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(54) Method and device for covering yarns.

(57) A method and device for covering a core yarn (11a) with at least one covering yarn helically wound or wrapped around the core yarn.

According to the invention a bobbin (11) of core yarn (11a) is supported by a bobbin supporting member (10) idly journaled to an upper shaft (12) having a first bore means (26) for guiding the core yarn (11a) and a second bore means (30) for guiding the covering yarn (10). The covering yarn (10) is in its turn fed along an arch-shaped guide means (17) rotatably connected with said upper shaft (12) to rotate around the core yarn bobbin (11). The covering yarn is helically wrapped onto the core yarn (11a) by causing said covering yarn in said path (28) to rotate around the bobbin (11) of core yarn and means (15, 16) are provided for preventing the bobbin supporting member (10) to rotate.

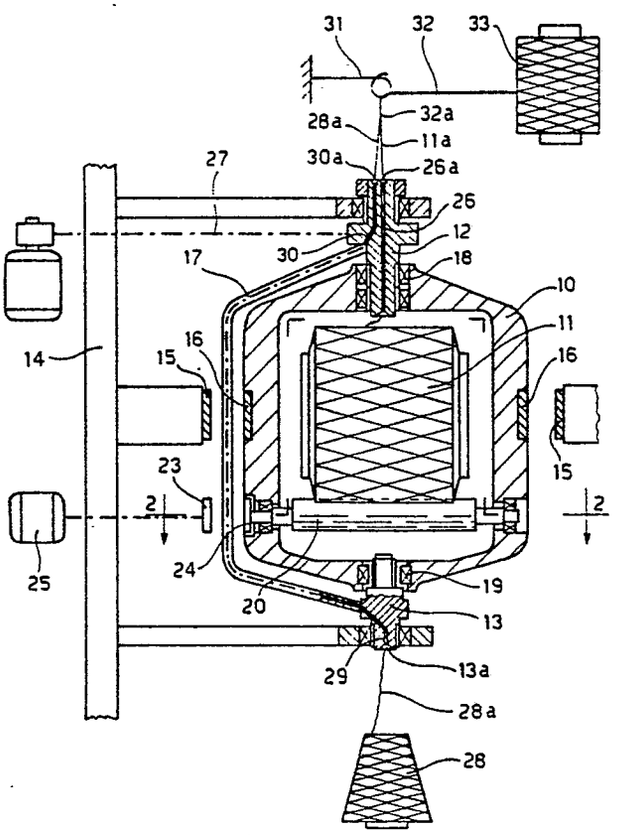

Fig. 1

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METHOD AND DEVICE FOR COVERING YARNS

The present invention refers to a method and a device for wrapping a covering yarn about a core yarn, particularly rubber or spandex yarns. The invention is also directed to a composite yarn obtained with the claimed method and apparatus.

Currently a rubber or similar yarn, also referred to below as "core yarn" is wrapped with a covering yarn by running it through a rotating follow spindle supporting a bobbin of covering yarn which is rotated at high speed so as to form a "balloon" around the spindle; the covering yarn is continuously wound in helical form around the core yarn due to the rapid rotation of the bobbin on the spindle.

This usual covering system (US-A-3 640 057 and US-A-3 927 515) has a number of limitations and drawbacks, one of which is the need to previously wind the covering yarn on special tubes of limited capacity because of the high rotations; during wrapping operation thus each wrapping unit has to be stopped frequently and the core yarn through the spindle must be broken in order to remove the empty spool and replace it with a new bobbin of covering yarn. In consequence, all the operations involved in pre-winding the covering yarn, stopping the wrapping unit, breaking the core yarn and replacing the empty spool with a new bobbin, result in a particularly complex and time-consuming system because the wrapping machine is frequently stopped. Furthermore, replacing a bobbin of covering yarn on a spindle which rotates at high speed involves a considerable waste of energy in maintaining large mass of yarn rotating rapidly, thereby limiting the work speed of the machine which cannot exceed certain limits which have proved to be critical.

Thus an object of the present invention is to provide a method and a device for wrapping yarns which makes use of an absolutely new wrapping principle, thus eliminating all time-consuming prewinding operations previously necessary for preparing the bobbins of covering yarn, reducing the number of stops at each textile machine and consequently increasing the productivity of the machine itself.

A further object of the invention is to provide a method and a device for wrapping yarns, as defined above, which allows considerable saving of energy, owing to the total absence of yarn masses in rapid rotation.

A further object of the present invention is to provide a method and a device of the type refered to, according to which not only is it possible to work with yarn bobbins of greater capacity, thus reducing the number of stops of the wrapping machine for the replacement of empty tubes, but on the basis of which the empty spool for the covering yarn can be replaced without breaking the core yarn, thus improving the characteristics of the composite yarn thereby produced.

The above objects can be obtained by means of a method and wrapping device in which the bobbin of core yarn is supported by a bobbin supporting member idly journaled by a rotating hollow shaft and in which the covering yarn run along a arch-shaped guide which is made to rotate around the bobbin from which the covering yarns is unwound; the core and covering yarns are both fed from the lower end of the hollow shaft and thus the two bobbins of yarns can be carried on fixed support members, thus eliminating the need to maintain large mases of yarn in rapid rotation.

The invention will be illustrated in greater detail below, making reference to some embodiments and to the attached drawings in which:

Fig. 1 is a schematic view of a possible embodiment of a wrapping device operating with a single covering yarn;

Fig. 2 is a section along line 2-2 of figure 1;

Fig. 3 shows a second possible embodiment of a wrapping device, using two covering yarns, crossing over one another as they wrap around a core yarn;

Fig. 4 is a partial view of the device in figure 1 or than in figure 3, showing further modifications;

In figure 1 the wrapping device includes an annular support member 10 for supporting a bobbin 11 of a core yarn 11a to be covered with a second covering yarn 28a helically wrapped around the core yarn; the support member 10 in its turn is idly supported by means of a pair of coaxially arranged upper and lower shafts 12 and 13, on the frame 14 of a textile machine.

The shafts 12 and 13 an rotate, both with respect to frame 14 of the machine, and with respect to support member 10 for the bobbin 11; thus, to avoid any undesired rotation of bobbin support member 10, magnetic checking means 15, 16 or other suitable means which will allow free rotation of a yarn guide tube 17 around member 10, as explained below, have been provided. In the specific case the checking means comprises permanent magnet cores 15, 16 facing opposite polarities, said magnet cores being positioned on frame 14 and support member 10 at a suitable distance to allow the yarn guide tube 17 to rotate.

The support member 10 for the bobbin 11 of core yarn, for example a rubber yarn which must be covered with another type of yarn, is quadran-

gular or annular shaped, having bearings 18 and 19 for shafts 12 and 13 on two horizontal sides. This support member 10 delimits a central opening in which a core yarn bobbin 11 is positioned; the bobbin is kept in a horizontal position, rotating around its longitudinal axis, so as to facilitate continuous and regular unwinding of the core yarn 11a. Bobbin 11 can be supported by any suitable means e.g., as shown, by means of a pair of horizontal rollers 10 and 21, on which bobbin 11 just rests. One of the rollers, roller 21, turns idly while the other, roller 20, is suitably connected to a driver means 25 so as to cause bobbin 11 to rotate around its horizontal axis, so that core yarn 11a is unwound from bobbin 11 in a regular way and at the required tensile stress. Since rollers 20 and 21 are practically positioned inside the bobbin support member 10, around which the arch-shaped guide tube 17 for the covering yarn rotates, rotation of roller 20 can be controlled by, for example, a magnetic coupling consisting of two opposed discs 23 and 24 incorporating permanent magnets having alternate polarities, and suitably spaced so as to create a gap sufficient for tube 17 to pass. One of the discs, 24, is connected to one end of roller 20, while the other disc, 23, is connected to a drive motor 25. It should however be pointed out that other support and drive systems for bobbin 10 of the core yarn can be used.

As it is unwound from bobbin 11, core yarn 11a is guided along a linear path consisting of a channel or guide bore 26 through the upper shaft 12 said bore 26 being coaxial to the rotational axis of the shaft itself. Lower shaft 13 rotates idly while upper shaft 12 is rotated by a control means such as, for example, a motor drive 27, one for each device, or, in any event, for more than one device on the same textil machine.

As mentioned above, core yarn 11a must be helically wound with a covering yarn 28a which is unwound from a bobbin 28. Bobbin 28 is placed underneath the support member 10 for the bobbin 11 of core yarn so that yarn 28a is fed out at a point, 13a, in its path which is coaxial to the rotational axis of guide tube 17. Bobbin 28 can be fixed or caused to rotate at a low velocity sufficient to unwind the yarn at a required tensil stress. Thus yarn 28a unwound from bobbin 28 is guided along a separate path defined by the above mentioned arch-shaped tube 17. In particular, as shown in the example in figure 1, yarn 28a enters 13a axially, and then proceeds in a channel or bore 29 of lower shaft 13 to which the lower end of guide tube 17 is attached, and then continues, running through tube 17, whose upper end is connected to upper shaft 12 in correspondence with a channel or bore 30, having end 30a in a position eccentric or radially spaced from exit 26a of core yarn 11a from axial bore 26 on the same shaft 12. Finally, number 31 in figure 1 indicates a yarn guide ring which deviates the covered yarn 32, to a bobbin 33.

The working of the device described above according to the method of the present invention is as follows: core yarn 11a, which must be covered, is unwound continuously from bobbin 11 caused to rotate by roller 20, and fed along axial bore 26 in upper shaft 12 towards yarn guide ring 31. At the same time covering yarn 28a is unwound from bobbin 28, fed continuously along path 29, 17, 30 towards yarn guide ring 31, exiting from upper shaft 12 in a position 30a radially spaced from the axial exit 26a for the core yarn 11a.

Thus, when tube 17 and shafts 12, 13 are rotated they cause covering yarn 28a to rotate around support member 10 and core yarn bobbin 11; owing to spaced disposition of exit 30a from exit 26a, covering yarn 28a winds helically around core yarn 11a from a point 32a, whose position will depend on the specific operational parameters of the device and on its constructional characteristics, such as the rotational speed of tube 17, the velocity at which the yarns are fed, the position of yarn guide ring 31, and the radial distance between exit points 26a and 30a.

The above indicates the evident advantages of such an invention; in fact, bobbin 28 of covering yarn is no longer supported by a rotating spindle and is practically stationary, and thus bobbins of high capacity can be used, eliminating the prewinding operations previously required. The masses of yarn, although greater that those of traditional wrapping machines, are now stationary or turning at a low speed required for the yarn to be correctly unwound, and energy consumption is consequently drastically reduced, while, at the same time the operations involved in replacing the spools are significantly simplified, since they are now greatly facilitated by the complete independence of the paths for the two yarns.

The device in figure 1 can be differently carried out while maintaining the innovative principles of the invention: for example, so as to cover with two crossed threads, as indicated in figure 3. In this figure the parts corresponding or similar to parts in figure 1 have been given the same reference numbers. Thus, in figure 3, covering yarn bobbin 11 rest on rollers, not shown, which are positioned on an annular bobbin support member 10 journaled on shafts 12 and 13. A first covering yarn 28a unwound from bobbin 28 is guided along a first curved path defined by the arch-shaped tube 17, or, in an equivalent way, between a first lower shaft 13 and the upper shaft 12. Reference 27 again indicates a drive for the upper shaft 12 which, for example, caused tube 17 to rotate in a clockwise direction. In figure 3, reference 34 indicates a bob-

bin for a second covering yarn 34a, which axially enters a bore 35a in a second lower shaft 35 aligned with the preceding ones. Bore 35a is connected to the lower end of a second tube 36, defining a second arch-shaped path for the second covering yarn, 34a; second guide tube 36 is in turn connected to a bore 37 in an upper rotating ring 38, coaxially supported by the upper shaft 12.

Exit point 37a of covering yarn 34a from bore 37 of upper ring 38 is radially spaced with respect to exit 30a of the first covering yarn. A second drive 39 is provided to rotate ring 38 and guide tube 36 in a direction opposite to that of shaft 12 and tube 17, with an equal or different angular velocity so as to obtain helical cross-winding of the two covering yarns 28a and 34a on the core yarn 11a.

Finally, figure 4 illustrates a further embodiment comprising a conical flange or disc 40, connected to lower shaft 13 in the figure referred to; the wall of disc 40 includes a bore defining part of the path of the covering yarn, which continues in the tube guide, as shown. Disc 40 acts as a flywheel and can be counterbalanced in a position diametrically opposed to tube 17 so as to allow the covering yarn to rotate regularly, particularly in devices operating at high velocity.

From the above, and from the attached designs, it will therefore be clear that a new method and a new device to cover yarns have been provided, according to which the traditional spindles supporting the bobbin of covering yarn, through which the core yarn to be covered passes, have been totally eliminated, and replaced by a new device which envisages separate and totally independent paths for the core yarn and the covering yarn, offering to operational and practical advantages which lead to greater productivity and economy of the entire textile machine of which the invented device forms part.

Claims

1. A method for covering yarns, according to which a core yarn (11a) is continuously unwound from a bobbin (11) and is covered by at least one covering yarn (28a) helically wrapped around said core yarn (11a), in which said core yarn (11a) is fed along a linear path provided by a bore (26) coaxially arranged in an upper shaft (12), characterized in that the covering yarn (28a) is fed along an arch-shaped separate path (27) around the bobbin (11) of core yarn, from a point (13a) coaxially arranged to the bore (26) for the core yarn (11a) underneath the bobbin of the said core yarn, towards an exit point (30a) lateral to the path (26) of the core yarn (11a) and above said bobbin (11) of core yarn, causing the covering yarn (26a) to be helically wrapped onto the core yarn (11a) by rotating said covering yarn (26a) in said arch-shaped path around the bobbin (11) of core yarn and coaxially to the linear path (26) for the core yarn (11a).

2. A device for covering a core yarn (11a) with at least one covering yarn (28a) helically wrapped around said core yarn (11a) which is continuously unwound from a bobbin (11), characterized by comprising; a frame (14), and upper hollow shaft (12) rotatably supported by the frame (10) said upper shaft having a first axial bore (26) for the core yarn (11a) and a second bore (30) for the covering yarn (28a) laterally spaced apart from said axial bore (26), and a bobbin supporting member (10) for the core yarn (11a), said bobbin supporting member (10) being idly journaled to said upper shaft (12); an arch-shaped yarn guiding tubular means (17) for the covering yarn (28a), said yarn guiding means (17) being rotatably provided around said bobbin supporting member (10) and connected to said hollow upper shaft (12) to rotate the covering yarn (26a) around said bobbin (11), drive means (27) to rotate the upper hollow shaft (12) and checking means (15, 16) preventing said bobbin support member (10) to rotate.

3. Device as in claim 2, characterized by the fact that the guiding means for the covering yarn (26a) include a guide tube (17) rotatably supported between said upper hollow shaft and a lower hollow shaft positioned underneath said bobbin supporting member (10), and guiding bores (29) in said upper and lower shafts (13) for guiding the covering yarn (28a).

4. Device as in claims 2 and 3 characterized by the fact that a disc-shaped element (40) is connected to at least one of said upper and lower shafts (12, 13).

5. Device as in claim 4, characterized by the fact that the wall of said disc-shaped element (40) includes a guiding bore for the covering yarn (28a).

6. Device according to claim 2, characterized by the fact that the checking means for the bobbin support member (10) include magnetic checking means.

7. Device as in claim 2, characterized in that said bobbin support member (10) comprises an annular member and bobbin supporting rollers (20, 21) inside said annular member (10).

8. Device as in claim 7, characterized by the fact that at least one of said bobbin supporting roller (20) is connected to a drive means (25).

9. Device according to claim 8, characterized by the fact that said supporting roller (20) is connected to the drive means (25) by a magnetic

coupling having spaced apart coupling elements (23, 24) to allow the passage of the yarn guiding tube (17).

10. Device according to claim 2 for covering a core yarn (11a) with a first (28a) and at least a second (34a) covering yarn characterized by comprising in combination with said first arch-shaped yarn guiding tubular means (17), a second arch-shaped yarn guiding tubular means (36) rotatably provided around said first yarn guiding tubular means, and second drive means (39) to rotate said second yarn guiding tubular means in respect to said bobbin supporting member (10) a said first yarn guiding tubular means (17).

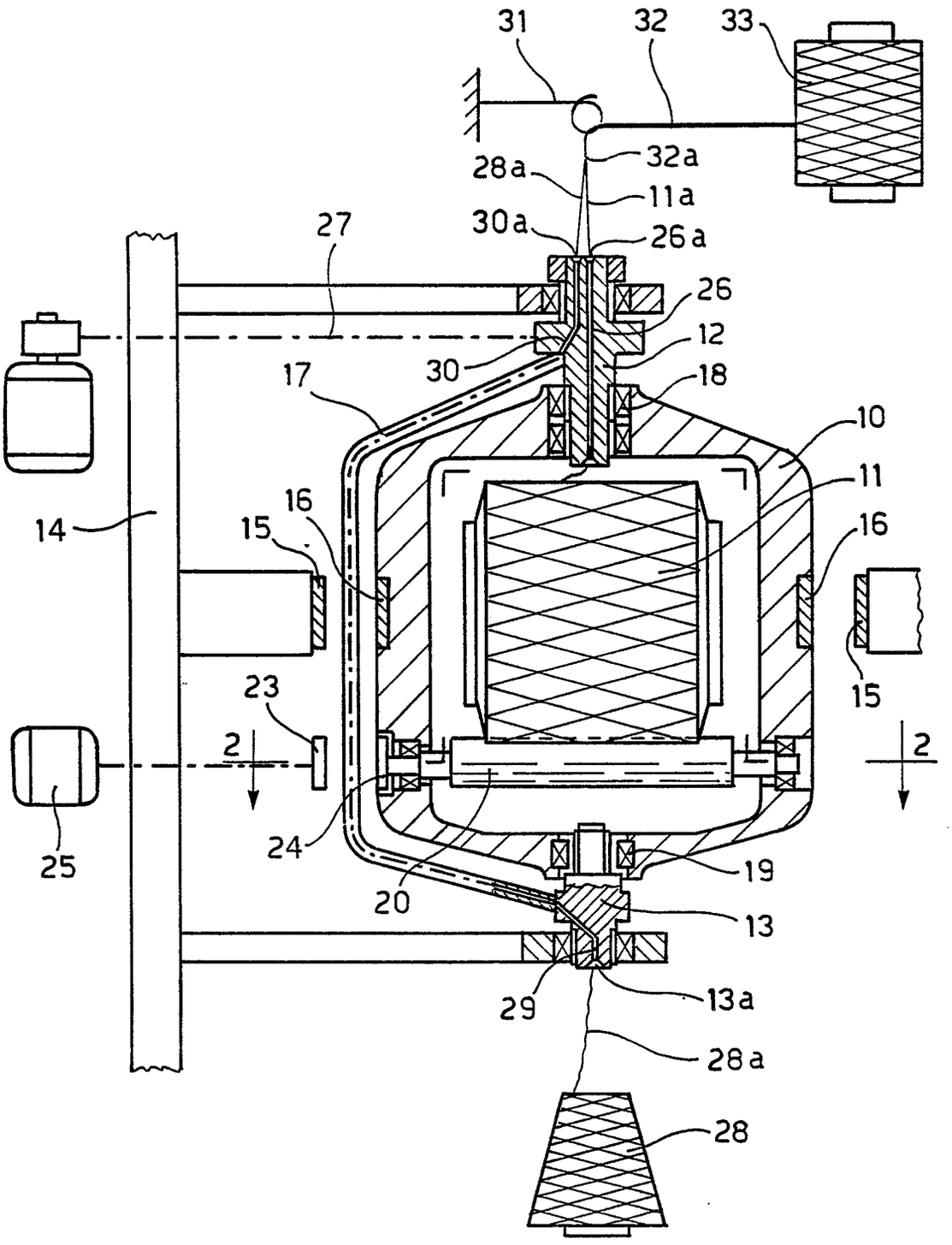
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Fig. 1

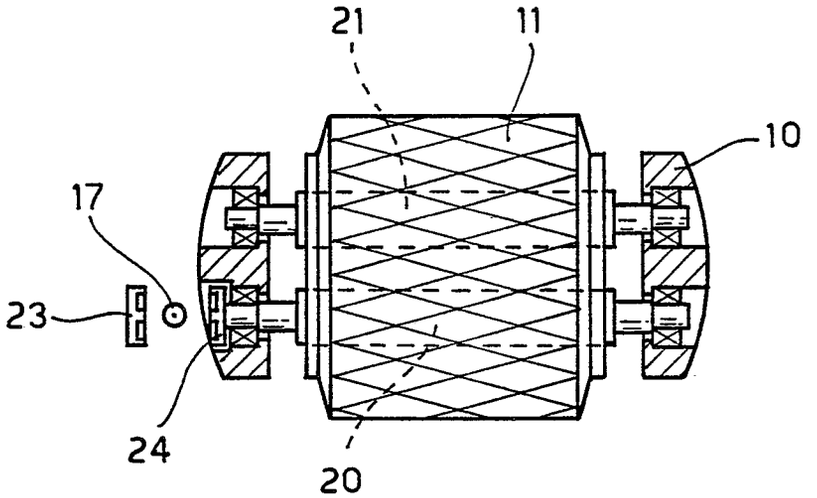

Fig. 2

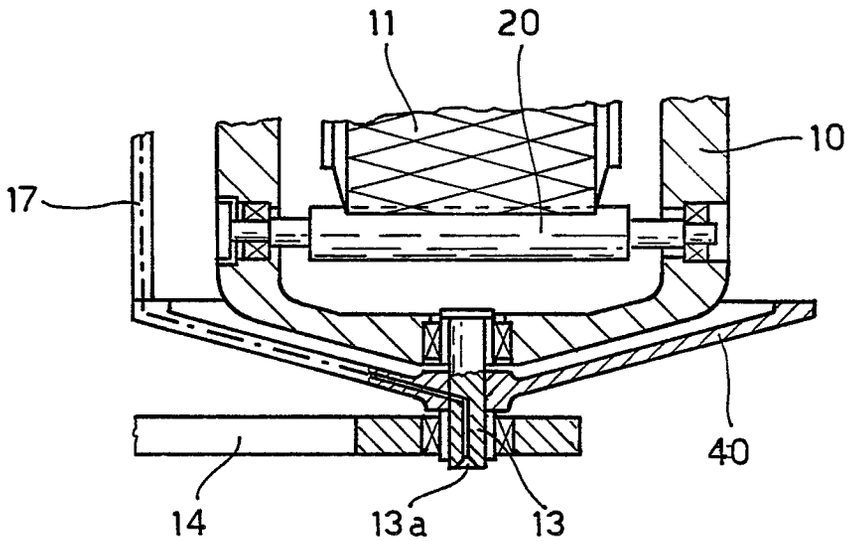

Fig. 4

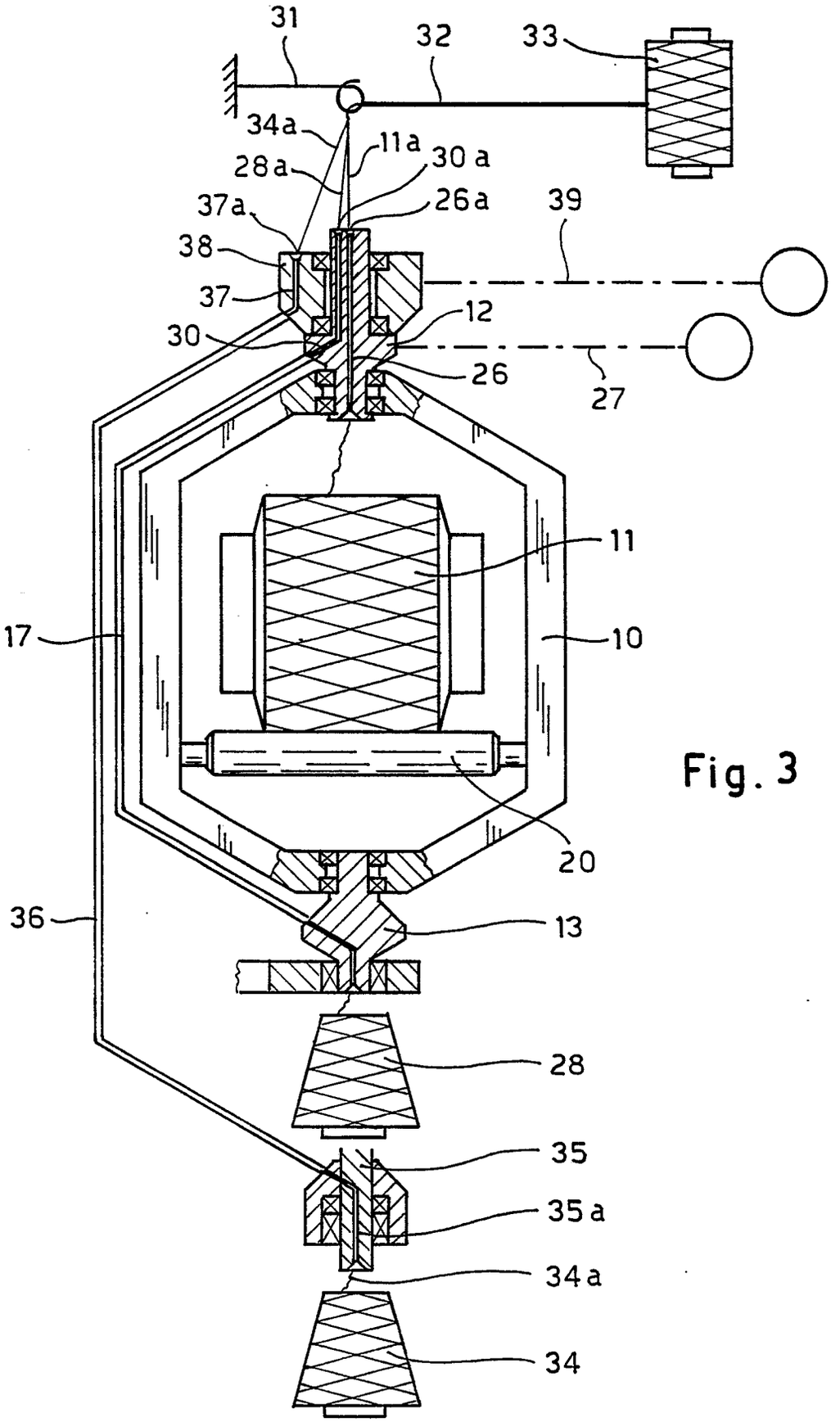
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Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 11 5301

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.4)
X	FR-A-1234291 (M.J.VIEL) * page 1, column 1, line 38 - page 2, column 1, line 17; figure 1 *	1,2,3	D02G3/38 D02G3/28
Y		4,5,6	

A	GB-A-2064600 (ICHIKAWA IRON WORKS CO. LTD.) * page 3, line 34 - page 4, line 22; figures 2-4 *	1,2	
Y	* page 5, line 42 - line 86; figure 3 *	6	
A	* page 7, line 54 - line 57; figures 3, 4 *	7	
A	* page 6, line 53 - page 7, line 53; figures 3, 4 *	8,9	

A	FR-A-1128307 (SOCIETE ANONYME DES PNEUMATIQUES DUNLOP) * page 1, column 2, line 1 - page 2, column 1, line 36; figure 1 *	1,2,7	

Y	DE-U-7443364 (PALITEX PROJECT COMPANY GMBH) * page 3, line 13 - line 15; figure 1 *	4,5	
	---		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	CH-A-272803 (W.KENYON AND SONS LTD) * page 2, line 16 - line 20; figure 1 *	10	D01H
	---		D02G
A	US-A-2737773 (R.J.CLARKSON) * column 3, line 39 - line 68; figure 1 *	8	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	1 FEBRUARY 1989	HOEFER W.D.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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