

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 669 113 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

14.06.2006 Bulletin 2006/24

(51) Int Cl.:

A63C 9/02 (2006.01)

(21) Application number: **04028966.2**

(22) Date of filing: **07.12.2004**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR**

Designated Extension States:

AL BA HR LV MK YU

(72) Inventor: **Östberg, Mikael**

784 56 Borlänge (SE)

(74) Representative: **Olsson, Jan et al**

Bjerkéns Patentbyrå KB

P.O.Box 1274

801 37 Gävle (SE)

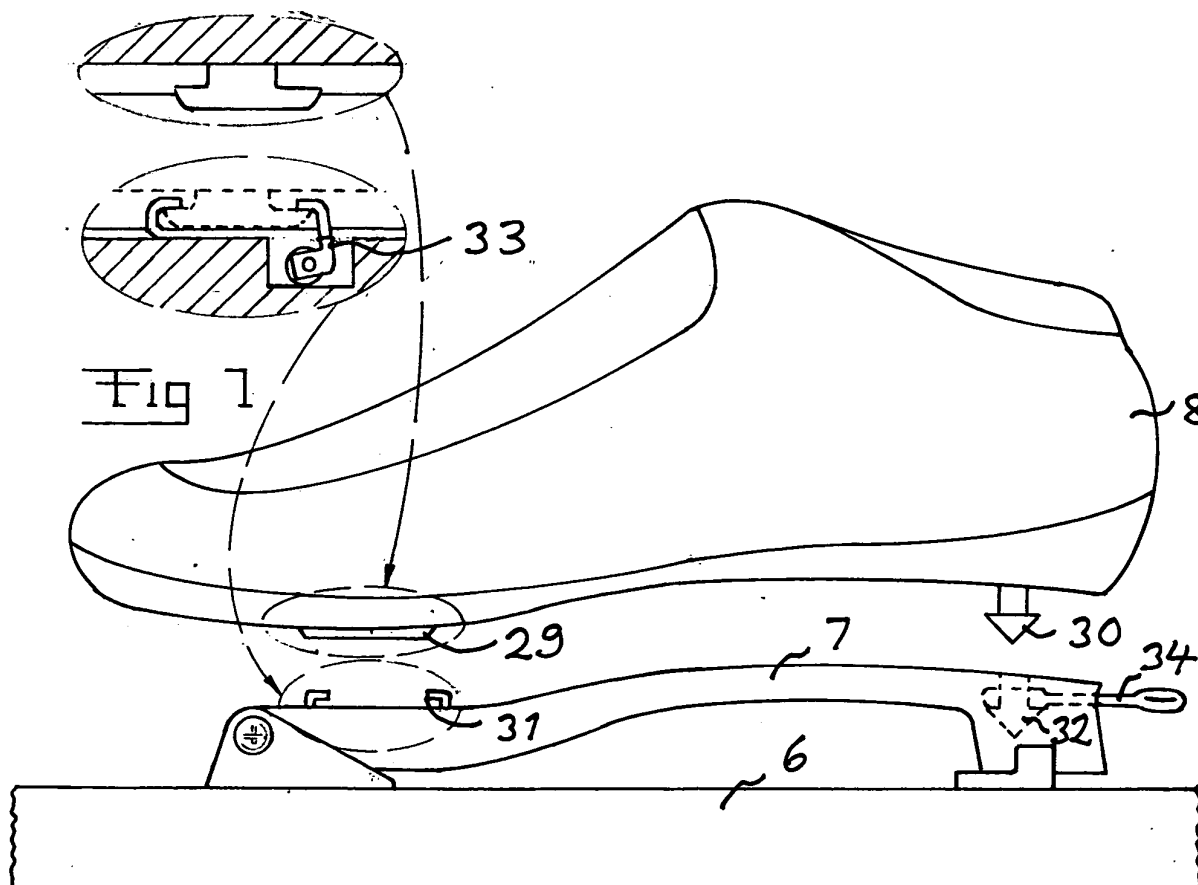
(71) Applicant: **Östberg, Mikael**

784 56 Borlänge (SE)

(54) **A ski binding**

(57) A ski binding for connecting a ski boot to a cross-country ski comprises an attachment (1) to be secured to the ski (6), a rigid member (7) pivotally connected to said attachment about a pivot axis (11) above the upper surface of the ski and adapted to support a said ski boot

(8) as well as means adapted to fix said ski boot to said support member so that said pivot axis will be located under said boot in the longitudinal direction of the ski behind the intended location of a tip of a foot to be received in said boot.



EP 1 669 113 A1

Description

TECHNICAL FIELD OF THE INVENTION AND PRIOR ART

[0001] The present invention relates to a ski binding for connecting a ski boot to a cross-country ski allowing pivoting of the boot with respect to the ski about an axis extending substantially perpendicularly to the longitudinal direction of the ski for lifting the heel of the boot away from the ski when pushing away.

[0002] Such a ski binding is applicable to cross-country skis of the type used for competitions, for physical training or only as a means of transport. However, the discussion below will mainly be directed to the ski racing application, since the demands put on such ski bindings are particularly high in that application.

[0003] Ski bindings of this type have to allow said pivoting of the boot with respect to the ski for making it possible to efficiently push away when skiing at a high speed, and the skier does then in many situations experiences a considerable degree of instability. This is particularly the case when using the skating technique, which is the reason why the invention will hereinafter be particularly discussed with respect to that technique, although ski bindings of this type may be used for other skiing techniques, such as the classic technique, as well.

[0004] One type of such ski bindings comprises a clamp secured to the ski and adapted to receive a pin transversely arranged on the front end of a ski boot while allowing pivoting of the boot with respect to the ski around this pin (see appended fig 1). Especially ski boots provided with such a pin and designed primarily for skating have been stiffened so as to improve the stability. However, the sole has to be flexible for enabling lifting of the heel of the boot, which results in a flexibility of the boot also in the lateral direction and by that instability of the boot. It is also known to provide such a ski boot with guiding means co-operating with corresponding guiding means arranged on top of the ski for improving the stability. However, in spite of these measures the skis will be experienced as comparatively unstable in some situations, especially during the pushing away phase. This means that in some situations may problems with the balance be the limiting factor for the maximum speed obtainable, especially in sprint races, and in particular when the skiing technique of skating is used.

SUMMARY OF THE INVENTION

[0005] The object of the present invention is to provide a ski binding of the type defined in the introduction being improved in at least some respect with respect to such ski bindings already known.

[0006] This object is according to the invention obtained by providing such a ski binding with an attachment to be secured to the ski, a rigid member pivotally connected to said attachment about a pivot axis above the

upper surface of the ski and adapted to support a said ski boot as well as means adapted to fix said ski boot to said support member so that said pivot axis will be located under said boot in the longitudinal direction of the ski behind the intended location of a tip of a foot to be received in said boot.

[0007] By fixing the ski boot to a said rigid support member and arranging the pivot axis for the connection between the ski boot and the ski under the ski boot behind the intended location of a tip of a foot to be received in said boot, and accordingly under the foot of the skier in question, the stability of the connection between the ski boot and the ski will be improved substantially with respect to ski bindings of this type already known. This is especially the case in the last part of the pushing away phase, which was previously rather unsteady, especially when skating, but which for the ski binding according to the present invention will be surprisingly steady thanks to both the rigid connection between the ski boot and the ski thanks to said rigid support member and the location of the pivot axis now being under the ski boot instead of in front of the toe portion thereof. Thanks to the stability of the binding and by that of the boot, no high and rigid support members reaching over the ankle are necessary on the boot as present on conventional boots for the skating technique, but lower ski boots may be used instead. This results in a better mobility of the ankle region of the skier, so that the foot may be laterally more inclined when desired for adaption to the nature of the snow layer under the ski. This improves the possibility to obtain an optimum pushing away phase. Another advantage of the possibility to use such ski boots is that the weight thereof may be reduced.

[0008] Thus, the maximum speed obtainable when skiing under certain conditions may be increased by using a ski binding according to the present invention instead of such ski bindings already known.

[0009] According to a preferred embodiment of the invention, said means is adapted to fix said ski boot to said support member so that said pivot axis will be located 3-9 centimetres behind the intended location of a tip of a foot to be received in said boot. It will in this way be possible to ensure that said pivot axis is arranged so that the force exerted on the ski during the last part of the pushing away phase will be directed from the middle foot substantially straight through said pivot axis onto the ski for resulting in an efficient pushing away. This force had for ski bindings already known of the type discussed above a tendency to bend the front part of the ski boot, since the force from the foot was applied at a substantial distance behind the pivot axis. It is preferred to design said means to fix said ski boot to said support member so that said pivot axis will be located behind the rear end of the big toe of a foot to be received in said boot. It is then possible to obtain that the pushing away force will be transferred from the foot to the ski in an optimum way.

[0010] According to another preferred embodiment of the invention said attachment is adapted to be secured

to a ski so as to position said pivot axis for said support member substantially at the point of balance of said ski. It is preferred to position the pivot axis of a ski binding of this type substantially at the point of balance of a ski for obtaining best possible performances of the ski. This results in a particular advantage in a ski binding according to the present invention, since this means that the force applied upon the ski when pushing away will substantially intersect the point of balance of the ski, so that the transmission thereof onto the snow layer under the ski will be much more distinct and efficient than would the force be applied at a distance behind said point of balance as is the case for ski bindings already known.

[0011] According to another preferred embodiment of the invention the ski binding comprises an arrangement allowing a ski boot fixed to said support member by said fixing means to be offset with respect to a longitudinal central line of said ski, i.e. laterally displaced towards one of the longitudinal borders of the ski. When using said ski for the skating technique it is preferred to have the ski boot arranged to be offset with respect to said central line of the ski in the direction towards the inner edge of the ski, i.e. the edge gripping into the snow layer when pushing away.

[0012] According to another preferred embodiment of the invention said arrangement is adapted to allow an adjustment of the degree of said lateral displacement. This means that the lateral displacement may be adjusted to be an optimum with respect to the conditions prevailing. This means that the displacement may be as large as possible when skiing on snow in the form of a hard snow crust, when only the inner edge is used for the skiing, while said displacement may be reduced for skating on a soft snow layer, in which also a part of the gliding surface under the ski is used when skiing according to the skating technique.

[0013] According to another preferred embodiment of the invention said fixing means and said support member are designed to allow said ski boot to be laterally displaced with respect to said support member for being fixed in different positions with respect thereto. This is one preferred way of obtaining said lateral displacement, and another is to provide said arrangement with means for connecting said support member to said attachment laterally displaced towards one of the longitudinal borders of a ski, which may constitute an easier way to obtain a larger lateral displacement. These two embodiments may also be combined, so that for instance a major lateral displacement may be obtained by said connecting means and a final fine adjustment by displacing the ski boot with respect to the support member.

[0014] According to another preferred embodiment of the invention said means for laterally displacing the support member comprises a spacer arranged on a pin-member defining said pivot axis and acting on said support member for removing it with respect to one lateral side of said attachment and by that laterally displace the support member with respect to said ski. The lateral dis-

placement aimed at may by simple means, efficiently and reliably be realised in this way.

[0015] According to another preferred embodiment of the invention said arrangement is adapted to allow a conversion of said lateral displacement from one of said longitudinal borders of a ski to the other. This is a very preferred feature of the present invention, since after a certain period of use of a ski for skating the inner edge thereof will be worn out, so that the skiing will not be that efficient any more and the ski would without this possibility have to be discarded. However, thanks to this embodiment of the invention the lateral displacement of the ski boot with respect to the central line of the ski will then be changed to be towards the other longitudinal border of the ski, so that the left and right ski will change position and the previous outer edges of the skis will now be the inner edges.

[0016] According to another preferred embodiment of the invention said pin-member defining said pivot axis is designed to be removable with respect to said attachment and with respect to said support member for enabling arrangement of said spacer at either side of said support member for removing this with respect to either of two lateral sides of the attachment and by that towards an optional of the two longitudinal borders of the ski. This is an easy way to obtain said conversion by simply moving said spacer from one side of the support member to the other.

[0017] According to another preferred embodiment of the invention said means for fixing said ski boot to said support member is adapted to secure the ski boot to the support member in the front region and in the rear region of the boot, through which it may be ensured that the support member will act as would it be an integral part of the ski boot.

[0018] According to another preferred embodiment of the invention the ski binding comprises means adapted to store potential energy upon pivoting of said support member from a position in which the heel of a said ski boot rests through the support member onto the ski for influencing said support member back to this position in absence of outer forces thereupon. It is advantageous that said energy storing means comprises a spring arranged to act between said attachment and the support member for storing potential energy when pivoting said support member away from said position. A suitable resistance to said pivoting may be obtained by an appropriate dimensioning of such an energy storing means, which has a stabilising effect upon the skiing.

[0019] According to another preferred embodiment of the invention the ski binding comprises a first engagement member arranged on the lower side at the rear of the support member and a second engagement member to be secured on top of a said ski, and these engagement members comprise female and male portions, respectively, adapted to come into engagement when the rear portion of said support member carrying the heel of a said ski boot is pivoted down towards the ski for stabilising

the support member with respect to lateral movements in this position thereof.

[0020] Other advantages as well as advantageous features of the present invention will appear from the following description and the other dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] With respect to the appended drawings, below follows a specific description of preferred embodiments of the invention cited as examples.

[0022] In the drawings:

- Fig 1 is a simplified perspective view of a cross-country ski having a ski binding according to the prior art in the pushing away phase when skating,
- Fig 2 is a side-elevation of a ski binding according to a preferred embodiment of the invention connecting a ski boot to a cross-country ski in a first position of the ski boot with respect to the ski,
- Fig 3 is a view similar to that of Fig 2 with the ski boot in a second position with respect to the ski substantially corresponding to the position during the last part of the pushing away phase when skating,
- Fig 4 is a perspective view of the ski binding with ski boot and ski according to Fig 2,
- Fig 5 is a schematic, simplified view of the ski binding and ski boot according to Fig 2 from above,
- Fig 6 is an exploded and enlarged view of a part of the ski binding shown in the figures 2-5, and
- Fig 7 is a side elevation schematically illustrating a ski binding according to another embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0023] It is schematically illustrated in fig 1 how a ski binding for connecting a ski boot to a cross-country ski according to the prior art provides pivoting of the boot with respect to the ski about an axis extending substantially perpendicular to the longitudinal direction of the ski and being located in front of the toe portion of the foot of the skier for lifting the heel of the boot away from the ski when pushing away. In this case the force applied to the ski boot by contracting the muscles of the thigh of the skier will be transferred to the ski at a position well behind said pivoting axis resulting in the disadvantages described above.

[0024] A ski binding according to a preferred embodiment of the present invention will now be described while

making reference simultaneously to fig 2-6. The ski binding comprises an attachment 1 to be secured to the ski, for instance by screws, in the mid region thereof. This attachment has two lateral wings 2, 3 (see fig 6) with holes 4, 5 for defining a pivot axis extending substantially perpendicularly to the longitudinal direction of the ski 6. A rigid member 7 is pivotally connected to the attachment 1 about said pivot axis in a way to be described more in detail below and adapted to support a ski boot 8. Means 9, 10, for instance in the form of screws and nuts, are adapted to fix the ski boot 8 to the support member 7 so that said pivot axis 11 will be located under the boot in the longitudinal direction of the ski behind the intended location of a tip of a foot to be received in said boot, and more exactly close behind the rear end of the big toe of a foot to be received in the boot and stiffening this.

[0025] The support member extend under substantially the entire ski boot and is secured thereto both in the front region and the rear region of the boot, so that it will in the practice act as an integral part of the ski boot and stiffening this.

[0026] The attachment 1 is adapted to be secured to a ski so that the pivot axis 11 will be located substantially at the point of balance (centre of gravity) of the ski, which is important when the ski is lifted from the ground.

[0027] How the support member 7 is connected to the attachment 1 appears more exactly from fig 6. A pin-member formed by a tube 12 having a length corresponding to the distance between the wings 2, 3 is adapted to be pushed through a tube or hole 13 at the end of the support member 7 (only a part of this member is shown in fig 6), which has an inner diameter substantially corresponding to the outer diameter of the tube 12. Screws 14, 15 are secured to the opposite sides of the tube 12 having an internal thread, so that the pivot axis 11 is defined by the centre axis of the tube 12.

[0028] A spacer 16 in the form of a sleeve having a larger outer diameter than the inner diameter of the hole 13 and an inner diameter at least as large as the outer diameter of the tube 12 is arranged on the tube 12 on one side of the tube 13 removing this by the length of the spacer from one 2 of the wings. Thus, thanks to the spacer a lateral displacement of the support member 7 and by that of a ski boot fixed thereto towards one longitudinal border of the ski will be achieved. This lateral displacement with respect to a longitudinal centre line of the ski will be substantially half the length of the spacer 16. When arranging the spacer 16 on the side illustrated in fig 6 said displacement will be towards the longitudinal border 17 of the ski.

[0029] It is possible to convert said lateral displacement to be towards the other longitudinal border 18 of the ski instead by simply turning the screws 14, 15 out of engagement with the tube 12, move the support member 7 over the tube 12 towards the border 18 and the spacer 16 to the other side of the tube 12 and then secure the screws 14, 15 to the tube 12 again. This means that the inner edge of the ski will be changed from the edge

19 to the edge 20 and the ski from being a left ski to be a right ski.

[0030] It is illustrated in fig 5 how lateral grooves 21, 22 may be provided either in the bottom of the ski boot or in the support member 7 for enabling further adjustment of the lateral displacement of the ski boot 8 with respect to the ski 6.

[0031] A spring member 23 is connected to the support member 7 and it has one free end at each side of the support member. It is shown in fig 4 how one 24 of these free ends is adapted to bear against a stop member 25 arranged on a lateral wing of the attachment at the side towards which the support member 7 is displaced. This spring 23 is adapted to store potential energy when the support member is pivoted away from the position (indicated by dashed lines in fig 4) in which the heel of a ski boot rests through the support member onto the ski for influencing the support member back to this position in absence of outer forces thereupon and to provide a certain resistance when lifting the heel portion of the ski boot for stabilizing this movement.

[0032] The ski binding also comprises a first engagement member in the form of a recess 26 arranged on the lower side at the rear of the support member 7 and a second engagement member 27 in the form of a row of projections 28 to be secured on top of the ski while extending transversely thereto. Two projections 28 are in this case adapted to come into engagement with said recess 26 when the support member is pivoted down towards the ski for stabilizing the support member with respect to lateral movements in this position thereof. The lateral displacement of the support member with respect to the ski decides which two projections 28 will enter the recess 26 in this position.

[0033] The technique when skating with a ski provided with a ski binding according to the present invention will be the same as for ski bindings of this type already known. However, the skier will be able to assume a much more steady state during the pushing away phase, and the force applied by the legs through the foot towards the ski and the snow layer will have a more advantageous direction and be more distinct. Thus, the ski boot will have a position with respect to the ski close to that shown in fig 3 during the end of this pushing away phase, which means that the force applied to the ski through the middle foot region of the foot will be directed substantially through the pivot axis 11. This means that the force will be directed substantially through the point of balance of the ski, which is preferable with respect to the result of said pushing away.

[0034] Not only the fixing of the ski boot 8 to the rigid support member 7 but also a more tight connection of the support member to the tube 12 than the pin of a conventional ski boot to a conventional binding and this location of the pivot axis 11 under the ski boot and the foot of the skier contributes to an increased stability with respect to ski bindings already known and accordingly to a better balance of the skier and possibility to ski faster

without losing the balance.

[0035] A ski binding according to another preferred embodiment of the invention is shown in fig 7. This differs from that according to fig 2-6 only by the way of fixing the ski boot 8 to the support member 7. It is here shown how this may be achieved in a way similar to that used for instance bicycles shoes by simply pressing male members 29, 30, here in the front and rear region of the ski boot, into engagement with female members 31, 32 on the support member for being caught therein by snap-in lock members 33, 34, which may then easily be opened when the ski boot is to be removed again. A number of other possibilities to secure the ski boot to a support member of a ski binding according to the present invention are possible.

[0036] The invention is of course not in any way restricted to the preferred embodiments thereof described above, but many possibilities to modifications thereof would be apparent to a person with ordinary skill in the art without departing from the basic idea of the invention as defined in the appended claims.

[0037] The support member may have any other shape than that shown in the figures, and it is also within the present invention to have the support member formed as an integral part of a ski boot by that having a stiffened portion under the sole for forming the sole of the ski boot.

[0038] It is possible to provide the entire lateral displacement of the ski boot solely by a displacement of the ski boot with respect to the support member, but in such a case the ski boot have to be very steady.

Claims

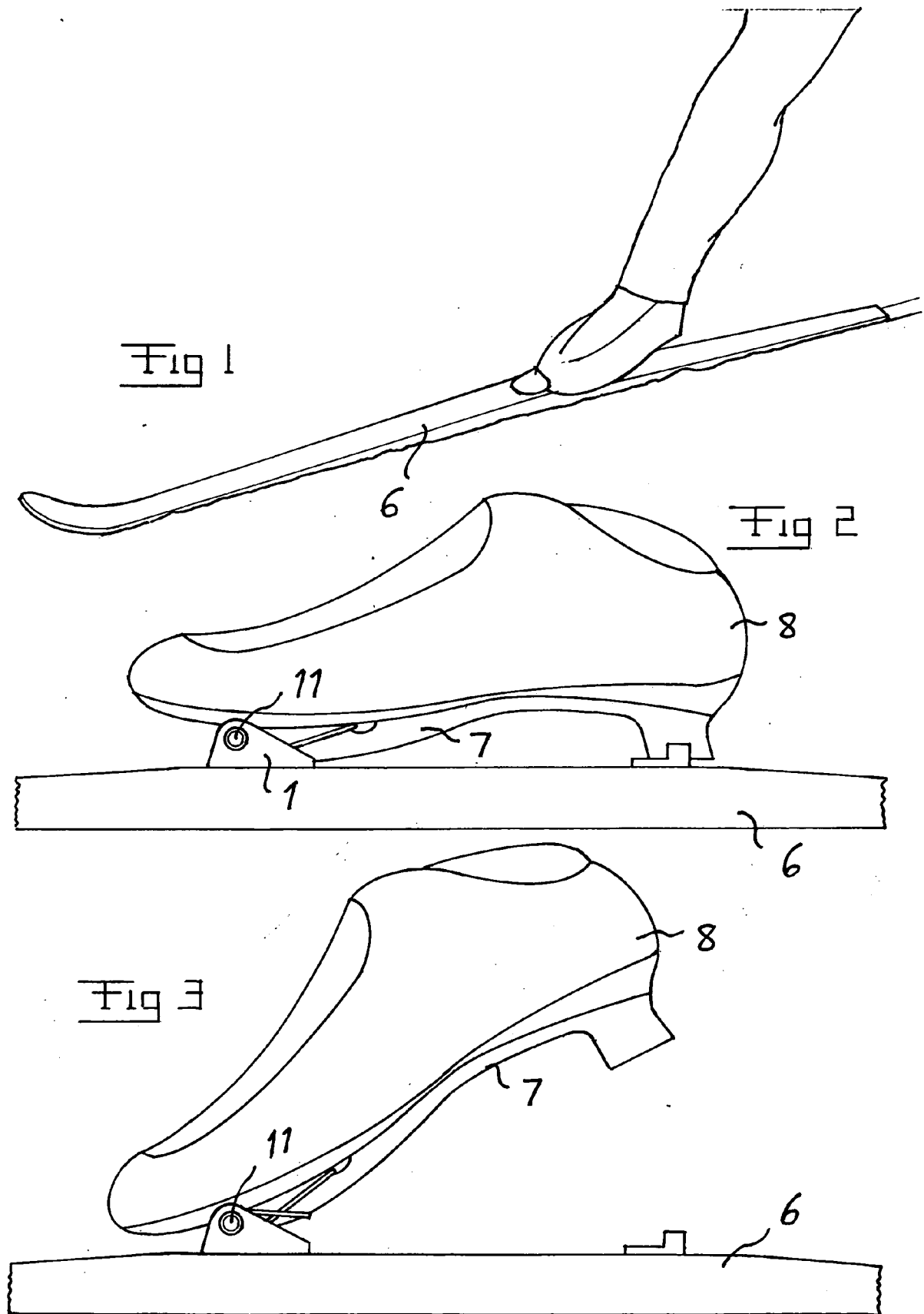
1. A ski binding for connecting a ski boot (8) to a cross-country ski (6) allowing pivoting of the boot with respect to the ski about an axis extending substantially perpendicularly to the longitudinal direction of the ski for lifting the heel of the boot away from the ski when pushing away, **characterized in that** it comprises an attachment (1) to be secured to the ski, a rigid member (7) pivotally connected to said attachment about a pivot axis (11) above the upper surface of the ski and adapted to support a said ski boot as well as means (9, 10) adapted to fix said ski boot to said support member so that said pivot axis will be located under said boot in the longitudinal direction of the ski behind the intended location of a tip of a foot to be received in said boot.
2. A ski binding according to claim 1, **characterized in that** said means (9, 10) is adapted to fix said ski boot (8) to said support member (7) so that said pivot axis will be located 3-9 cm behind the intended location of a tip of a foot to be received in said boot.
3. A ski binding according to claim 2, **characterized in that** said means (9, 10) is adapted to fix said ski boot

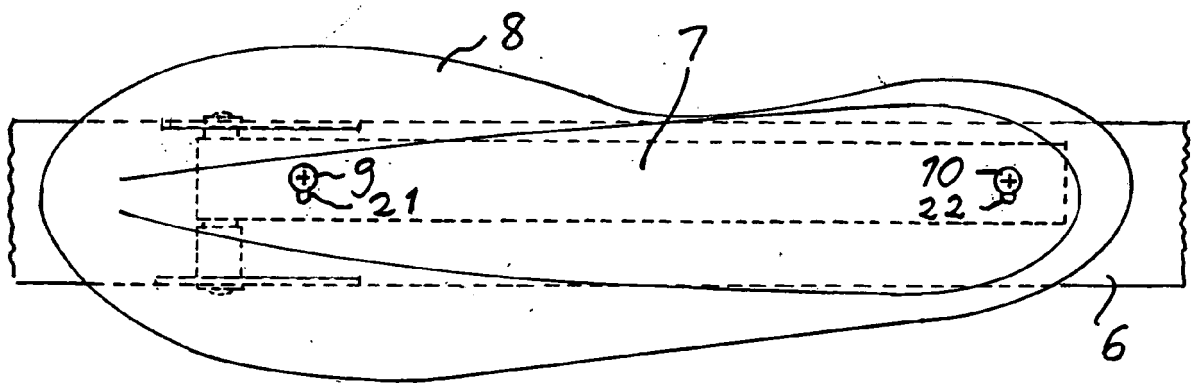
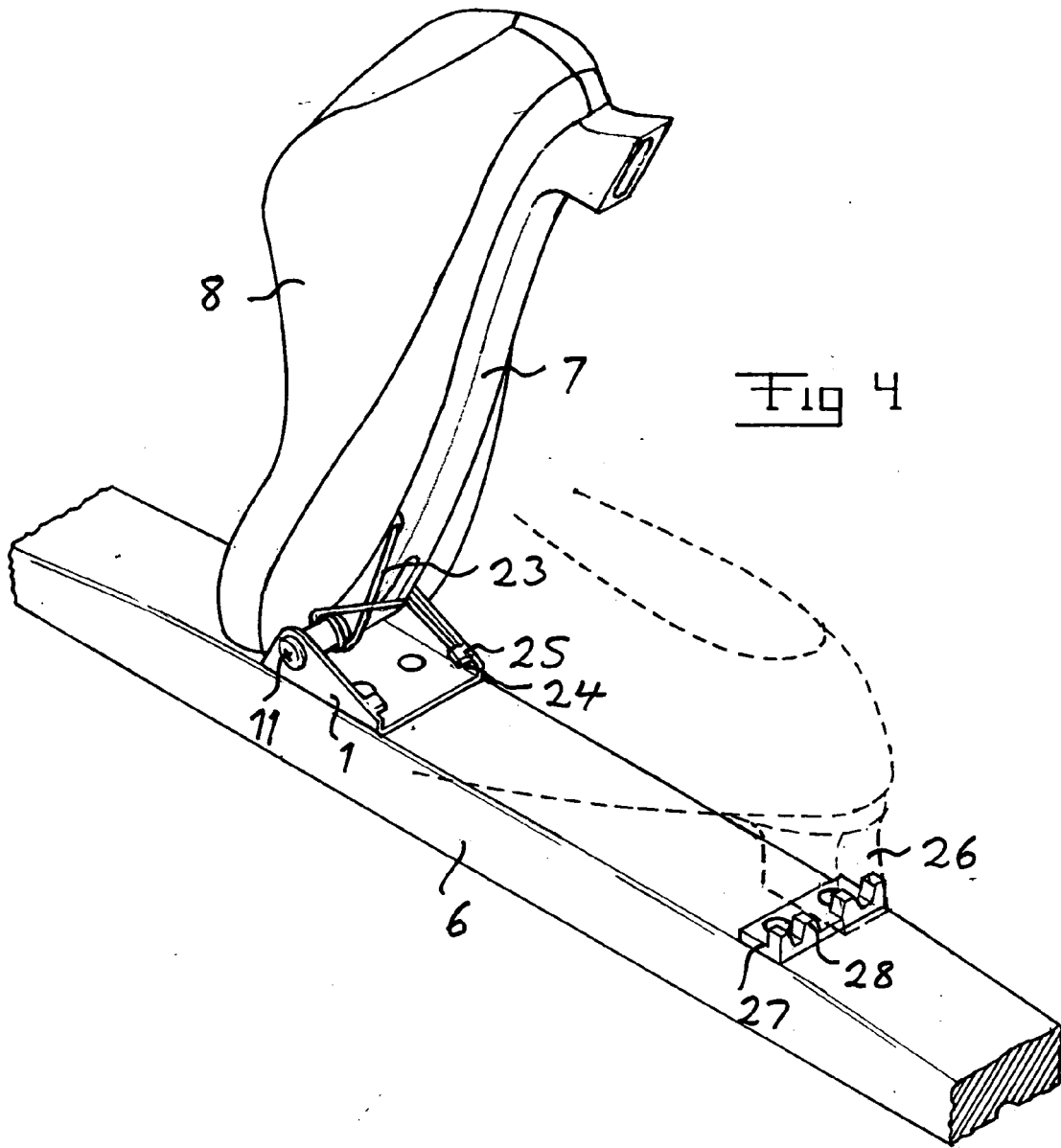
(8) to said support member (7) so that said pivot axis will be located behind the rear end of the big toe of a foot to be received in said boot.

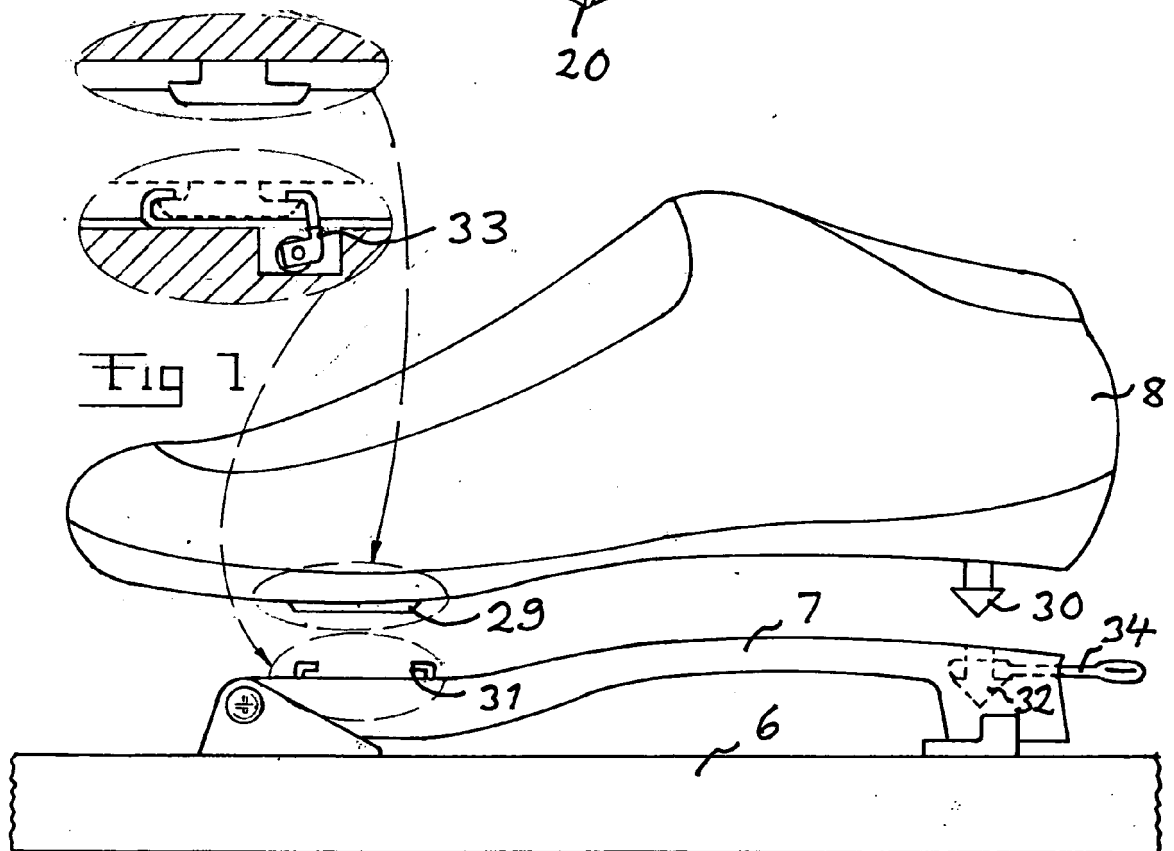
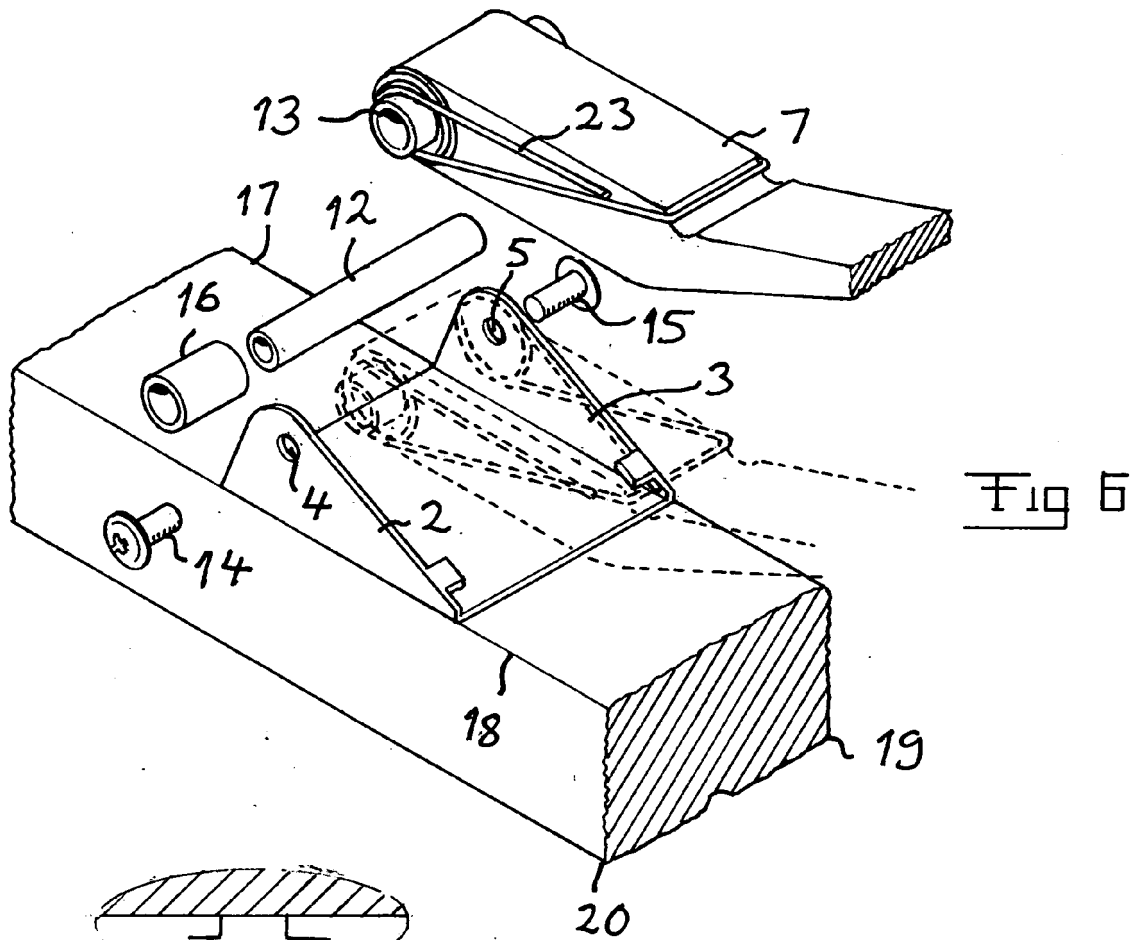
4. A ski binding according to any of the preceding claims, **characterized in that** said attachment (1) is adapted to be secured to a ski (6) so as to position said pivot axis (11) for said support member (7) substantially at the point of balance of said ski. 5
5. A ski binding according to any of the preceding claims, **characterized in that** it comprises an arrangement allowing a ski boot (8) fixed to said support member (7) by said fixing means to be offset with respect to a longitudinal centre line of said ski (6), i.e. laterally displaced towards one of the longitudinal borders (17, 18) of the ski. 10
6. A ski binding according to claim 5, **characterized in that** said arrangement is adapted to allow an adjustment of the degree of said lateral displacement. 15
7. A ski binding according to claim 6, **characterized in that** said fixing means (9, 10) and said support member (7) are designed to allow said ski boot (8) to be laterally displaced with respect to said support member for being fixed in different positions with respect thereto. 20
8. A ski binding according to any of claims 5-7, **characterized in that** said arrangement comprises means (12-16) for connecting said support member (7) to said attachment laterally displaced towards one of the longitudinal borders of a ski. 25
9. A ski binding according to claim 8, **characterized in that** said means for laterally displacing the support member comprises a spacer (16) arranged on a pin-member (12) defining said pivot axis (11) and acting on said support member for removing it with respect to one lateral side (2, 3) of said attachment (1) and by that laterally displace the support member with respect to said ski. 30
10. A ski binding according to any of claims 5-9, **characterized in that** said arrangement is adapted to allow a conversion of said lateral displacement from one of said longitudinal borders (17, 18) of a ski to the other. 35
11. A ski binding according to claim 7 and 10, **characterized in that** said arrangement is adapted to allow said conversion by allowing lateral displacement of said ski boot (8) with respect to said support member (7). 40
12. A ski binding according to claim 9 and 10, **characterized in that** said pin-member (12) defining said 45

pivot axis (11) is designed to be removable with respect to said attachment (1) and with respect to said support member (7) for enabling arrangement of said spacer (16) at either side of the support member for removing this with respect to either of two lateral sides of the attachment and by that towards an optional of the two longitudinal borders of the ski.

13. A ski binding according to any of the preceding claims, **characterized in that** said means (9, 10) for fixing said ski boot (8) to said support member (7) is adapted to secure the ski boot to the support member in the front region and in the rear region of the boot. 50
14. A ski binding according to any of the preceding claims, **characterized in that** it comprises means (23) adapted to store potential energy upon pivoting of said support member (7) from a position in which the heel of a said ski boot rests through the support member onto the ski for influencing said support member back to this position in absence of outer forces thereupon. 55
15. A ski binding according to claim 14, **characterized in that** said energy storing means comprises a spring (23) arranged to act between said attachment (1) and the support member (7) for storing potential energy when pivoting said support member away from said position.
16. A ski binding according to any of the preceding claims, **characterized in that** it comprises a first engagement member (26) arranged on the lower side at the rear of the support member (7) and a second engagement member (28) to be secured on top of a said ski, and that these engagement members comprise female and male portions, respectively, adapted to come into engagement when the rear portion of said support member carrying the heel of said ski boot is pivoted down towards the ski for stabilizing the support member with respect to lateral movements in this position thereof.









European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 02 8966

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	WO 03/013669 A (F.B.C. DI GIULIANO FRATI & C. S.N.C; FRATI, GIULIANO) 20 February 2003 (2003-02-20) * page 6, line 10 - page 7, line 18; figure 1 *	1,3,4, 13-16	A63C9/02
X	EP 1 034 819 A (BREUER-BONO, MARTIN, DIPL. ING) 13 September 2000 (2000-09-13) * column 1, line 50 - column 2, line 50; figure 1 *	1-3, 13-16	
X	US 2002/008359 A1 (GLASS DOUGLAS ET AL) 24 January 2002 (2002-01-24) * page 3, paragraph 42; figure 6 *	1,5-7, 13-16	
X	US 6 079 717 A (MEESTER ET AL) 27 June 2000 (2000-06-27) * column 2, lines 18-46; figure 1 *	1,14,15	
X	US 2002/079658 A1 (BOBBERT MAARTEN ET AL) 27 June 2002 (2002-06-27) * figure 2 *	1,3, 13-16	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A63C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 April 2005	Examiner Murer, M
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			

1
EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 02 8966

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.

18-04-2005

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 03013669	A	20-02-2003	IT PN20010031 U1	10-02-2003
			WO 03013669 A1	20-02-2003
			EP 1414531 A1	06-05-2004

EP 1034819	A	13-09-2000	AT 407010 B	27-11-2000
			AT 32999 A	15-04-2000
			EP 1034819 A2	13-09-2000

US 2002008359	A1	24-01-2002	AU 6993501 A	30-01-2002
			EP 1301247 A1	16-04-2003
			TW 510806 B	21-11-2002
			WO 0205908 A1	24-01-2002

US 6079717	A	27-06-2000	NL 1007231 C2	09-04-1999
			DE 19846007 A1	15-04-1999

US 2002079658	A1	27-06-2002	NL 1011985 C2	07-11-2000
			AU 4625400 A	21-11-2000
			CA 2369456 A1	16-11-2000
			DE 10084565 T0	06-06-2002
			WO 0067859 A1	16-11-2000
			US 2004090022 A1	13-05-2004
