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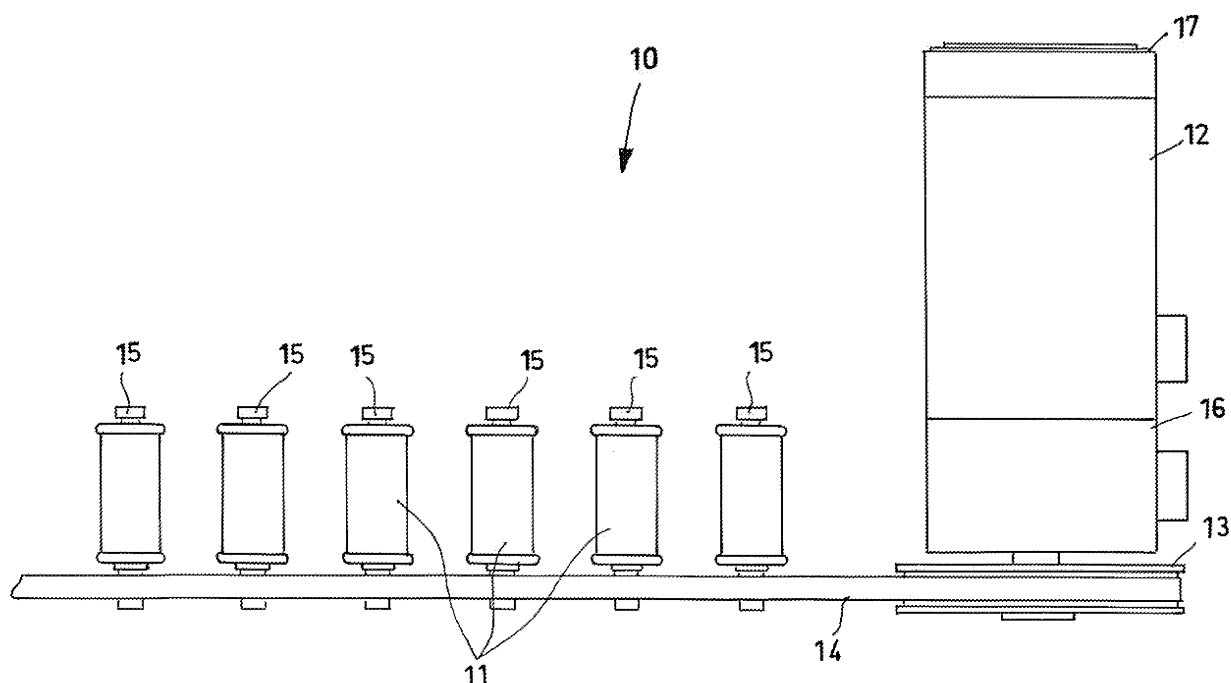
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(54) **Improved textile machine**

(57) Textile machine (10) for working a plurality of spindles (11) of a textile material comprising a motor (12) for actuating a pulley (13), said pulley (13) moving a belt

(14) supporting a plurality of spindle shafts (15), a joint (16) being provided between said motor (12) and said pulley (13) in which such a joint (16) is of the current-inducing type.



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## Description

**[0001]** The present invention refers to an improved textile machine, in particular to a spiraling machine.

**[0002]** With the term spiraling machine we mean all those textile machines with which it is possible to carry out the winding of one or more threads around a third thread, usually elastic, for making various objects such as socks, stockings, elastic bandages, medical mesh, elastic belts or in general hosiery.

**[0003]** Spiraling machines known today for working spindles of a textile material usually comprise a motor for actuating a pulley which in turn sets a belt supporting a plurality of spindle shafts in motion.

**[0004]** One problem that affects such machines is that of controlling and being able to vary the movement of the spindles in every condition of use of the machine, in particular even both during the starting up and turning off transients of the motor and with the continuous variation of the yarn load on the spindles.

**[0005]** One solution known today consists in using not a single pulley but rather a set of pulleys having different diameters so as to adapt in a desired manner the transmission of motion from the motor to the spindles. Such an embodiment has numerous drawbacks such as the fact of having, each time, to provide for replacing the pulleys as well as not ensuring a continuous modulation of the speed inside a range of values.

**[0006]** Alternatively spiraling machines are known which are provided with a motor that is controlled through an inverter and/or geared motors.

**[0007]** This system makes it possible to substantially reduce the stock of pulleys necessary for changing the speeds of the spindles as well as making it possible to control and vary the speed of the motor continuously from about 20-25Hz to a rated frequency of the motor, usually of about 50Hz.

**[0008]** The lower speed limit is dictated by the need of the motor of having a minimum speed of the shaft so as to ensure that the fan mounted on it dissipates the generated heat, thus avoiding overheating.

**[0009]** Such a lower speed limit can be lowered, as long as it foresees, however, a separate and independent ventilation system that is capable of ensuring the correct operation of the machine even at low speeds.

**[0010]** The purpose of the present invention is that of making an improved textile machine that is capable of avoiding the aforementioned drawbacks of the prior art in an extremely simple, cost effective and particularly functional manner.

**[0011]** Another purpose is that of making an improved textile machine in which it is not necessary to replace the pulley when the operation conditions of the machine itself vary and in which it is possible to control with high precision the transmission of movement from the motor to the spindles both during the starting up and turning off transients and as the load of yarn on the spindles varies.

**[0012]** These purposes according to the present inven-

tion are achieved by making an improved textile machine as outlined in claim 1.

**[0013]** Further characteristics of the invention are highlighted by the dependent claims.

5 **[0014]** The characteristics and the advantages of an improved textile machine according to the present invention shall become clearer from the following description, given as an example and not for limiting purposes, with reference to the attached schematic drawing in which an improved textile machine is shown according to the present invention.

10 **[0015]** With reference to the figure, an embodiment of an improved textile machine according to the present invention is shown with reference numeral 10.

15 **[0016]** Such a textile machine 10 for working a plurality of spindles 11 of a textile material comprises at least one motor 12 for actuating a pulley 13 for moving a belt 14 supporting a plurality of spindle shafts 15. Alternatively to the belt 14 it can be foreseen for there to be a band and/or any other support that can be moved by the pulley 13 and that supports the spindles. According to the invention a joint 16 is foreseen juxtaposed between the motor 12 and the pulley 13, in which the joint 16 is a joint of the current-inducing type.

20 **[0017]** Advantageously, such a joint 16 is controlled by an electronic gearbox depending on the movement of the spindles 11 themselves.

25 **[0018]** Therefore, in particular, the feedback on the joint 16 is obtained by means of at least one sensor or encoder for measuring the speed of the spindles 11, that is connected to the gearbox for controlling the joint 16. Finally, the textile machine 10 can comprise an auxiliary generator 17 for supplying power to the control electronic circuits of the machine 10 in the case of lack of power supply from the mains as well as a retaining carcass of the auxiliary generator 17, of the motor 12 and of the joint 16.

30 **[0019]** It should be very easy to understand how the improved textile machine object of the invention operates.

35 **[0020]** The motor controlling the movement of the spindles is turned on at full speed before transmitting motion to the pulley with an acceleration ramp.

40 **[0021]** The acceleration of the machine is controlled by the joint through a programmed ramp which makes it possible to bring the spindles to the normal operation speed while keeping the current absorbed by the motor within its rated limit.

45 **[0022]** The presence of the current-inducing joint juxtaposed between the motor and the pulley thus makes it possible to set a predetermined speed thereof without having to change any pulley in the system for the transmission of motion.

50 **[0023]** Moreover, the control card that controls the current-inducing joint controls the speed of the spindles of the closed loop type by reading the speed of the spindles.

**[0024]** This type of control ensures with precision the stability of the speed value of the spindles even when

the load is changed due to the emptying out of the spools.

**[0025]** Alternatively, it is possible to control the current-inducing joint even without feedback, or rather by "open loop" control, in speed control or torque control mode.

**[0026]** The excursion of the adjustment of speed that can be obtained is extremely wide and is not limited by a minimum speed of the motor since this is not affected by conditions of under-ventilation since it is always in normal operation conditions.

**[0027]** Advantageously, therefore, even for low movement speeds of the spindles it is not necessary to have any separate and independent ventilation, which is on the other hand necessary in motors equipped with inverters and/or geared motors.

**[0028]** The precision of the adjustment of speed of the current-inducing joint in feedback from the control card is estimated in the order of 0.2%.

**[0029]** Since the motor is thus always actuated at its maximum speed, there is the minimum consumption of energy possible.

**[0030]** Finally, since the current-inducing joint is based upon the well known current-inducing electromagnetic effect, it is not affected by wearing and/or maintenance problems either.

**[0031]** Since the same motor of the spiraling machine 10 that controls the spindles can, through a series of gears, control also the insertion shafts, pulling shafts and picking up of the yarns, in such a case the current-inducing joint 16, juxtaposed between the motor and such shafts, provides for controlling and varying also the movement of such shafts with the same advantages as described previously.

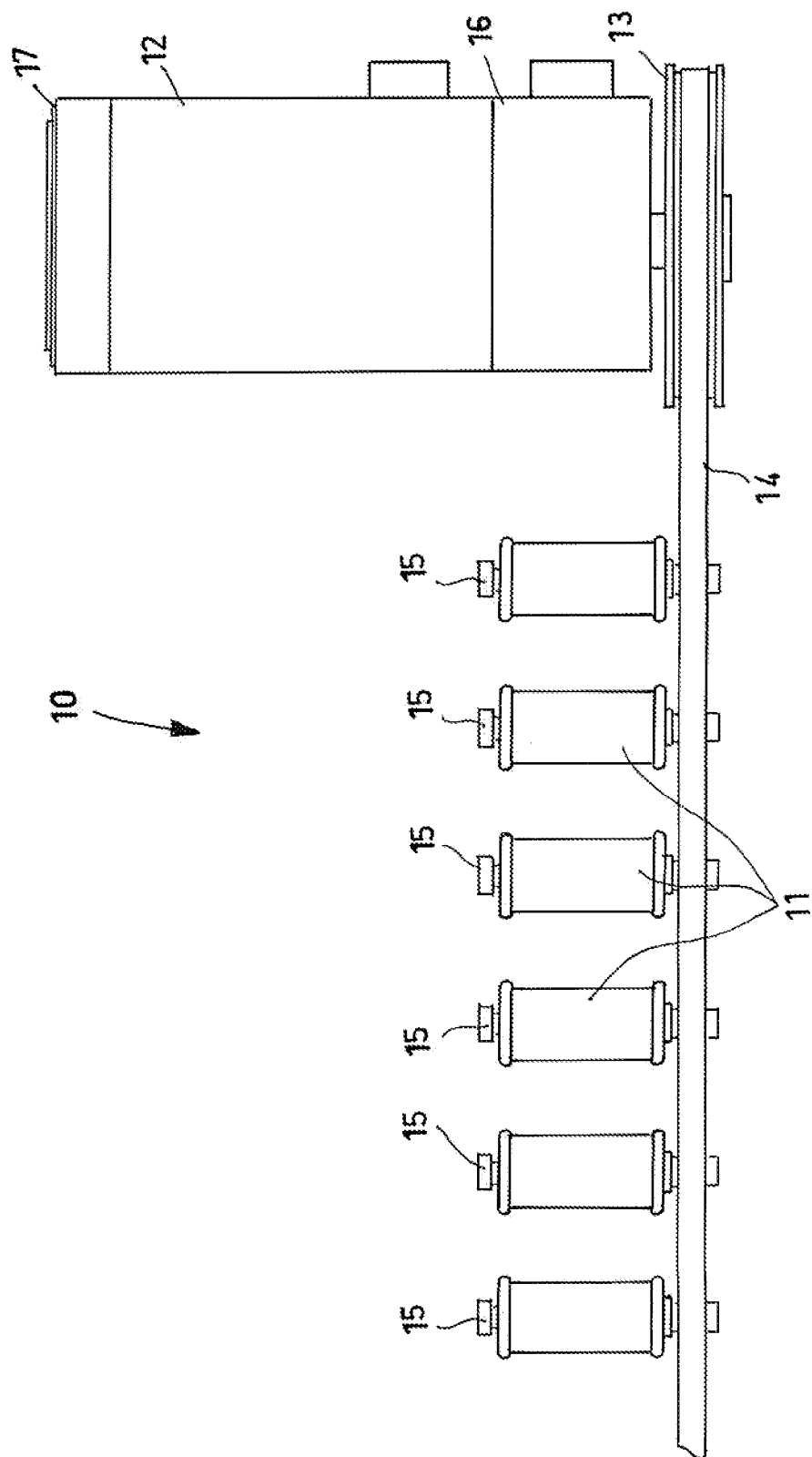
**[0032]** It has thus been seen that an improved textile machine according to the present invention achieves the purposes previously highlighted.

**[0033]** The use of a joint 16 of the current-inducing type, which is per se known and therefore not described in its internal structure, has demonstrated the unexpected capability of avoiding all the drawbacks and the numerous problems of controlling the movement of the spindles in a spiraling machine overcoming the technical problems of known machines of this kind. Indeed, the textile machine according to the present invention makes it possible with a single pulley to control and vary the speed of the spindles continuously inside a range of values always ensuring a constant closed loop control of the speed even in the case of variations of load of the spindles as well as in starting up and turning off transients.

**[0034]** The improved textile machine of the present invention thus conceived can undergo numerous modifications and variants, all covered by the same inventive concept; moreover, all the details can be replaced by technically equivalent elements. In practice, the materials used, as well as their sizes, can be any according to the technical requirements.

## Claims

1. Textile machine (10) for working a plurality of spindles (11) of a textile material, comprising at least a motor (12) for actuating a pulley (13), said pulley (13) moving a belt (14) supporting a plurality of spindle shafts (15), a joint (16) being provided between said motor (12) and said pulley (13), **characterized in that** said joint (16) is of a current-inducing type.
2. Textile machine (10) according to claim 1 **characterized in that** said joint (16) is controlled by an electronic gearbox depending on the movement of said spindles (11).
3. Textile machine (10) according to claim 2, **characterized in that** it comprises at least a measuring sensor of the speed of the spindles (11), said at least one sensor being connected to said gearbox in order to realize a closed loop for controlling said joint (16).
4. Textile machine (10) according to any of preceding claims, **characterized in that** it comprises an auxiliary generator (17) for the feeding of control electronic circuits of said machine (10) in case of non feeding from the web.
5. Textile machine (10) according to claim 4 **characterized in that** it comprises a retaining carcass of said auxiliary generator (17), of said engine (12) and of said joint (16).
6. Textile machine (10) according to any of preceding claims **characterized in that** said at least an engine (12) is further connected to insertion shafts, pulling shaft and/or picking-up of yarns, said current-inducing joint (16) being juxtaposed between said at least a motor (12) and said insertion shafts, pulling shafts and/or picking up.





## EUROPEAN SEARCH REPORT

Application Number  
EP 11 17 4269

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 2 230 759 A1 (ZINSER TEXTILMASCHINEN GMBH [DE]) 20 December 1974 (1974-12-20) * page 4, lines 1-16; figure 1 *	1-6	INV. D01H1/24 D01H1/241 D01H1/243
A	DE 15 35 062 A1 (ZINSER TEXTILMASCHINEN GMBH) 2 July 1970 (1970-07-02) * page 5, line 1 - page 6, line 1; figure 2 *	1	
A	EP 0 793 329 A1 (SHINKO ELECTRIC CO LTD [JP]) 3 September 1997 (1997-09-03) * the whole document *	1	
A	EP 2 006 424 A1 (RIETER AG MASCHF [CH]) 24 December 2008 (2008-12-24) * abstract *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			D01H
Place of search		Date of completion of the search	Examiner
Munich		10 November 2011	Dupuis, Jean-Luc
CATEGORY OF CITED DOCUMENTS		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	
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			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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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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10-11-2011

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
FR 2230759	A1	20-12-1974	CH	571595 A5	15-01-1976
			DE	2326176 A1	12-12-1974
			FR	2230759 A1	20-12-1974
			GB	1459894 A	31-12-1976
			IT	1012767 B	10-03-1977
			JP	50052315 A	09-05-1975
-----					
DE 1535062	A1	02-07-1970	CH	436054 A	15-05-1967
			DE	1535062 A1	02-07-1970
			GB	1129979 A	09-10-1968
			US	3417561 A	24-12-1968
-----					
EP 0793329	A1	03-09-1997	CZ	9700610 A3	17-09-1997
			EP	0793329 A1	03-09-1997
			JP	9233763 A	05-09-1997
			US	5717264 A	10-02-1998
-----					
EP 2006424	A1	24-12-2008	NONE		
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