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

(11) EP 1 088 539 A1

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.04.2001 Bulletin 2001/14

(51) Int. Cl.[7]: **A61G 7/10**

(21) Application number: **00203391.8**

(22) Date of filing: **29.09.2000**

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

(30) Priority: **29.09.1999 NL 1013174**

(71) Applicant: **Careflex Holding B.V.**
3812 RL Amersfoort (NL)

(72) Inventor:
Meeuwissen, Martinus Adriaan
6823 BG Arnhem (NL)

(74) Representative:
Jorritsma, Ruurd et al
Nederlandsch Octrooibureau
Scheveningseweg 82
P.O. Box 29720
2502 LS Den Haag (NL)

(54) **Raising device**

(57) Raising device comprising a lifting device and a carrying strap. The carrying strap has two or more ends which have to be connected to the lifting device. To ensure safe operation, it is proposed according to the invention for lifting or lowering to be possible only if the connection between carrying strap and lifting device is perfect. This is monitored with the aid of sensor means which are connected to a control unit for the lifting device. If appropriate, it is possible for these sensor means only to become active after a defined load on the carrying strap has been exceeded, so that in the unloaded condition it is not necessary for the connection between carrying strap and lifting device to be perfect.

EP 1 088 539 A1

Description

[0001] The present invention relates to a raising device comprising a lifting device and a carrying strap, which is connected to the lifting device, for holding the person to be raised, said lifting device comprising an electric lifting member which is controlled by a control unit. A raising device of this type is generally known in the prior art. As an example, reference is made to European application EP 0782430 A. It should be understood that other raising devices, and in particular other lifting devices, also lie within the scope of the present invention. One example which may be mentioned is a ceiling lift in which cables or the like extend downwards from the ceiling and can be coupled to a carrying strap so as to move a patient.

[0002] The carrying strap may be a single strap which is wrapped, for example, beneath the armpits or beneath the buttocks of the patient. It is also possible for the carrying strap to be of multiple design, i.e. to have, for example, four free ends, so that the patient can be moved in a horizontal position.

[0003] The term carrying strap is also understood as meaning carrying jackets and other structures. The only important factor is that the carrying strap be slightly flexible and be arranged around the patient and has to be connected to the lifting device in order for it to be possible to carry out lifting. It should also be understood that where the text refers to lifting, this is also intended to encompass lowering of the patient.

[0004] In practice, it has been found that as a result of increased pressure of work there is an increasing risk that the connection between carrying strap and lifting device will not be perfect. In general, this is not a problem, since the carrying strap becomes detached before the actual lifting takes place and the person remains in the original position.

[0005] However, if the carrying strap does become detached during lifting, there are risks to the health of the patient and liability risks for the institution concerned and/or the operating staff.

[0006] To resolve this problem, the prior art proposes improved connecting methods between carrying strap and, for example, the lifting arm of a lifting device. For example it has been proposed to attach a pin with a collar to the lifting arm and to provide the carrying strap with a keyhole-shaped opening at its end. Under load, the narrowed part of the keyhole-shaped opening will rest on the pin section.

[0007] However, it has been found that there is still a risk of accidents. This applies both to straps with two ends and to straps with more ends, such as three or four ends.

[0008] DE 4447393 C discloses a crane hook provided with a sensor which checks whether or not a load has been correctly positioned. If positioning is incorrect, lifting is impossible. Raising heavy loads using large cranes as described in the above publication cannot be compared to raising patients.

[0009] The object of the invention is to provide a safe raising device which eliminates risks of an imperfect connection and the resultant consequences.

[0010] In a raising device as described above, this object is achieved in that there are sensor means which detect that the carrying strap has been correctly attached to the lifting device and which are connected to said control unit such that, in the event of incomplete or incorrect attachment, at least the lifting movement by the said lifting member is blocked.

[0011] In general, the lifting devices operate electrically with the aid of some kind of control. Consideration may be given to remote controls, control panels and the like. According to the invention, it is proposed for this control to be influenced in such a manner that, if the connection between carrying strap and lifting device is not perfect, lifting is impossible. The above-described sensor means may comprise any structure known in the prior art. The most simple structure is a (micro)switch, for example arranged in the lifting arm of the lifting device, which detects the presence of the relevant coupling part of the strap. The relevant part of the coupling is only present at this location if the coupling is perfect.

[0012] It is also possible to provide electrical contact or to construct an electric circuit which is only closed if all the connections to the lifting device satisfy the demands imposed. The sensors may comprise all mechanical, electrical or electronic, magnetic or optical sensors.

[0013] The connection between lifting device and carrying strap may be any connection which is known in the prior art, but preference is given to a rapid-action coupling with male and female parts, the carrying strap being provided with the male part. In this case, the demands imposed on the design of the coupling are less high. This is because if connection is not perfect, according to the invention it will be impossible for lifting to be carried out. The risk of accidents is in principle reduced to zero.

[0014] According to an advantageous embodiment of the invention, there is also a presence sensor which detects the presence of a patient. This sensor may, for example, be designed as a weight sensor and detects whether the strap has been subjected to a load. Naturally, the presence sensor may also be designed differently and may function using spring structures, light beams or any other structure which is conceivable in the prior art.

[0015] If the strap is free of load, the lifting member, such as an electric motor, can be readily operated, since there is then no risk of accidents. As a result, it is possible to use the device even though the strap is not perfectly connected. This may be of importance when moving the device towards a patient in order subsequently to move the patient.

[0016] The invention also relates to a lifting yoke comprising a carrying part provided with attachments

for attachment of a carrying strap for carrying a patient, and also provided with an attachment part for attachment to a lift. Structures of this type are generally known in the prior art and comprise metallic parts of relatively high weight. In practice, it has been found that if a lifting yoke of this type is handled incorrectly or maladroitly, it may strike a patient, possibly causing injuries. On account of the high weight of the lifting yoke, such injuries may be serious.

[0017] On the other hand, it is necessary for a lifting yoke to be sufficiently strong to ensure that it can be used to move even heavy patients without any risk.

[0018] The object of the present invention is to provide a lifting yoke which, on the one hand, has a low weight and, on the other hand, is sufficiently strong.

[0019] In a lifting yoke as described above, this object is achieved in that the connection between attachment part and carrying part comprises a flexible member. This flexible member may, for example, be a cable, rope or strap. In this way, it has proven possible to optimize the ease of handling of the carrying part of the lifting yoke while maintaining sufficient strength. Surprisingly, it has emerged that this part of the structure can be designed exclusively for strength and not for rigidity.

[0020] The carrying part preferably comprises a tube part provided with attachments for one or more carrying straps.

[0021] The invention will be explained in more detail below with reference to an exemplary embodiment illustrated in the drawing, in which:

Fig. 1 diagrammatically depicts a raising device according to the invention;
Fig. 2 diagrammatically depicts the electrical connections according to the invention;
Fig. 3 diagrammatically depicts one end of a strap, and
Fig. 4 shows a perspective view of the lifting yoke according to the invention.

[0022] Fig. 1 shows a raising device according to the invention. Details of this device can be found in European application 96904387.6, which is incorporated by reference. For the present invention, it is only important to understand that the device comprises a frame 2 which can be moved on wheels 15. The other end of the frame is provided with a lifting-arm assembly, comprising an auxiliary arm 3 and a lifting arm 4. These arms can be operated if appropriate independently of one another, in a manner which is not shown in more detail. The main lifting motor is denoted by 10. It is actuated via console 16, which is connected to control unit 19. The power supply is denoted by 18. A remote control can be provided, if appropriate. Kneerests 12 are also arranged on the frame. In the vicinity of the free end of the lifting arm 4 there are catches 8 designed to interact with the free ends of a strap 13. Strap 13 can be uncoupled from the free ends of lifting arm 4.

[0023] The coupling between strap 13 and the end of the lifting arm 4 is not shown in detail. For the invention, it is only important that there be sensors 7 which register that the coupling has been made perfectly and the signal from these sensors is fed to control unit 19. A weight sensor, which records the load on the lifting-arm assembly 3, 4, is denoted by 11.

[0024] The device described above operates as follows. If a patient is to be moved, for example, from a sitting position to a standing position, the lifting device 1 is moved towards the patient who is sitting, for example, on a chair. One side of the strap 13 is uncoupled from lifting arm 4 and is arranged beneath the arm pits and behind the back of the shoulders of the patient. Then, the free end of strap 13 is connected to lifting arm 4 once again. If this connection is not perfect, there is a risk that the connection will become detached during lifting and that the patient will fall once the chair has been removed, which may lead to injuries or other problems.

[0025] However, according to the invention the motor 10 can only be operated by control unit 19 after both sensors 7 have detected that the connection of the two free ends of strap 13 to the free end of the lifting arm 4 is perfect. Only then does control unit 19 enable operation by means of console 16.

[0026] The only exception to this is if there is no load on the strap 13 and therefore on the arm assembly 3, 4. This is recorded by weight sensor 10. If the load on the lifting-arm assembly, and more particularly on the free end of lifting arm 4, is, for example, less than 10 kg, this is detected by sensor 11, and in that case the sensors 7 are not effectively connected to the control unit, i.e. the motor 10 can be operated.

[0027] It will be understood that such weight sensors may also be integrated in the coupling between the free end of strap 13 and the free end of the lifting arm 4. As an alternative to weight sensors, it is also possible to use other presence sensors which can be used to record the presence of a patient.

[0028] Fig. 3 shows one end of a strap 13 which is illustrated in part. It can be seen from this figure that that part which is to be fitted into the receiving part of lifting arm 4 is pin-shaped, and this part is denoted by 20. It is provided with a mushroom-shaped projection 21, by means of which it can be locked in the receiving part of lifting arm 4. Locking of this nature can be released, for example, with the aid of a push-button. The use of a pin-shaped end 20 which is to be arranged in a receiving part accommodated in or attached to the lifting arm 4 has the advantage that the end of the lever 13 can only be fitted in one position, unlike in the prior art, in which use is made of eyelets attached to the strap, which have to engage over pins arranged at the ends of lifting arm 4. In practice, it has been found that it is particularly easy for incorrect attachment to take place, and this may lead to accidents and injuries.

[0029] It will be understood that the design of the end of the raising strap which is shown here can be used for any type of raising strap and is not used exclusively for the structure according to the present invention. However, with the structure shown in Fig. 3 it is easy to operate an electric switch.

[0030] As described above, the structure described here works with all kinds of lifting devices. This also applies to lifting devices in which, for example, balance brackets are used, connected between the lifting arm and the carrying strap. As indicated above, the device can also be used for ceiling lifts and structures of this kind. It is only important that the invention offers protection against lifting or lowering a patient in the loaded state when the connection between the carrying strap which carries a patient in whatever way and the lifting arm, balance bracket or other part of the lifting device is not perfect. In the case of lifts in which the position of the free ends of the strap are accurately known during lifting, it is also possible for the sensors to be designed as position sensors.

[0031] Fig. 4 shows the lifting yoke according to the invention. It is denoted overall by 41 and is attached to an arm 49 of a lifting device. It should be understood that it can also be attached to a ceiling lift or some other kind of lift. The lifting yoke comprises a carrying part 42 which is provided, in the vicinity of its ends, with attachments 43, 44 for receiving a carrying strap 45. The patient can be held inside the latter. The head of the patient is situated in the vicinity of the attachment 43, while the legs of the patient are situated in the vicinity of the attachment 44. It should be understood that the carrying strap 45 can be designed in any way which is known in the prior art. For example, it is possible for an attachment to be present only in the vicinity of 44.

[0032] The carrying yoke 41 and part 50 of the lifting arm are connected by means of a structure comprising a flexible strap 47 and a rotary knob 46. Strap 47 is connected to an auxiliary strap 51 which, in turn, is connected to the free ends of carrying part 42. On the other side, strap 47 is connected to the free end in the vicinity of attachment 44. The rotary knob 46, which is not shown in detail, is designed in such a manner that when it is turned strap 47 is moved. In this way, the angular position of carrying part 42 can be set. If appropriate, there is an (automatic) lock, so that when rotary knob 46 is released strap 47 and therefore yoke 41 can no longer be moved.

[0033] The use of strap 47 and strap 51 allows a particularly high strength to be obtained in combination with a particularly low weight. As a result, it is possible to make the entire lifting yoke considerably more lightweight than in the prior art. As a result, there is no longer a risk of the weight of the lifting yoke causing injuries when it is moved inadvertently so as to hit the patient or carer.

[0034] These and further variants lie within the scope of the present invention as described in the appended claims.

Claims

1. Raising device comprising a lifting device (1) and a carrying strap (13), which is connected to the lifting device, for holding the person to be raised, said lifting device comprising an electric lifting member (10) which is controlled by a control unit (19), characterized in that sensor means (7) are provided which detect that the carrying strap (13) has been correctly attached to the lifting device and which are connected to the said control unit (19) such that, in the event of incomplete or incorrect attachment, at least the lifting movement by the said lifting member (10) is blocked.

2. Raising device according to Claim 1, comprising sensor means (11) for detecting the presence of a person to be raised, which sensor means are connected to the control unit (19) such that the sensor means (7) which detect that the carrying strap (13) has been correctly attached to the lifting device only become effective when a patient is present.

3. Raising device according to one of the preceding claims, comprising at least two connections between the carrying strap and the lifting device, each provided with sensor means which each separately influence the movement of the lifting member.

4. Device according to Claim 3, wherein said sensor means detect when a circuit formed by the strap is closed.

5. Device according to one of the preceding claims, wherein said connection between the said carrying strap and the raising device comprises a rapid-action coupling.

6. Device according to Claim 5, wherein said rapid-action coupling comprises a male part and a female part, and the male part is accommodated in the said carrying strap.

7. Device according to Claim 5 or 6, wherein said sensor means are accommodated in the said rapid-action coupling.

8. Device according to one of the preceding claims in combination with Claim 2, wherein said sensor means (11) comprise a weight sensor which below a defined load emits a signal which allows the lifting movement by the said lifting member irrespective of the signal from the sensor means.

9. Lifting yoke (41) comprising a carrying part (42)

provided with attachments (43, 44) for attachment of a carrying strap (45) for carrying a patient, and provided with an attachment part (46) for attachment to a lift, characterized in that the connection between attachment part (46) and carrying part (42) comprises a flexible member (47).

10. Lifting yoke according to Claim 9, in which the said flexible member comprises a strap.

11. Lifting yoke according to Claims 9 or 10, in which the said flexible member is arranged displaceably with respect to the attachment part.

12. Lifting yoke according to Claim 11, in which the said flexible member is arranged lockably with respect to the said attachment part.

Fig 1

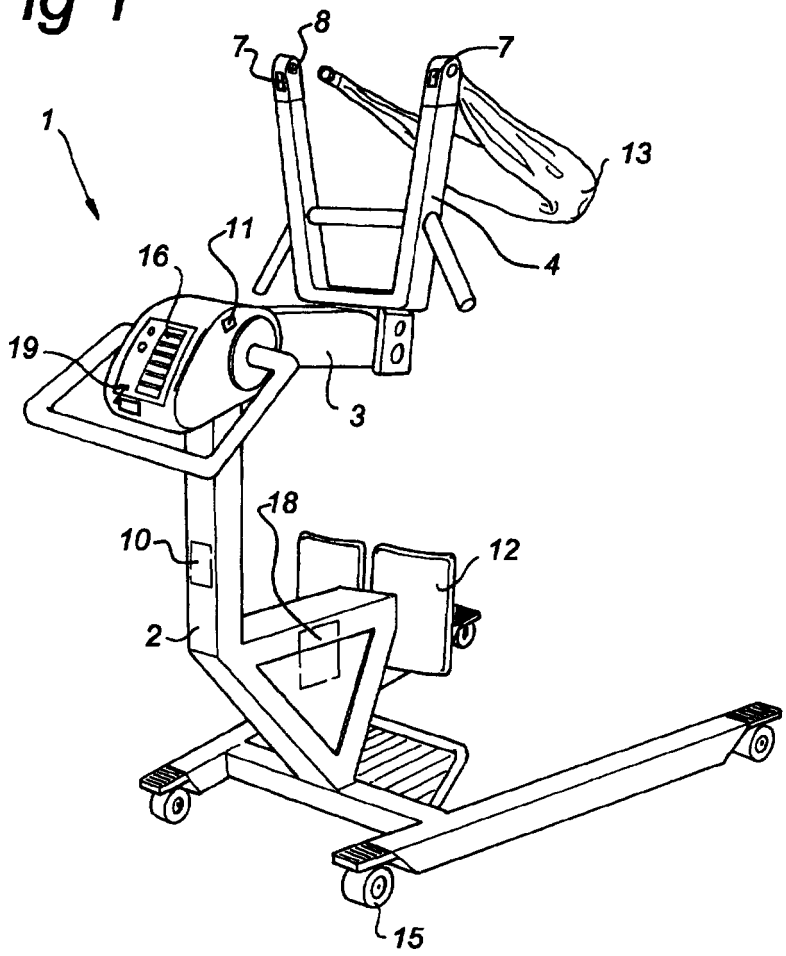


Fig 2

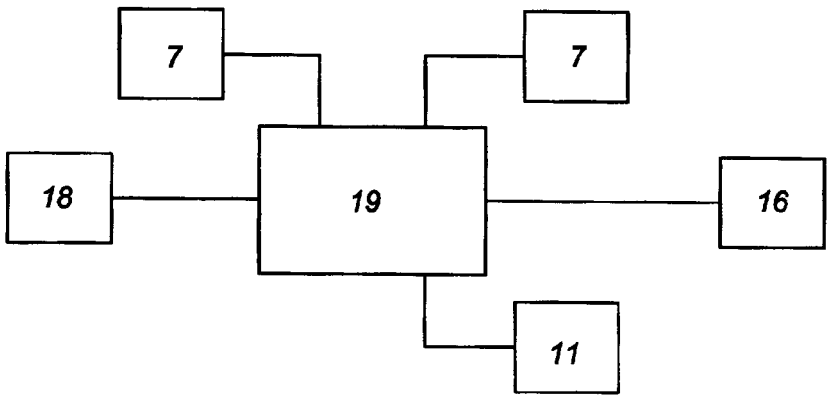


Fig 3

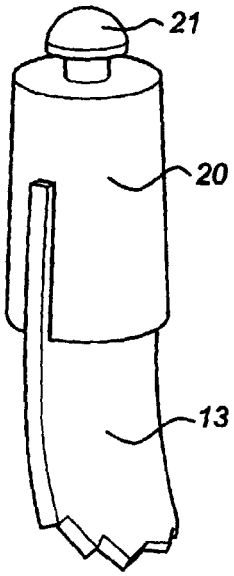
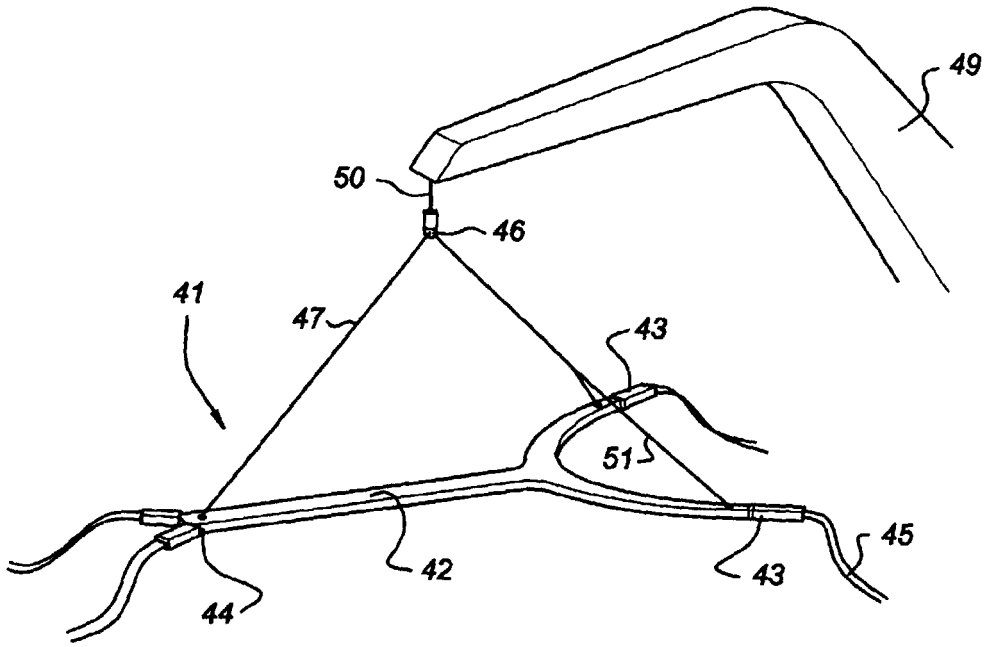


Fig 4



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 20 3391

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)
Y,D	EP 0 782 430 A (CAREFLEX HOLDING BV) 9 July 1997 (1997-07-09) * the whole document *	1,3	A61G7/10
Y,D	DE 44 47 393 C (MANNESMANN AG) 13 June 1996 (1996-06-13) * column 1, line 7 - line 28 * * column 2, line 62 - column 3, line 14 * * column 3, line 30 - line 54; claim 1; figures *	1,3	
A	GB 2 293 857 A (ARJO LTD) 10 April 1996 (1996-04-10) * page 3, line 5 - page 4, line 22; figures *	1,5,7	
A	GB 2 292 311 A (SMITHS INDUSTRIES PLC) 21 February 1996 (1996-02-21) * column 4, line 2 - line 6 * * column 5, line 24 - column 6, line 12; figures *	1,3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	GB 2 302 561 A (ARJO LTD) 22 January 1997 (1997-01-22) * abstract; figures *	1	A61G B66C B66F
X	US 4 221 011 A (FLINCHBAUCH) 9 September 1980 (1980-09-09) * column 2, line 52 - column 3, line 33; figures 1,2 *	9,10	
A	WO 94 15570 A (MAH) 21 July 1994 (1994-07-21) * page 13, line 22 - page 14, line 9; figure 20 *	9	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 December 2000	Baert, F

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)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 20 3391

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)
A	US 2 680 855 A (ROBINSON) 15 June 1954 (1954-06-15) * column 3, line 5 - line 20; figure 3 *	9	
A	DE 298 20 207 U (CAREFLEX HOLDING B.V.) 18 February 1999 (1999-02-18) * page 8, line 6 - line 28; figures 5,6 *	11	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 December 2000	Baert, F

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 00 20 3391

This annex lists the patent family membersrelating 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.

22-12-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0782430 A	09-07-1997	NL 9500482 A	01-10-1996
		AU 722011 B	20-07-2000
		AU 4850696 A	02-10-1996
		DE 69600334 D	09-07-1998
		DE 69600334 T	01-10-1998
		DK 782430 T	22-03-1999
		US 5878450 A	09-03-1999
		AT 166784 T	15-06-1998
		AT 195860 T	15-09-2000
		CA 2214851 A	19-09-1996
		DE 69610082 D	05-10-2000
		EP 0818189 A	14-01-1998
		ES 2119570 T	01-10-1998
		WO 9628125 A	19-09-1996
		US 6134725 A	24-10-2000
DE 4447393 C	13-06-1996	NONE	
GB 2293857 A	10-04-1996	NL 1001127 C	09-04-1996
GB 2292311 A	21-02-1996	AU 694528 B	23-07-1998
		AU 2841995 A	07-03-1996
		EP 0697204 A	21-02-1996
		US 5621932 A	22-04-1997
GB 2302561 A	22-01-1997	AU 5159096 A	30-01-1997
		WO 9701319 A	16-01-1997
US 4221011 A	09-09-1980	NONE	
WO 9415570 A	21-07-1994	US 5333333 A	02-08-1994
		AU 6120894 A	15-08-1994
US 2680855 A	15-06-1954	NONE	
DE 29820207 U	18-02-1999	NL 1007513 C	19-05-1999

EPO FORM P0459

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