(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 437 321 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.07.2004 Bulletin 2004/29

(51) Int Cl.[7]: **B66B 9/04**, B66F 3/25

(21) Application number: **04425006.6**

(22) Date of filing: **09.01.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **10.01.2003 IT rm20030007**

(71) Applicant: **OTIS ELEVATOR COMPANY**
Farmington, CT 06032 (US)

(72) Inventor: **Foschini, Gianluca CEAM S.r.l.**
40012 Calderara di Reno (BO) (IT)

(74) Representative: **Iannone, Carlo Luigi et al**
Ing. Barzanò & Zanardo Roma S.p.A.
Via Piemonte, 26
00187 Roma (IT)

(54) Jack lifting-device, particularly for oleo-dynamic elevator systems

(57) The invention relates to a jack lifting device, particularly for oleo-dynamic elevator systems, said device providing a jack (12) sliding within a cylinder (17), a tank (14), coupled with said cylinder, a support element for the cylinder - jack assembly, wherein the tank (14) is integrated within the support element of the cylinder (17) - jack (12) assembly.

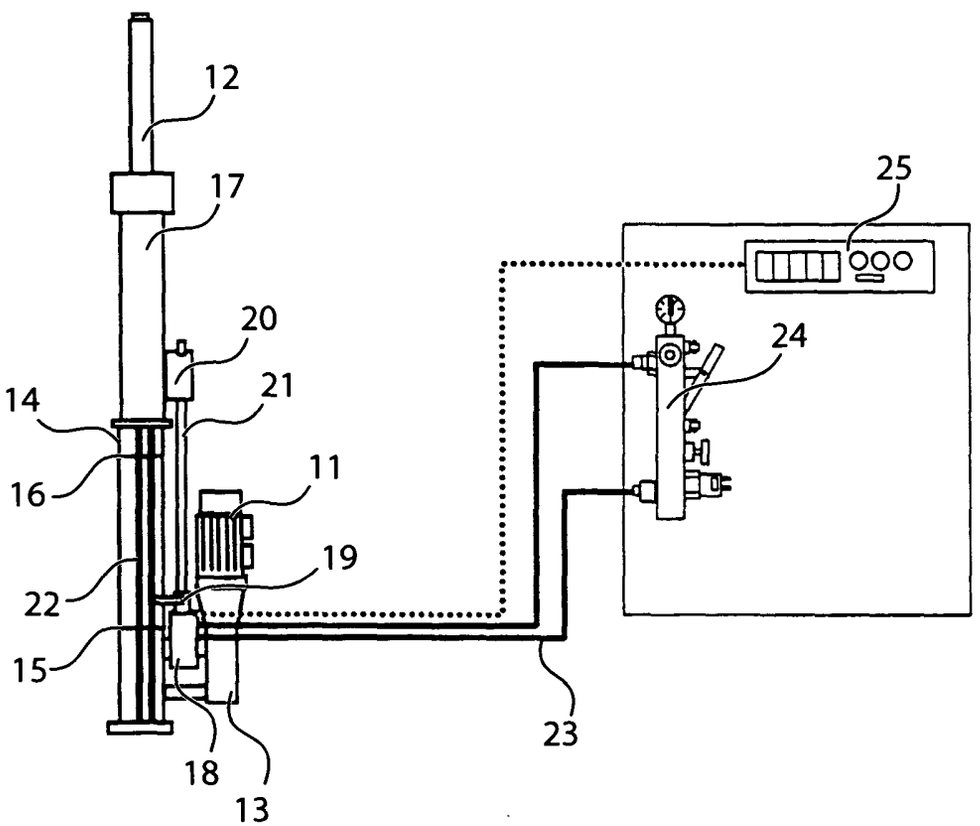

Fig. 2

EP 1 437 321 A1

Description

[0001] The present invention relates to a jack lifting device, particularly for oleo-dynamic elevator systems.

[0002] More specifically, the invention concerns a device of the above kind, studied and realised to allow the optimum positioning of means comprising the system, thus saving space and making it easier the maintenance interventions.

[0003] As it is well known, different solutions exist to realise oleo-dynamic elevators, not having machine room, i.e. a specific space allowing to position the motor and the relevant mechanical means.

[0004] Said solutions provide the integration or assembling of the system in such a way to occupy a reduced space. One these possible solutions is due to the possibility of saving space, by immerging the motor within the oil tank. The whole assembly is then positioned within the car hoistway or in the bottom of the ditch.

[0005] A problem arising from the above system is due to the fact that in case the tank is of the horizontal type and it is placed between the car and the wall, it becomes necessary to increase the hoistway dimensions, thus using more space. Further, in case said tank is placed within the ditch, possibly under the jack, it would be necessary to provide a support frame for the same jack, thus increasing costs and assembling time.

[0006] Furthermore, the problem exists for this kind of solutions due to the possible water infiltrations within the ditch, thus the possible pollution of the motor fluid and the consequent motor damaging.

[0007] In case the tank is provided vertically (narrow and high tank), it would be easier o place the same into the free zone between car and wall (on the jack side or laterally with respect to the floor doors). In such a case, motor replacement operations would occur from the roof of the car or from the footpace, through door provided laterally with respect to the floor door. Motor replacement, which is immerged into the oil, would be in any case critical, since the space to reach the motor would be limited, and further oil leakages would occur on delicate parts (footpace floor or car). Furthermore, the choice of immerging the oil within the fluid would make it necessary to use dielectric fluids and would preclude the possibility of using water based fluids.

[0008] Another possible solution to integrate or assembling the system in such a way to occupy a reduced space is that of using an air cooled motor, not immerged within the oil: in this case a system of the closed circuit kind is used wherein the hydraulic fluid is displaced by the jack to an accumulator and the whole is placed within the car hoistway.

[0009] By this solution, motor maintenance is simplified, but other problems are added if an accumulator is added. Particularly, critical aspects concern safety, since a component containing high pressure gas is employed, as well as maintenance, since it is known that after few years accumulator membranes loose their elasticity and sealing characteristics and must be replaced, and dimensions, due to the large oil volume circulating, accumulators must a capability of many litres and dimensions up to two meters height. Finally, hydraulic circuit is complicated since it is necessary to add an auxiliary motor pump to fill in the accumulator, and many lines must be provided to connect each other the various components.

[0010] In this contest it is included the solution suggested according to the present invention.

[0011] It is therefore specific object of the present invention a jack lifting device, particularly for oleo-dynamic elevator systems, said device providing a jack sliding within a cylinder, a tank, coupled with said cylinder, a support element for the cylinder - jack assembly, characterised in that said tank is integrated within said support element of the cylinder - j ack assembly.

[0012] Particularly, according to the invention, said device is an oleo-dynamic device.

[0013] Preferably, according to the invention, said jack lifting device can be placed vertically.

[0014] Furthermore, according to the invention, cooling fins are provided on said cylinder - jack assembly, preferably provided longitudinally with respect to the cylinder - jack assembly support element.

[0015] Still according to the invention, said tank can contain an aqueous solution or oil.

[0016] Always according to the invention, at least a pulley can be connected to said jack.

[0017] Further, according to the invention, at least a motor, at least a pump, control devices, safety devices and at least a pulley for the operation of an elevator can be provided.

[0018] Still according to the invention, said at least a motor can be provided vertically and parallel or horizontal and perpendicular with respect to the jack lifting device.

[0019] Always according to the invention, said system can be mounted according to a traction configuration of the 2:1 indirect traction kind, or 4:1 kind, or to a direct kind traction kind.

[0020] The present invention will be now described, for illustrative but not limitative purposes, according to its preferred embodiments, with particular reference to the figures of the enclosed drawings, wherein:

Figure 1 shows a configuration for the positioning of components of an elevator traction system according to the prior art;

Figure 2 shows an application of the lifting device to an elevator traction system;

Figure 3 shows a second application of the lifting device to an elevator traction system;

Figure 4 shows a third application of the lifting device to an elevator traction system;

Figure 5 shows a fourth application of the lifting device to an elevator traction system of the 2:1 indirect traction according to the invention;

Figure 6 shows a fifth application of the lifting device to an elevator traction system of the 4:1 indirect traction according to the invention; and
Figure 7 shows a sixth application of the lifting device to an elevator traction system of the direct traction according to the invention;

[0021] Making reference to figure 1, it is possible to observe a system for oleo-dynamic elevator according to the prior art. It can be easily noted that motor 1 and pump 2 are immerged into oil 3 contained within a tank 4. liquid, during the operation steps, can reach a minimum level 5 and a maximum level 6. Block valve 7 and shut off valve 8 are provided as safety devices.

[0022] This configuration has many maintenance and operation problems, as already described.

[0023] Figure 2 shows an embodiment according to the invention. Particularly, it is possible to note that motor 11 is placed laterally and vertically with respect to the position of the jack 12. this choice is particularly convenient under the space occupancy point of view. Under the motor 11, screw pump 13 is provided, connected to the fixed tank 14, which is also support for the jack, and is filled with oil or water solution, the minimum level 15 and the maximum level 16 of which are shown in the figure. Cylinder 17 is provided above the jack 12. Between the motor and the tank, they are placed the block valve 18, the shut off valve 19 and the rupture valve 20, the latter coupled each other by a pipe line 21. Finally, it is possible to observe the cooling fins 22.

[0024] Lifting system described is connected by suitable hydraulic and electric lines 23 to the auxiliary block 24 and to the remote adjusting 5, both provided within the controller cabinet.

[0025] Other embodiments of the present invention are shown in figures 3 and 4. Particularly, they always show a vertical positioning of the tank 14, while motor 11 is in a horizontal position long with the screw pump 13, in case space was not available to vertically mount the motor. The whole assembly is fixed to the bedplate 6. In figure 4, motor 11 and screw pump 13 are placed within a frame 27. each one of the figures show also the block valve 18 and the shut off valve 19.

[0026] In the following figures 5, 6 and 7, other embodiments of the present invention are shown. Each figure shows the motor 11, screw pump 13, fixed tank 14, with its minimum level 15 and maximum level 16, block valves 18, shut off valves and rupture valves 21, coupled by the pipe line 20, and the cooling fins 22. in figure 5 it can be particularly seen that the system can be applied to a 2:1 ratio indirect traction elevator. From the figure it is noted also pulley 28. said system allows to reach long stokes without realising hols for the jack, since the jack stroke is half (1/2) of the car stroke.

[0027] Figure 6 shows the application of the device to a 4:1 ratio indirect traction. In, fact, two pulleys are provided. Generally, the 2:1 ratio solution is preferred, since it provides only one pulley and ropes can be more easily mounted.

[0028] In figure 7, device is applied to a direct traction system, wherein the lifting has the extension of the cylinder elongation.

[0029] Present invention has different advantages. First one is the one relevant to the reduced dimensions of the tank, since it is provided within the jack pillar. Further, tank mounting procedure are reduced, as well as maintenance and replacement procedures, since they can be carried out in a more convenient, quick, an safe way, without dirtying, since the motor is not immerged within oil but within air. Further, from the bottom of the ditch, a possible oil spreading does not damage the car, the floor door or the footpace.

[0030] it is also useful to put into evidence that the use of an air immerged motor makes it possible to employ not dielectric fluids. Then, hydraulic system is remains simple, thus limiting the number of components, and increasing the global efficiency of the system. Furthermore, car lowering effect during loading and unloading steps is reduced, since the reduced amount of pressurised oil involves a reduced volume variation.

[0031] Now, the other advantages obtained by the system geometry will be taken into consideration. Vertical motor and pump, beside better exploiting the room'geometry, are less sensible to possible water infiltration within the ditch, since the motor is always at 1 meter from the bottom, and thus less risks are present to be submerged by the water. Further, tank geometry increase the heat elimination capability, being it provided with cooling fins. This effect is amplified thanks to the air pump effect due to the car moving within the room.

[0032] Finally, system has a reduced noise, since the motor, that is a noise source, is provided within the hoistway ditch, thus being far from the passengers and mainly from the building inhabitated portions.

[0033] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims.

Claims

1. Jack lifting device, particularly for oleo-dynamic elevator systems, said device providing a jack sliding within a cylinder, a tank, coupled with said cylinder, a support element for the cylinder - jack assembly, **characterised in that** said tank is integrated within said support element of the cylinder - jack assembly.

2. Jack lifting device, particularly for oleo-dynamic elevator systems, according to claim 1, **characterised in that** said device is an oleo-dynamic device.

3. Jack lifting device, particularly for oleo-dynamic el-

evator systems, according to one of the preceding claims, **characterised in that** said jack lifting device is placed vertically.

4. Jack lifting device, particularly for oleo-dynamic elevator systems, according to one of the preceding claims, **characterised in that** cooling fins are provided on said cylinder - jack assembly.

5. Jack lifting device, particularly for oleo-dynamic elevator systems, according to claim 4, **characterised in that** said cooling fins are provided longitudinally with respect to the cylinder - jack assembly support element.

6. Jack lifting device, particularly for oleo-dynamic elevator systems, according to one of the preceding claims, **characterised in that** said tank contains an aqueous solution or oil.

7. Jack lifting device, particularly for oleo-dynamic elevator systems, according to one of the preceding claims, **characterised in that** at least a motor, at least a pump, control devices, safety devices and at least a pulley for the operation of an elevator are provided.

8. Jack lifting device, particularly for oleo-dynamic elevator systems, according to claim 7, **characterised in that** said at least a motor is provided vertically and parallel or horizontal and perpendicular with respect to the jack lifting device.

9. Jack lifting device, particularly for oleo-dynamic elevator systems, according to claim 8 or 9, **characterised in that** said system is mounted according to a traction configuration of the 2:1 indirect traction kind, or 4:1 kind, or to a direct kind traction kind.

10. Jack lifting device, particularly for oleo-dynamic elevator systems, according to each one of the preceding claims, substantially as illustrated and described.

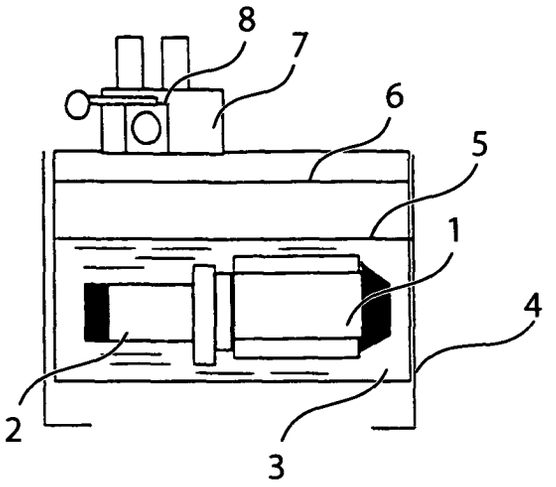

Fig. 1

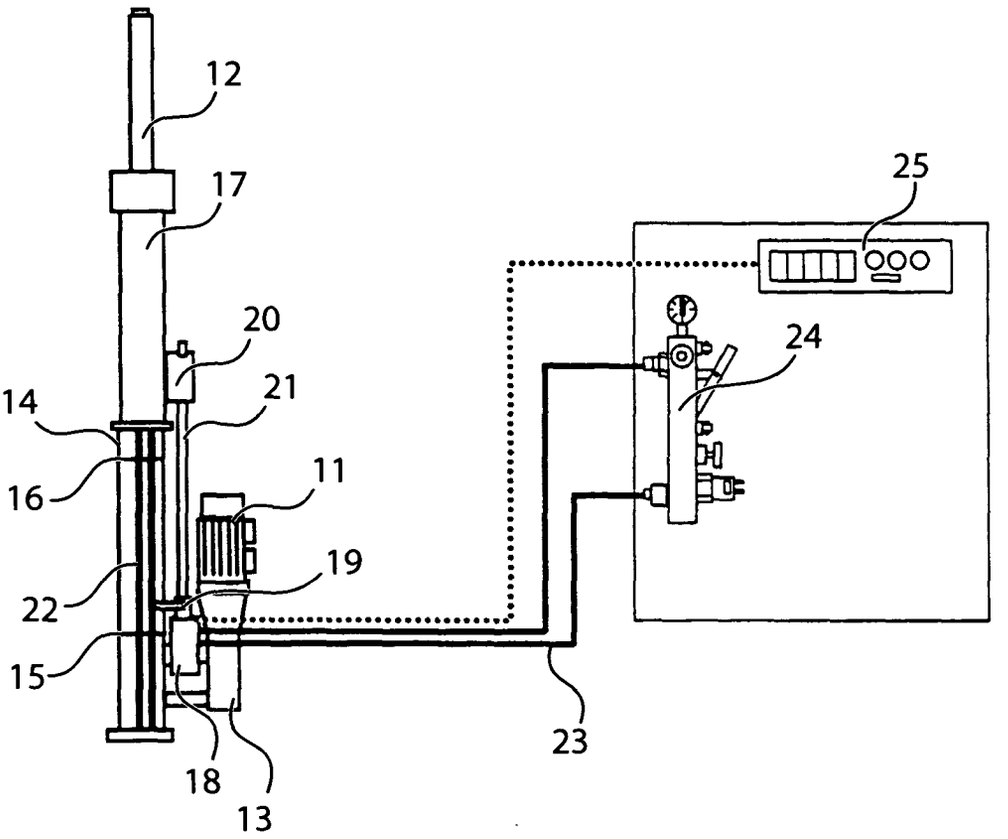

Fig. 2

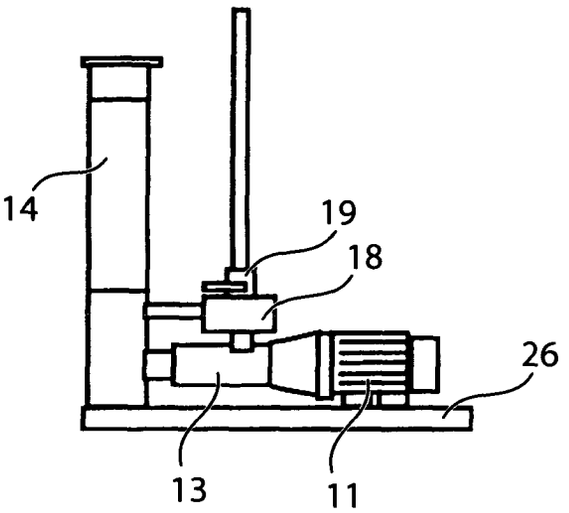

Fig. 3

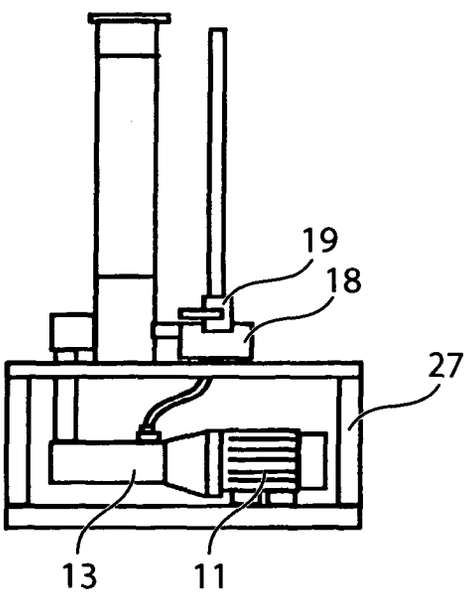

Fig. 4

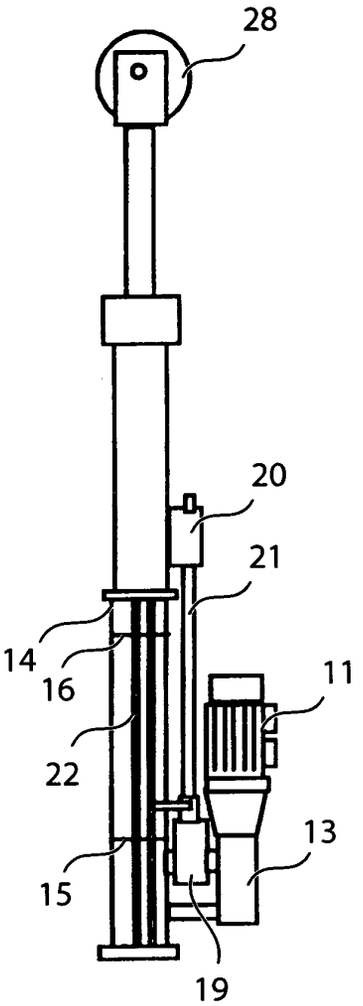

Fig. 5

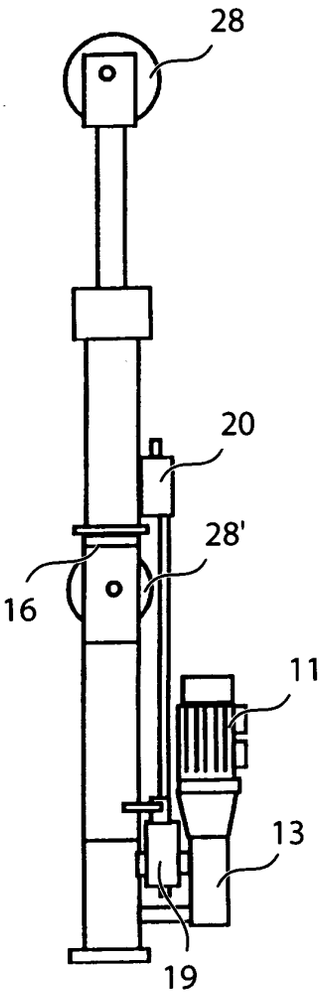

Fig. 6

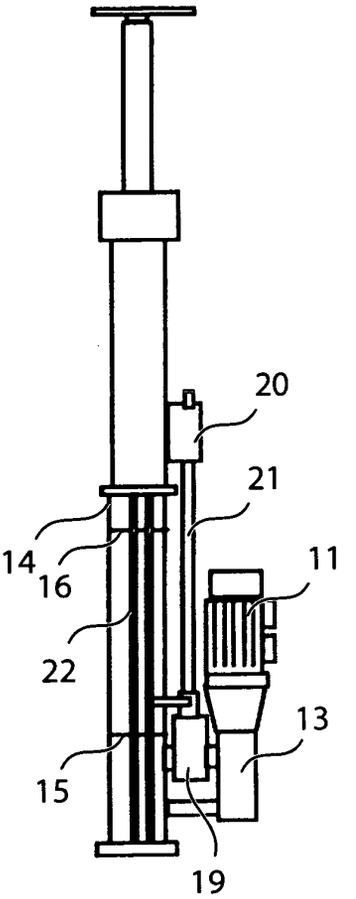

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5006

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)
X Y	PATENT ABSTRACTS OF JAPAN vol. 016, no. 471 (M-1318), 30 September 1992 (1992-09-30) & JP 04 169491 A (TAIYO LTD), 17 June 1992 (1992-06-17) * abstract *	1-3,6-9 4	B66B9/04 B66F3/25
X	EP 1 083 141 A (OTIS ELEVATOR CO) 14 March 2001 (2001-03-14) * abstract * * paragraph '0015! - paragraph '0020! * * figures 1,3 *	1-3,6,7, 9	
X	EP 0 924 155 A (OTIS ELEVATOR CO) 23 June 1999 (1999-06-23) * abstract * * paragraph '0009! - paragraph '0011! * * figure 1 *	1-3,6,7, 9	
X A	US 4 667 932 A (ARBELOA JESUS I) 26 May 1987 (1987-05-26) * column 2, line 65 - column 3, line 30 * * figure 1 *	1-3 8	TECHNICAL FIELDS SEARCHED (Int.Cl.7) B66B B66F
X	EP 1 232 993 A (BOSCH GMBH ROBERT) 21 August 2002 (2002-08-21) * abstract *	1-3,6	
Y	DE 30 01 770 A (MASCHF AUGSBURG NUERNBERG AG) 23 July 1981 (1981-07-23) * the whole document *	4	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 April 2004	Sheppard, B

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 42 5006

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-04-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 04169491 A	17-06-1992	NONE	
EP 1083141 A	14-03-2001	DE 19943408 A1	22-03-2001
		EP 1083141 A2	14-03-2001
EP 0924155 A	23-06-1999	US 6378660 B1	30-04-2002
		DE 69805147 D1	06-06-2002
		DE 69805147 T2	06-03-2003
		EP 0924155 A2	23-06-1999
		ES 2173553 T3	16-10-2002
US 4667932 A	26-05-1987	ES 263602 Y	01-09-1983
		ES 270376 Y	16-02-1984
		AT 24875 T	15-01-1987
		BR 8300997 A	16-11-1983
		CA 1202614 A1	01-04-1986
		DE 3369109 D1	19-02-1987
		EP 0087816 A1	07-09-1983
		MX 152865 A	23-06-1986
EP 1232993 A	21-08-2002	DE 10106714 A1	22-08-2002
		EP 1232993 A1	21-08-2002
DE 3001770 A	23-07-1981	DE 3001770 A1	23-07-1981
		AT 375322 B	25-07-1984
		AT 13581 A	15-12-1983
		CH 648266 A5	15-03-1985
		DK 20881 A ,B	19-07-1981
		ES 265201 Y	01-08-1983
		IT 1135040 B	20-08-1986

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82