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(54) **Machine for yarn twisting apt to be used as a twisting machine or as a cord machine**

(57) The machine (1) comprises in succession an inlet station (3) provided with a yarn-braking device (5), a first assembly (6 and 7) for twisting the yarn (2), a second assembly (8) for drawing the yarn (2), a third assembly (9) for distributing the yarn (2), a fourth assembly (10) for collecting the cross reel or the cop of the yarn (2), according to the use, and means (11) for moving the rotary

elements of said assemblies (6 and 7, 8, 9 and 10). The main characteristic of the present invention consists in the fact that the yarn-braking device (5) comprises an electric motor (14) of which the output shaft (15) controls the rotation about an axis (X) of a pulley (16) of the kind having a plurality of annular races (17), wherein the yarn (2) is twisted; the pulley (16) exerting a braking action against the advancement of said yarn (2).

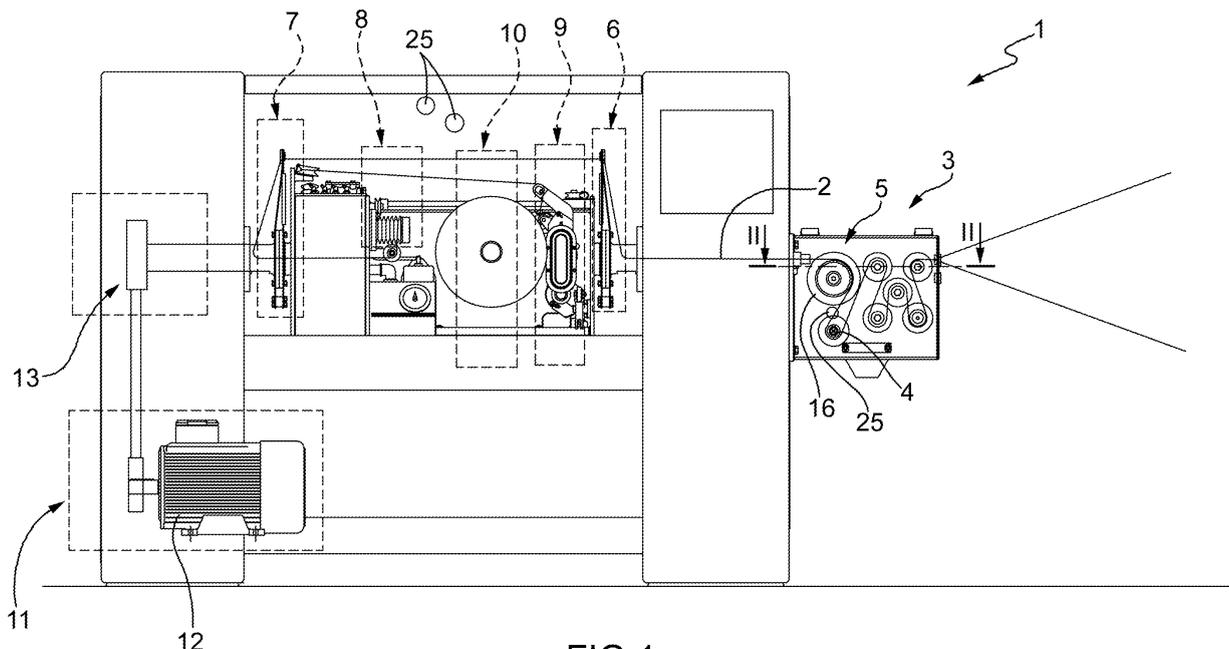


FIG.1

Description

[0001] The present invention relates to a machine for yarn twisting, apt to be used as a twisting machine or as a cord machine.

[0002] Machines for twisting natural or synthetic fibre yarns comprise a yarn inlet station, a device for applying a predefined tension to the yarn, a pulley for drawing the yarn and a collecting assembly for collecting the cross reel or the cop of said yarn. As is known, to enable the correct and precise formation of the cross reel or cop of the yarn, immediately downstream of the inlet station there is a yarn-braking device consisting of an assembly that contrasts the drawing of the yarn towards the collecting assembly. The yarn-braking device consists of a pulley on which the yarn entering the machine is wound.

[0003] The main drawback of the machines currently available on the market consists in the fact that the yarn-braking device is hydraulically operated. Said yarn-braking device comprises an appropriately-sized reservoir, an indicator of the level of the liquid in the reservoir, a hydraulic pump, a filter, a pressure gauge, a pressure regulator and a series of ducts (pipes, fittings, etc.) provided with seals. In addition to the structural complexity, large overall dimensions and large number of components of said yarn-braking device, it is also difficult to adjust the hydraulic yarn-braking device to make said pulley apply the appropriate resistance to contrast the drawing of the yarn towards the collecting assembly. Moreover it is apparent that the braking action of the yarn-braking device results in an increase in the temperature of the pumped liquid so that, in order to avoid overheating, which can be dangerous and harmful, said liquid must be cooled for example by providing the yarn-braking device with a cooling device or by increasing the amount of liquid in the reservoir and thus providing the assembly with a larger reservoir. Moreover, the yarn-braking device must be checked periodically, which necessarily involves machine downtimes, to avoid the presence of air bubbles and of solid residues and to check the seal of all parts of the yarn-braking device.

[0004] The purpose of the present invention is to provide a machine for yarn twisting, apt to be used as a twisting machine or as a cord machine, that overcomes the drawbacks described above and that is thus provided with a yarn-braking device of simple construction, that has reduced overall dimensions, can be adjusted easily and quickly and does not require periodical tests and inspections.

[0005] According to the present invention there is provided a machine for yarn twisting, apt to be used as a twisting machine or as a cord machine, comprising in succession:

- an inlet station provided with a yarn-braking device;
- a first assembly for twisting said yarn;
- a second assembly for drawing said yarn;
- a third assembly for distributing said yarn;

a fourth assembly for collecting the cross reel or the cop of said yarn, according to the use; and means for moving the rotary elements of said assemblies;

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characterized in that said yarn-braking device comprises an electric motor of which the output shaft controls the rotation about an axis of a pulley of the kind having a plurality of annular races, wherein said yarn is twisted; said pulley exerting a braking action against the advancement of said yarn.

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[0006] In order to better understand the present invention a preferred embodiment thereof will now be described with reference to the accompanying drawings in which:

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- figure 1 is a schematic view of a machine for yarn twisting, apt to be used as a twisting machine or as a cord machine, according to the present invention;
- figure 2 is a cross-section along the line II-II of figure 1; and
- figure 3 is a block diagram of an electronic control unit.

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[0007] With reference to figure 1 designated as a whole by number 1 is a machine for yarn twisting 2, apt to be used as a twisting machine or as a cord machine, comprising in succession:

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- an inlet station 3 provided with a plurality of pulleys 4 through which a yarn 2 passes and with a yarn-braking device 5;
- a first rotary element 6 of a known type to twist yarn 2 installed downstream of inlet station 3;
- a second rotary element 7 of a known type to twist yarn 2 installed downstream of first element 6;
- an assembly 8 (of a known type) for drawing yarn 2;
- an assembly 9 (of a known type) for distributing yarn 2;
- a collecting assembly 10 of a known type for collecting the cross reel or the cop of yarn 2, according to the use of the machine 1; and
- means 11 for moving the rotary elements of elements 6 and 7 and of assemblies 8, 9 and 10.

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[0008] Means 11 normally consist of an electric motor 12 and a power transmission assembly 13.

[0009] Said components of machine 1 are only described briefly in that they are of the type known in the prior art with the exception of yarn-braking device 5 as described below.

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[0010] With reference to figure 2, the main characteristic of the present invention consists in the fact that yarn-braking device 5 comprises an electric motor 14 on the output shaft 15 of which is keyed a pulley 16 of the type provided with a plurality of annular races 17 wherein yarn 2 is twisted as it moves towards the element 6; the pulley 16 having an axis of rotation X.

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[0011] Machine 1 as illustrated in figure 3 also comprises an electronic control unit 18 apt to control means 11 and electric motor 14. In particular control unit 18 comprises a memory block 21 for storing, for each diameter and material of yarn 2, the contrasting actions which said yarn-braking device 5 must exert against the advancement of said yarn 2 towards the collecting assembly 10. Control unit 18 also comprises a block 22 controlling means 11, a block 23 controlling electric motor 14, and a block 24 receiving signals from sensors 25 concerning values measured in machine 1. A first sensor 25 is apt to detect the drawing of yarn 2 for example between the elements 6 and 7 and thus of detecting whether the yarn 2 is under tension or slack due to being put under less tension than required for the assembly 10 to form a correct cross reel or cop of the yarn. A second sensor 25 is apt to detect a possible defibration of yarn 2, and namely to detect whether said yarn 2 is drawn in such a way that could jeopardise its integrity, thus leading to yarn 2 breaking. A third sensor 25 is installed in the inlet station 3 and is apt to detect the diameter of yarn 2. Connected to control unit 18 are a block 26 through which the user can plan the operation of the machine 1 and a display block 27 that displays the measurements in question and any alarm messages.

[0012] The contrasting action exerted by the yarn-braking device 5 can be exerted by applying a braking force against the advancement of yarn 2 from inlet station 3 to twisting element 6. Said braking force can be exerted by applying a braking torque to pulley 16 either by means of a command aimed at determining the rotation of pulley 16 (about the axis X) in the direction of advancement of yarn 2 but at a slower speed than that of the advancement of yarn 2 or by means of a command aimed at determining the rotation of pulley 16 (about the axis X) in the opposite direction to that of the advancement of yarn 2. In practice the value of the braking torque to be applied to pulley 16 is selected as a function of the material and of the diameter of yarn 2 which are defined by the user in block 26 in order to define the value of the contrasting action against the advancement of yarn 2; said braking torque value being stored in memory block 21. Control unit 18 can thus adjust the value of the braking torque on the basis of the data detected by sensors 25 and the control settings of means 11 and of motor 14, and in practice if control unit 18 counts the value of the braking torque as being outside a range set in memory block 21 for the specific operating conditions, it sends a command to change the value of said braking torque.

[0013] The advantages of the present invention are apparent from the above description.

[0014] In particular the yarn-braking device that is provided is of reduced dimensions, can be assembled easily and quickly and consists of a small number of components with all the subsequent advantages in terms of costs of production, assembly and maintenance. Moreover the problems typically associated with a hydraulic motor such as the seal, difficulty with adjustment, cooling

of the pumped liquid, etc. have all been overcome. It is apparent that an electric motor is far less complex to control than a hydraulic motor. The machine according to the present invention is provided with a control unit that automatically adjusts the control of the yarn-braking device, also according to the operating conditions detected by means of the sensors. Lastly, in certain conditions the electric motor of the yarn-braking device could be used as an electric generator so that the heat that was generated using a hydraulic motor is now converted into electric power that can be used in other stations of the plant of which the machine according to the present invention is part.

[0015] Lastly, it is clear that modifications and variations may be made to the machine 1 described and illustrated herein without departing from the scope of the present invention.

Claims

1. Machine for yarn twisting (2), apt to be used as a twisting machine or as a cord machine, comprising in succession:

an inlet station (3) provided with a yarn-braking device (5);

a first assembly (6 and 7) for twisting said yarn; a second assembly (8) for drawing said yarn (2); a third assembly (9) for distributing said yarn (2); a fourth assembly (10) for collecting the cross reel or the cop of said yarn (2), according to the use; and

means (11) for moving the rotary elements of said assemblies (6 and 7, 8, 9 and 10);

characterized in that said yarn-braking device (5) comprises an electric motor (14) of which the output shaft (15) controls the rotation about an axis (X) of a pulley (16) of the kind having a plurality of annular races (17), wherein said yarn (2) is twisted; said pulley (16) exerting a braking action against the advancement of said yarn (2).

2. Machine according to Claim 1, **characterized in that** it comprises an electronic control unit (18) controlling said means (11) and said electric motor (14) in order to contrast the advancement of said yarn (2).

3. Machine according to Claim 2, **characterized in that** said electronic control unit (18) comprises a first block (21) storing, for each diameter and material of said yarn (2), the contrasting actions which said yarn-braking device (5) must exert against the advancement of said yarn (2) towards said fourth collecting assembly (10), a second block (22) controlling said means (11) and a third block (23) controlling said electric motor (14).

4. Machine according to Claim 3, **characterized in that** said control unit (18) comprises a fourth block (24) receiving signals concerning detected values from at least a sensor (25). 5
5. Machine according to Claim 4, **characterized in that** it comprises a first sensor (25) connected to said fourth block (24) and able to detect the drawing of said yarn (2) downstream said inlet station (3), namely the strain exerted on said yarn (2). 10
6. Machine according to Claim 4 and/or Claim 5, **characterized in that** it comprises a second sensor (25) connected to said fourth block (24) and able to detect a possible defibration of said yarn (2), and namely if said yarn (2) undergoes a drawing which could jeopardise its integrity, thus leading to its break. 15
7. Machine according to at least a third sensor (25) connected to said fourth block (24) and able to detect the diameter of said yarn (2). 20
8. Machine according to at least one of Claims 4-7, **characterized in that** it comprises a fifth block (26) through which the user can plan the operation of said means (11), of said assemblies (6 and 7, 8, 9 and 10) and of said yarn-braking device (5). 25

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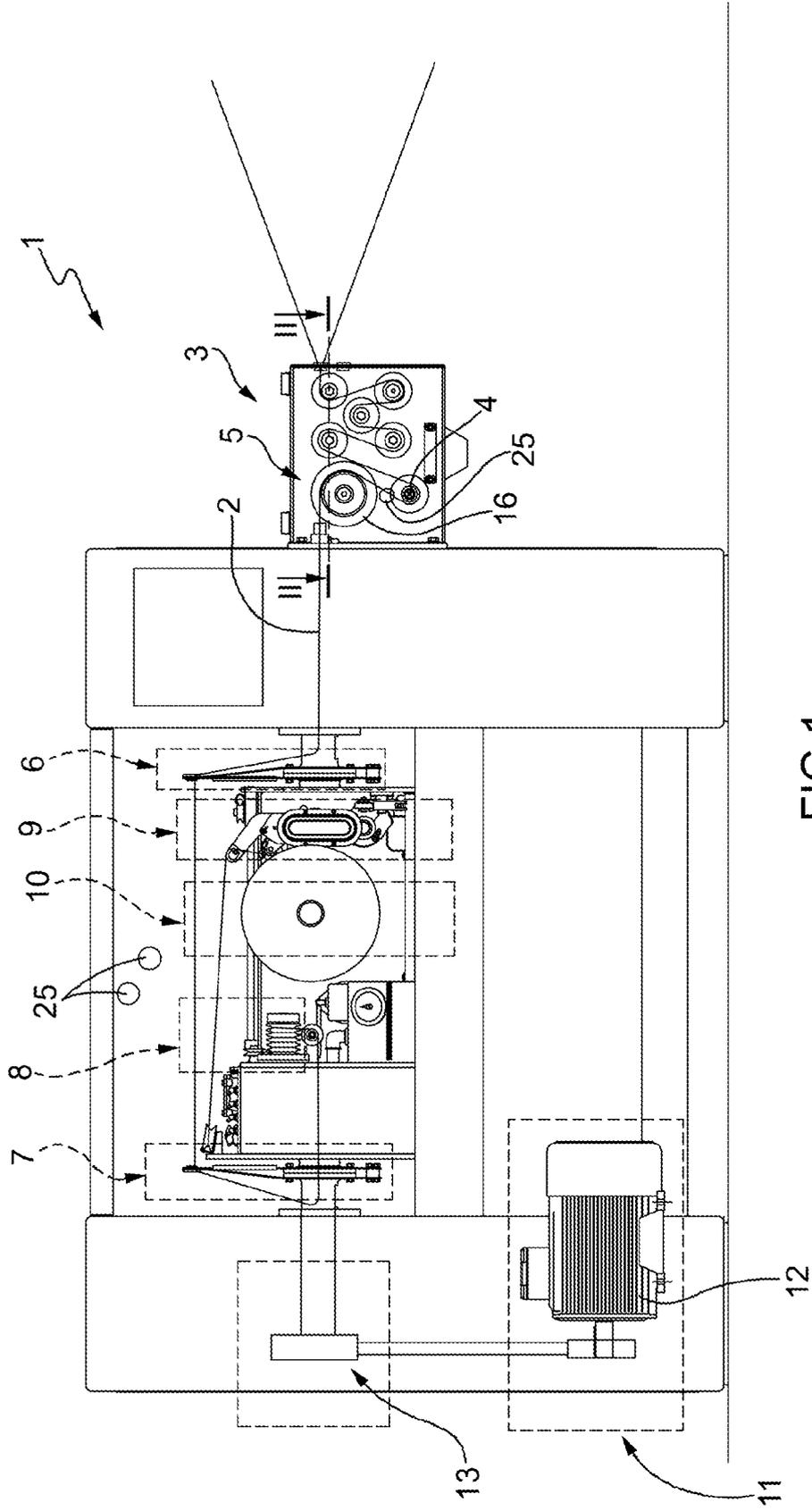


FIG.1

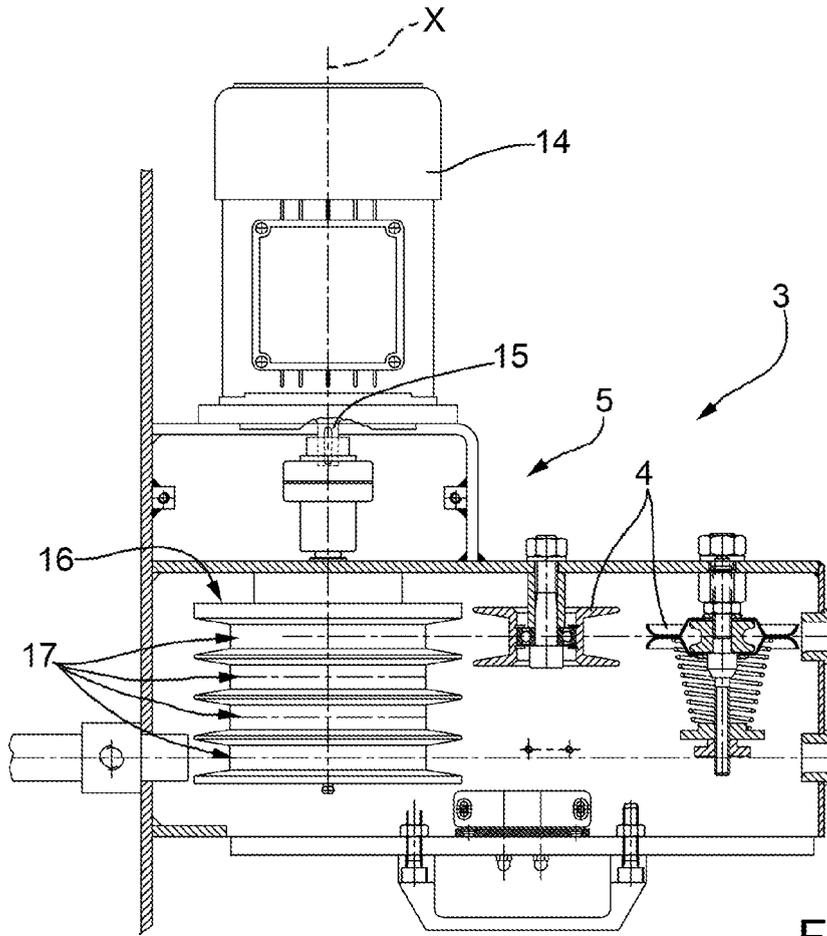


FIG.2

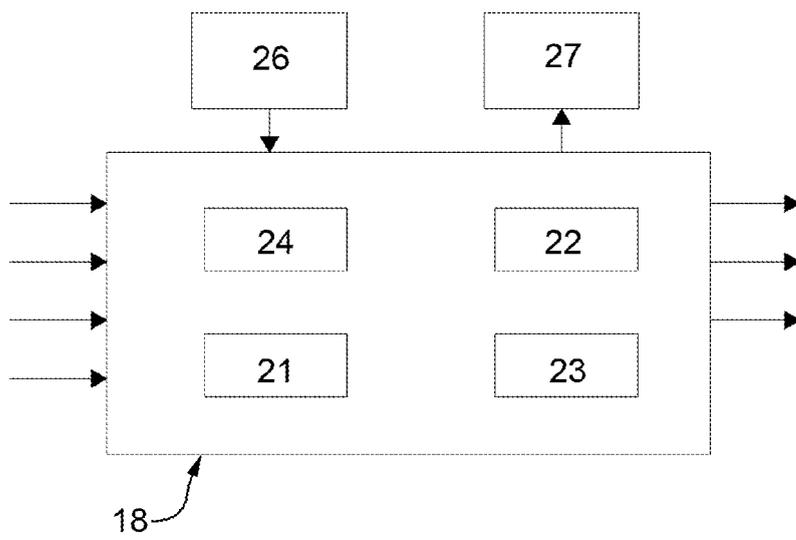


FIG.3



EUROPEAN SEARCH REPORT

Application Number
EP 09 17 0068

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2004/002866 A (CONTITECH LUFTFEDERSYST GMBH [DE]; BERGER MARKUS [DE]; OEHL RAINER [DE]) 8 January 2004 (2004-01-08)	1,2	INV. D01H13/10 D01H1/00 B65H59/18 B65H59/16
A	* page 4, line 16 - page 5, line 6; figure 1 *	3-8	
A	----- GB 921 138 A (DUNLOP RUBBER CO; LARMUTH & BULMER LTD) 13 March 1963 (1963-03-13) * sentences 19-52; figure 3 *	1	
A	----- DE 28 54 007 A1 (BROSA ERICH) 3 July 1980 (1980-07-03) * the whole document *	1	
A	----- US 3 885 604 A (ROWLAND KENNETH HARRY) 27 May 1975 (1975-05-27) * column 3, line 22 - column 4, line 52; figures 3-5 *	1	
A	----- GB 770 037 A (DUNLOP RUBBER CO) 13 March 1957 (1957-03-13) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC)
			D01H B65H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 November 2009	Examiner Dreyer, Claude
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
ON EUROPEAN PATENT APPLICATION NO.

EP 09 17 0068

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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19-11-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004002866 A	08-01-2004	AT 345301 T	15-12-2006
		AU 2003245826 A1	19-01-2004
		DE 10229077 A1	29-01-2004
		EP 1519888 A1	06-04-2005
		JP 2005537198 T	08-12-2005
		US 2005184183 A1	25-08-2005
-----	-----	-----	-----
GB 921138 A	13-03-1963	NONE	
-----	-----	-----	-----
DE 2854007 A1	03-07-1980	NONE	
-----	-----	-----	-----
US 3885604 A	27-05-1975	AT 334234 B	10-01-1976
		DE 2335416 A1	24-10-1974
		FR 2224388 A1	31-10-1974
		NL 7404566 A	11-10-1974
-----	-----	-----	-----
GB 770037 A	13-03-1957	FR 1126666 A	28-11-1956
-----	-----	-----	-----