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(54) Systems for spraying liquids for fire fighting in railway carriages

(57) It is disclosed a fire fighting system for the use in railway carriages. The system is made-up of a series of drinkable and/or demineralized water bombs (1A), nitrogen bombs (2A) for pressurizing, a special automatic device or a device that can be remotely controlled for spraying water in zones in which it is required its delivery, a pipe network (4A) and finally a series of final delivery nozzles (6A).

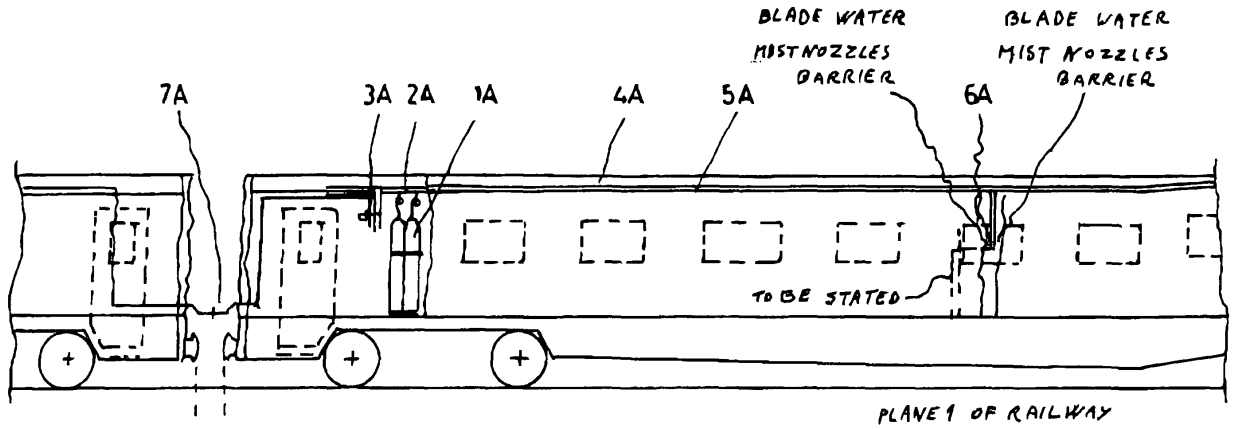

FIGURE 2

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Description

[0001] This invention refers to fire fighting system field for the use in railway carriages.

STATUS OF PRIOR ART

[0002] Actually the fire fighting safety in railway carriages is not fulfilled by any fixed extinguishing system. This situation, joined to the situation related to practical lack of fixed systems installed along the circulation railway, owing to its extension, can cause the obligation of using alternative safety systems that are greatly onerous for the collectivity such as, for example and not limited to this situation, the legal obligation of making a second parallel gallery used for emergency cases in tunnels having great lengths.

SYSTEM DESCRIPTION

[0003] The system forming the object of this description is a fixed system for fire fighting protection based on the delivery of nebulized water, specifically projected for the control, cutting off or extinguishing of fire in the field of railway carriages.

[0004] For a better comprehension of this invention and for showing how the same can be applied, it shall be made reference, as an example, to the annexed drawings, in which:

Figure 1 shows a functional scheme of the various parts of the system and of its various components;
Figure 2 shows a typical layout of a real installation, that can be made economically.

[0005] The Figure 1 shows schematically the layout of the various parts of fire fighting system in a railway carriage, joined by quick coupling flexible pipes to the adjacent carriages, so that the systems normally used in these carriages can be employed.

[0006] With reference to the typical scheme (see Figure 1) and to the typical layout scheme (see Figure 2), the system is made-up of a series of bombs 1 holding drinkable and/or demineralized water, a nitrogen bomb for pressurizing and delivering water into the line 2, a special device 3, that can be remotely controlled, for spraying water in the zones in which it is required the delivery, a pipe network 4 and finally a series of delivery nozzles 5. The delivery nozzles 5 are normally concealed into the internal bulkheads for the carriage completing and, during the intervention, they are automatically extracted from the bulkheads using a telescopic mechanism. The nozzles are made in different types: some thereof have the aim of suppressing and extinguishing fires, other ones, located in suitable positions, have the aim of separating smoke zones and shielding the heat transmitted by thermal irradiation and convection. Using a series of 3-way shunting valves 3, it is possible to select the delivery zone, as in the front side of the carriage, in the rear side or in one of the two carriage halves, in which the bombs are installed, or in a third half of adjacent carriage using a high pressure flexible pipe quick coupling. In this manner it is possible to avoid the water delivery where it is not necessary, but delivering it only in the whished fire zone and then being able to double the autonomy in each carriage half and, then, to reduce to a half the weights and overall dimensions of the bomb series keeping constant the autonomy and costs related to it.

[0007] The nozzles 5 cannot be removed, as they are concealed by a control inside the internal carriage wall. A hydraulic telescopic mechanism allows the ejection of nozzles for operation and return to rest position after having used the system.

[0008] The control mechanisms for the nitrogen bomb and water bombs are well-known, and then they are not discussed in further details.

[0009] The carriage ceiling has a double bottom with thermosensitive cable that detects the presence of excessive temperature higher than a certain danger threshold and with control circuits that, in relation to this temperature signal, control automatically the delivery start-up in the fire zone. As an alternative the control can be started manually by other controls, under the control of chief conductor or other service controller.

[0010] Figure 2 shows a typical layout of a real installation, that can be made economically. This figure shows the water bombs 1 A and nitrogen bombs 2A, the distribution valves 3A that shunt the water in the carriage holding the bomb series or in the adjacent carriage joined by the quick coupling 7A. The line 4A distributes the water into the nozzles 5A and in detail also in the central carriage zone into the nozzles 6A for generating an anti-smoke curtain.

RUNNING DESCRIPTION

[0011] The fire fighting system can be operated by remote control in the inside of railway train or by the manual control from the carriage. The remote control, on its turn, can be piloted in automatic manner by a suitable detection system (e.g., but not solely, thermal detection systems, smoke, flame detection systems, etc...) or in manual manner by an operator, eventually after that he has received an alarm signal using proper pushbuttons, by closed circuit television (TVCC) or by automatic detectors. The action of fire fighting system is to deliver thin water particles, no dangerous for the people or for things, which cuts off or extinguish á fire by the following mechanisms:

- Thermal absorption and following temperature reduction,
- Dilution of oxygen percentage near the flame by steaming and following production of water steam,
- Reduction of energy irradiation heat transmission

owing to the numerous water drops that are produced.

[0012] These fire fighting systems are normally offered on the market, but they are not provided on railway carriages owing to various problems, mainly to related costs.

PROPOSED SYSTEM ADVANTAGES

[0013] The system advantages with respect to the actual solution applied in railway carriages are the following ones:

1. Safety for persons. The carriage is supplied with a fire extinguishing system that is not dangerous for persons and can increase notably the survival probability in the case of this event;
2. Safety for things;
3. Localized and immediate protection, that is to say it is present where it occurs, on the train, and not externally to it on the circulation railway.
This causes a spare in the costs of safety systems;
4. Further spare applying the passive structural safety rules (e.g. in tunnel parallel to the one of normal use for traffic).

[0014] The main advantages of the invention system with respect to normal known systems are:

1. Separation of zones holding smokes and zones at high temperatures, made-up in the middle of carriage owing to innovative water blade spraying nozzles.
2. "Selective" delivery system in many zones. Thanks to a new shunting three-way valve it is possible to select the delivery zone, or one of the two halves of carriage, in which bombs are contained or a third half of adjacent carriage owing to a high pressure flexible pipe quick coupling. In this manner it is possible to double the autonomy of each half carriage and, then, to reduce to a half the weights and overall dimensions of bomb series, keeping constant the autonomy and costs thereof.
3. The nozzles cannot be tampered as they disappear in the inside of internal carriage wall. A new hydraulic telescopic mechanism allows its ejection for the operation and return to the rest position after operation.

Although this invention was described with reference to its particular embodiments, many other variants and modifications and other uses shall be evident to the people skilled in the technics.

Claims

1. A liquid spraying system for fire fighting protection of railway carriages, in which the system is made-up of a series of drinkable and/or demineralized water bomb series, nitrogen bomb for pressurizing, a special automatic device or a device that can be remotely controlled for spraying water in zones in which it is required the delivery, a pipe network and finally a series of final delivery nozzles.

2. A liquid spraying system for fire fighting protection of railway carriages, which is made-up of a series of drinkable and/or demineralized water bomb series, nitrogen bomb/s for pressurizing and delivery line, a special device that can be remotely controlled for spraying water in zones in which it is required the delivery, a pipe network and finally a series of final delivery nozzles.

3. A liquid spraying system for fire fighting protection of railway carriages according to preceding claim, in which the delivery nozzles are concealed by the internal walls of the carriage completing and, during the operation, they are ejected automatically by a telescopic mechanism that can be remotely controlled or can be of automatic type.

4. A liquid spraying system for fire fighting protection of railway carriages, in which the nozzles are of different types, that is to say some ones have the aim of cutting off and extinguishing the fire, other ones, located in proper positions and being in blade form, have smoke locking means and heat shielding against the heat transmitted by irradiation and convection forming a central curtain of separation in the carriage.

5. A liquid spraying system for fire fighting protection of railway carriages, in which, using a series of 3-way shunting valves, it is possible to select the delivery zone, that is to say in the front carriage side, in rear carriage side or in one of the two carriage halves, in which there are provided the bombs or in a third half of adjacent carriage through a flexible high pressure quick connection, so that it is possible to deliver water where it is necessary or in the zone interested by fire and then being able to double the autonomy of each half carriage and to reduce to a half weights and overall dimensions of bomb series, although with equal autonomy and costs thereof.

6. A liquid spraying system for fire fighting protection of railway carriages, in which the nozzles cannot be removed as they disappear into the inside of the internal carriage wall, a hydraulic telescopic mechanism allowing its ejection for the operation and return to the rest position after the operation.

7. A liquid spraying system for fire fighting protection of railway carriages, in which the carriage ceiling has a double bottom with thermosensitive cable having

double sensibility threshold that detects the presence of excessive temperature higher than a certain danger threshold and with control circuits that, in relation to this temperature signal, control automatically the delivery start-up in the fire zone.

8. A liquid spraying system for fire fighting protection of railway carriages, according to claim 7. in which, as an alternative, the delivery control can be manually started by other controls, under the control of chief conductor or other service controller.

9. A liquid spraying system, in particular but not exclusively of normal or demineralized water, according to what was described, shown and claimed.

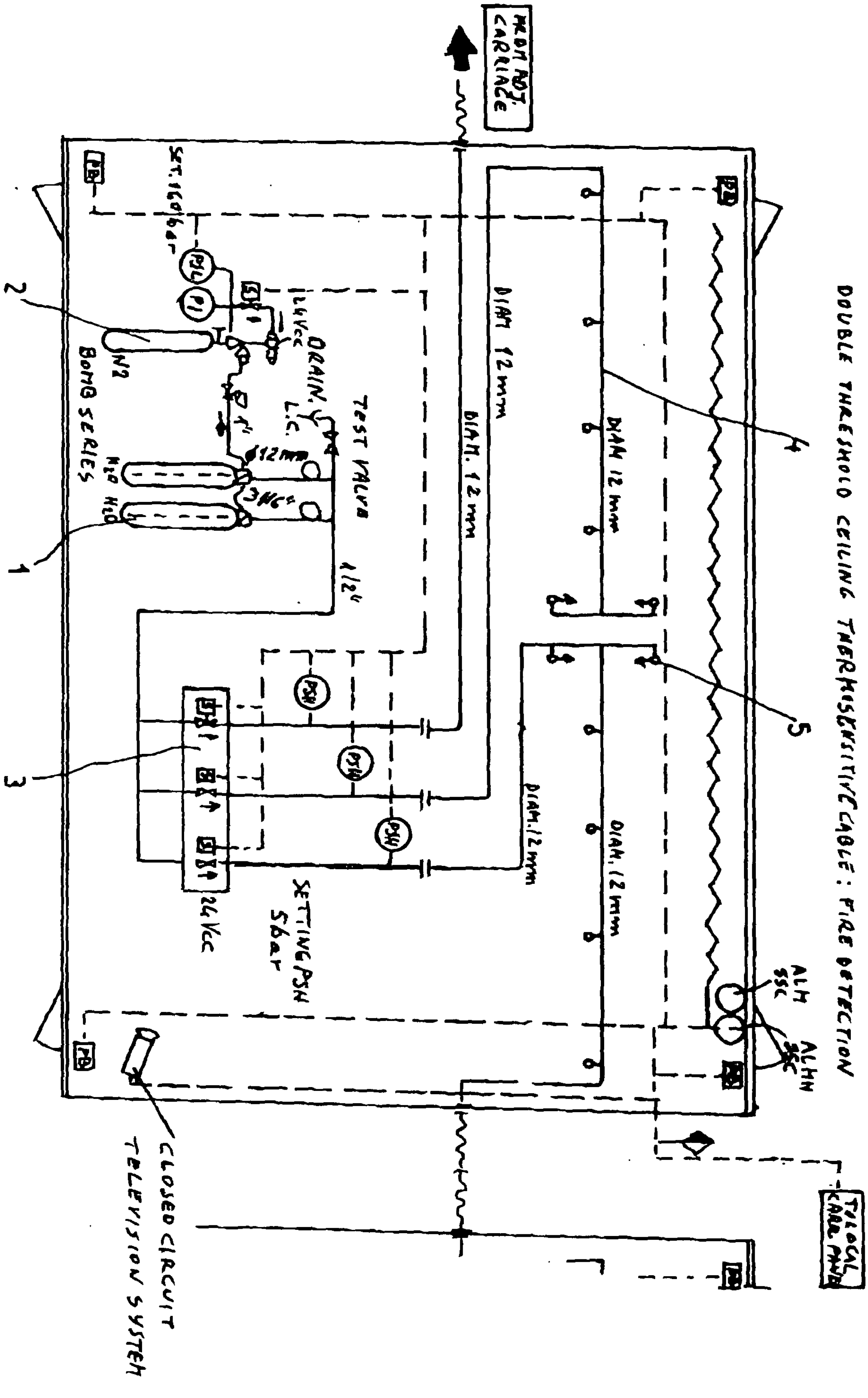
DOUBLE THRESHOLD CEILING THERMOSENSITIVE CABLE : FIRE DETECTION
CLOSED CIRCUIT TELEVISION SYSTEM
TEST VALVE
SETTING PSH 5bar
24Vcc
DRAIN L.C.
N2
BOMB SERIES
DIAM. 12 mm
1
2
3
4
5

FIGURE 1

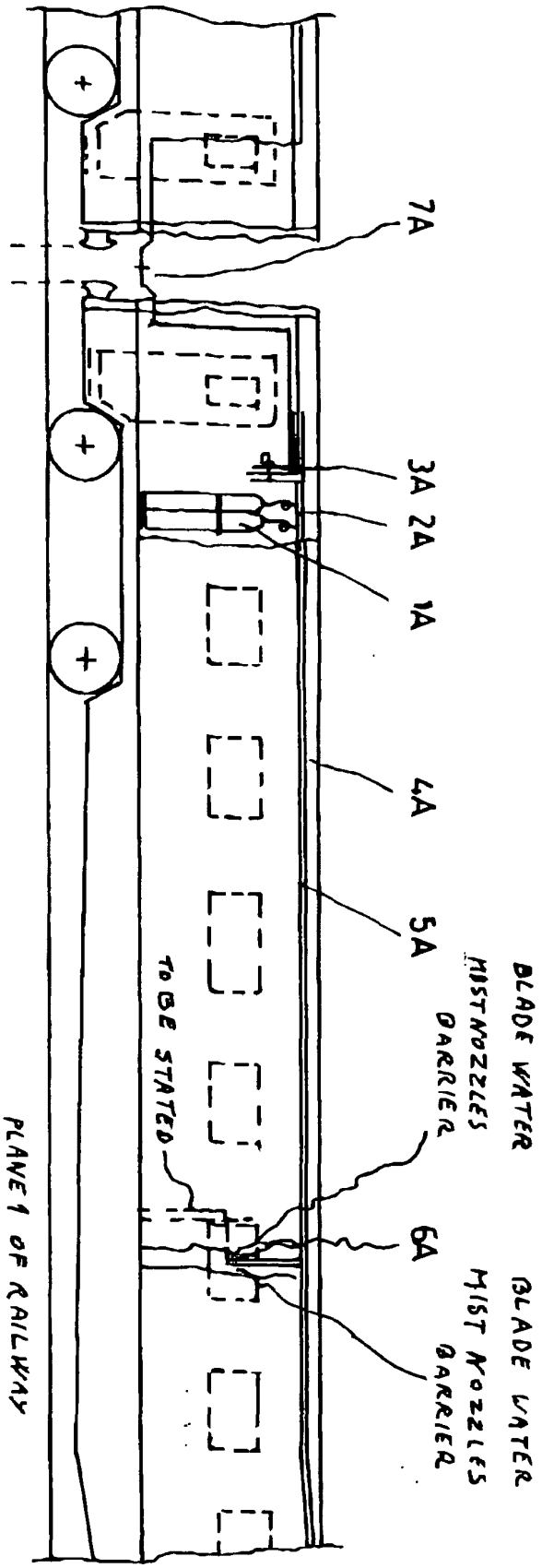
7A
3A
2A
1A
4A
5A
6A
BLADE WATER MIST NOZZLES BARRIER
BLADE WATER MIST NOZZLES BARRIER
TO BE STATED
PLANE 1 OF RAILWAY

FIGURE 2

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EUROPEAN SEARCH REPORT

Application Number
EP 05 01 3910

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	US 5 797 457 A (SUNDHOLM ET AL) 25 August 1998 (1998-08-25) * the whole document * -----	1,2 3	A62C3/07 A62C37/09 A62C35/02 A62C37/48
Y	US 2 389 331 A (TYDEN EMIL) 20 November 1945 (1945-11-20) * page 2, lines 50-26; figures 1,2 * -----	3,6	
Y A	DE 102 11 271 A1 (SYSTEMTECHNIK HERZOG GMBH) 9 October 2003 (2003-10-09) * paragraphs [0027], [0028] * -----	6 4	
Y	FR 2 803 763 A (THE CHANNEL TUNNEL GROUP LTD) 20 July 2001 (2001-07-20) * abstract * -----	5	
Y	EP 0 522 671 A (AEG WESTINGHOUSE-TRANSPORT-SYSTEME GMBH; AEG SCHIENENFAHRZEUGE GMBH) 13 January 1993 (1993-01-13) * column 3, lines 5-35 * -----	5	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	US 2 185 944 A (HOLMES WILLIS GERALD) 2 January 1940 (1940-01-02) * the whole document * -----	7	A62C
A	EP 1 419 804 A (METRO DE MADRID, S.A) 19 May 2004 (2004-05-19) * the whole document * -----	8	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 October 2005	Schut, T

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)

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☒ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 05 01 3910

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-3

   A liquid spraying system ... made-up of a series of water bomb series, nitrogen bomb for pressurizing, a special automatic device or a device that can be remotely controlled for spraying water..., a pipe network and finally a series of final delivery nozzles.

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2. claim: 4

   A liquid spraying system ... in which the nozzles are of different types, some ones extinguishing the fire, other ones forming a central curtain of separation in the carriage.

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3. claim: 5

   A liquid spraying system ... using a series of 3-way shunting valves to select the delivery zone

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4. claim: 6

   A liquid spraying system ... comprising nozzles with a hydraulic telescopic mechanism allowing its ejection for the operation and return to the rest position after the operation.

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5. claims: 7,8

   A liquid spraying system ... comprising a carriage with a double ceiling in which a thermosensitive cable has been placed.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 01 3910

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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13-10-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5797457 A	25-08-1998	AU 680300 B2	24-07-1997
		AU 7701194 A	01-05-1995
		DE 4497432 T0	21-11-1996
		WO 9509677 A1	13-04-1995
		GB 2296433 A	03-07-1996
		JP 3553947 B2	11-08-2004
		JP 9503140 T	31-03-1997
US 2389331 A	20-11-1945	NONE	
DE 10211271 A1	09-10-2003	NONE	
FR 2803763 A	20-07-2001	AT 292497 T	15-04-2005
		AU 3187301 A	24-07-2001
		EP 1246669 A1	09-10-2002
		WO 0151130 A1	19-07-2001
EP 0522671 A	13-01-1993	AT 121038 T	15-04-1995
		DE 4123584 A1	14-01-1993
US 2185944 A	02-01-1940	NONE	
EP 1419804 A	19-05-2004	WO 03011397 A1	13-02-2003
		ES 2182720 A1	01-03-2003

EPO FORM P0459

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