical resistance of each thread, remain unchanged when passing from the reel of the creel to the drum of the warper, with a remarkable increase of production quality; that it is possible to use the present apparatus both in the thread-by-thread and multithread warping; that an apparatus according to the invention is relatively easy to make, cost-effective, and reliable even after a prolonged service life.

[0011] These and other advantages and characteristics of the invention will be best understood by anyone skilled in the art from a reading of the following description in conjunction with the attached drawings given as a practical exemplification of the invention, but not to be considered in a limitative sense, wherein:

- Fig. 1 schematically shows an apparatus according to the invention in operating conditions;
- Fig. 2 is an enlarged view of the apparatus shown in Fig. 1;
- Fig. 3 is a plan view of the apparatus shown in Fig. 2.

[0012] With reference to the attached drawings, a thread-carrier apparatus according to the invention is indicated by numeral (1) in its whole. Viewable in the drawings is the structure (2) of the drum of a warper of a type comprising a plurality of longitudinal belts on which the threads (F) are wound to make up the warp (W). Also visible are the lease bars (20) which are typical of this warper, able to operate both the thread-by-thread and multithread warping, and the belts (21) for driving axially the warp in the course of formation. In the first case, the warper is equipped with means, well known to those skilled in the art, located in correspondence of a base of said drum and providing for the presentation of the threads (F) in the programmed order and to the recovery or return thereof to the respective presentation channels once the programmed number of revolutions or windings for each thread has been reached. Only one thread-carrier is provided to which the said means hand over the relevant thread (F) each time, and from which

the same thread is released by a shedder. The threads (F) unwind from corresponding reels located on a fixed creel upstream of said means. In the case of warpers intended for multithread warping, provision is made for a plurality of thread-carriers, each of which carries a corresponding thread and rotates solid with the others about the longitudinal axis of the warper. The threads unwind from the corresponding reels placed on a rotating creel which is mechanically and electronically synchronized with the rotation of the thread-carriers.

What has been set forth above is well known to those skilled in the art and is disclosed in the following documents: EP 832998, EP 882820, EP 652310 and EP 913511. Reference may be made to these documents for further details concerning the structure and operation of this type of warpers.

[0013] The thread-carrier apparatus (1) is guided into rotation about the longitudinal axis of the drum (2) by means of a corresponding support, in the form of an arm (10) for example, so as to impart the working thread a corresponding circular trajectory and lay it down on the outer side of said belts for the formation of warp turns in a preset number, according to the programmed warp pattern. Electronic programmable means, not shown in the attached drawings for the sake of simplicity, provide for operating the above described means according to procedures well known to those skilled in the art and, accordingly, will not be described herein in greater detail.

[0014] The thread-carrier (1) comprises a rod (1) fixed substantially perpendicular to the arm (10), thereby resulting substantially parallel to the axis of the drum (2). According to the present invention, a freely rotating roller (12) is attached on the distal end of the rod (11). The roller (12) has a central slot for guiding the thread (F). The roller (12) may be made from ceramic material and be mounted on the rod (11) through a relevant bearing which is in turn fixed on the end of said rod (11).

When the warper is in operation, each thread (F) unwinds from the creel by passing over the roller (12) with an extremely reduced friction, which causes a correspondingly reduced degree of thread's tension during both the unwinding and release steps. In this way, therefore, a better efficiency of the machine is obtained, from both a quantitative and qualitative point of view, in the thread-by-thread as well as multithread warping.

[0015] In case of warpers for thread-by-thread warping, only one thread-carrier apparatus (1) will be provided.

In case of warpers for multithread warping, provision will be made for a plurality of thread-carrier apparatuses (1) with roller (12), each apparatus being supported by a corresponding arm (10): the said arms (10) being disposed in radial arrangement to allow for a simultaneous rotation thereof about the longitudinal axis of the warper's drum.

Claims

1. Thread-carrier apparatus for a warper of a type associated with a support (10) rotating about the axis of a drum (2) so as to drive a corresponding working thread (F) into a circular trajectory by winding it over the outer surface of the drum (2), the apparatus including a rod (11) with a distal portion thereof intended to contact and guide the thread (F) as the latter winds up onto the drum (2) of the warper, apparatus (1) **characterized in that** a freely rotating roller (12) is attached on the distal portion of said rod (11) for coming in contact and guiding the said thread.
2. Thread-carrier apparatus according to claim 1, **characterized in that** said roller (12) exhibits a central slot for the thread (F).
3. Thread-carrier apparatus according to claim 1, **characterized in that** said roller (12) is made from ceramic material.
4. Thread-carrier apparatus according to claim 1, **characterized in that** said roller (12) is mounted on the rod (11) by a ball bearing.

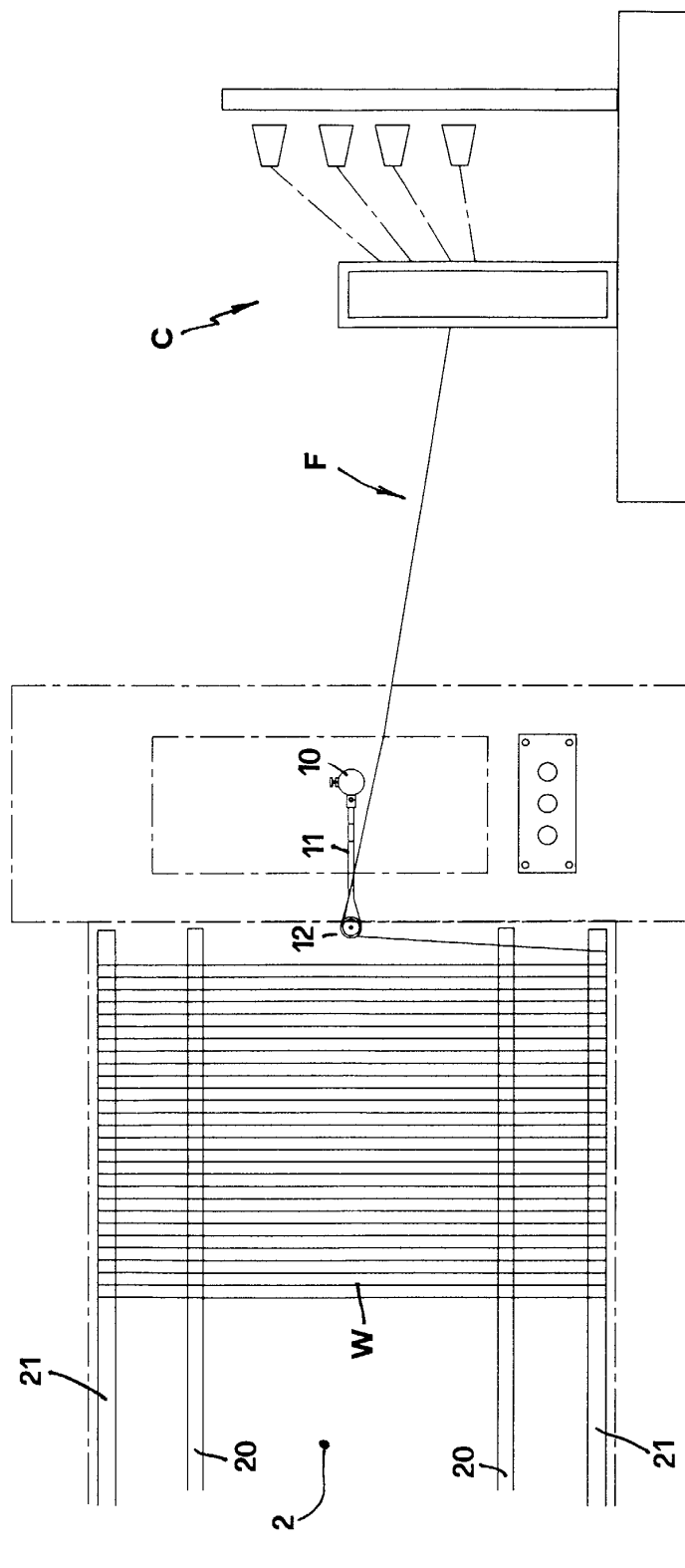


Fig. 1

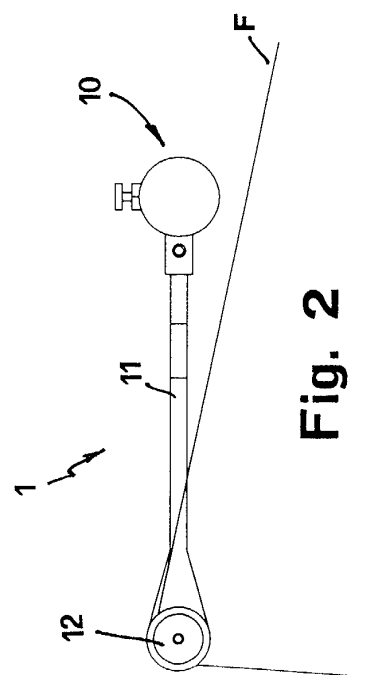


Fig. 2

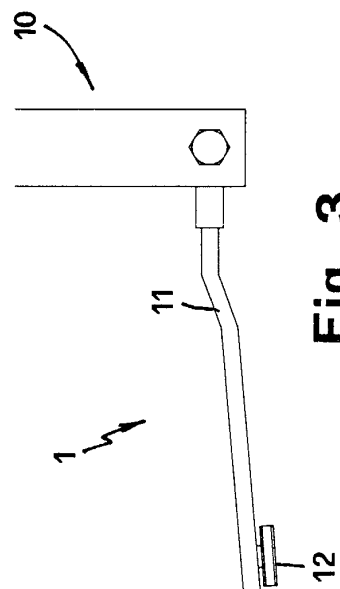


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0565

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.7)
A,D	EP 0 832 998 A (SUZUKI WAPER LTD) 1 April 1998 (1998-04-01) * figures 1-4 *	1-4	D02H3/00
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
MUNICH		11 December 2002	Louter, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure 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 L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 01 83 0565

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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11-12-2002

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