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(71) Applicant: **Staal- en Constructiebouw Goeree B.V.**
3253 MA Ouddorp (NL)

(72) Inventor: **Van Damme, Maarten Marinus**
3253 VK Ouddorp (NL)

(74) Representative: **Valkonet, Rutger et al**
Algemeen Octrooibureau
P.O. Box 645
5600 AP Eindhoven (NL)

(54) Boom construction

(57) The invention relates to a boom construction comprising a boom which is pivotally coupled to a connecting piece about a first pivot (15), which connecting piece is pivotable with respect to a supporting structure about a second pivot (8) which crosses the first pivot. The second pivot is a horizontal pivot, and the first pivot is pivotable in a vertical plane about the second pivot.

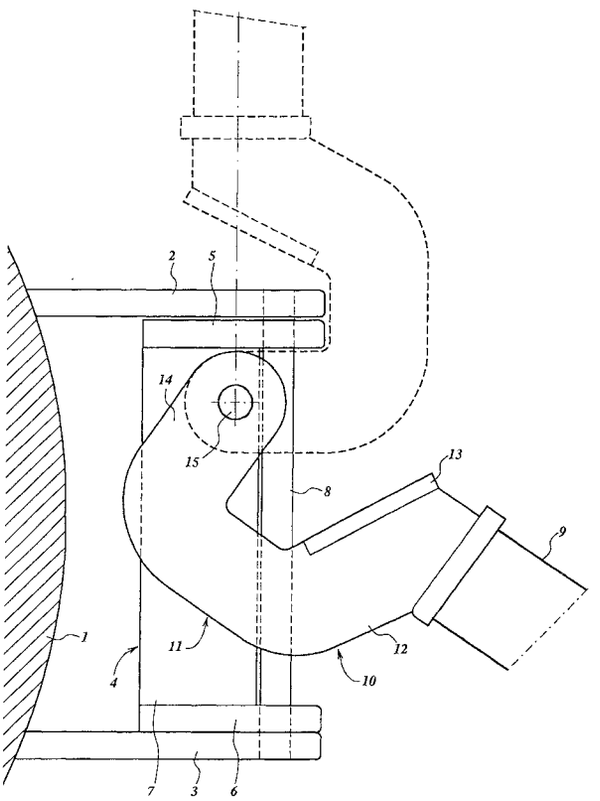

Fig. 1

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Description

[0001] The invention relates to a boom construction comprising a boom which is pivotally coupled to a connecting piece about a first pivot, which connecting piece is pivotable with respect to a supporting structure about a second pivot which crosses the first pivot.

[0002] Boom constructions of the above kind are used for all kinds of purposes. Thus they are used as cargo booms on ships, for example, and on fishing vessels they are used for attaching trawl nets thereto. With the boom construction that has so far been used for may decades, the first pivot is disposed horizontally and the second pivot is disposed vertically. The connecting piece, which is pivotable about the vertical axis, is generally provided with an ear extending in the direction of the boom in said construction, which ear is coupled to a forked end of the boom, which engages round the ear, by means of the horizontal pivot. In this known construction, the horizontal pivot and the boom are disposed on the same side of the vertical pivot, therefore. As a result of this construction, disadvantageous forces occur in the ear that forms part of the connecting piece, which ear is loaded for pressure, as well as on the horizontal pivot, in particular also upon pivoting of the loaded boom about the vertical pivot, all this in such a manner that the horizontal pivot and parts of the boom construction accommodating the horizontal pivot are very susceptable to wear. The object of the invention is to avoid the drawbacks of the prior art construction.

[0003] According to the invention, this objective can be accomplished in that the second pivot is a horizontal pivot, and in that the first pivot is pivotable in a vertical plane about the second pivot. The use of the construction according to the invention enables a more advantageous transmission of forces and thus a longer life, in particular of the connection between the boom on the one hand and the supporting structure on the other hand.

[0004] The invention will now be explained in more detail with reference to the accompanying drawing, which schematically shows the connection between the end of the boom and a supporting structure.

[0005] In the drawing:

Fig. 1 is a top plan view of a first embodiment of a boom construction according to the invention;
Fig. 2 is a top plan view of a second embodiment of the boom construction according to the invention; and
Fig. 3 is a side elevation of a second embodiment of the boom construction according to the invention.

[0006] The boom construction that is shown in Fig. 1 comprises a supporting structure 1, which may for example be a mast mounted on a ship or the like. Two vertically extending ears 2 and 3 are fixed to said supporting structure. Positioned between said ears 2, 3 is a connecting piece 4, which, in the illustrated embodiment, is built up of two plate-shaped parts 5 and 6 disposed near the ears and extending parallel to the ears, and an elongated, strip-shaped member 7 disposed between said plate-shaped parts 5 and 6, which is fixed to said plate-shaped parts 5 and 6. As will be apparent from the figure, ends of the plate-shaped parts 5 and 6 extend outside the strip-shaped member 7. Holes are formed in said ends of the plate-shaped parts 5 and 6 extending outside the strip-shaped member 7 and in the ends of the ears 2 and 3 positioned opposite thereto, in which holes a horizontal pivot 8 is accommodated. The horizontal pivot 8 is locked against movement in its longitudinal direction by means not shown, and the construction is furthermore such that the connecting piece 4 consisting of the parts 5-7 can freely pivot about pivot 8.

[0007] As is furthermore shown in Fig. 1, a coupling member 10 is attached to one end of a boom 9. Said coupling member 10 is built up of two substantially U-shaped brackets 11 extending parallel to each other. The free ends of the legs 12 of the brackets 11, which are interconnected by means of the connecting piece 13, are connected to the end of the boom 9. The arrangement is such that the two brackets 11 are positioned on either side of the pivot 8 and the plate-shaped part 7. Bores are formed in the free ends of the other legs 14 of the brackets 11, which bores function to receive a pivot 15 which is also passed through a bore formed in the elongated strip 7 that is disposed between the two brackets 11.

[0008] As is apparent from the figure, the boom 9 is disposed on the side of the horizontal pivot 8 remote from the pivot 15 in that case.

[0009] Furthermore it will be apparent from the figure that the boom 9 will be pivotable about the horizontal pivot 8 together with the coupling member 10 and the connecting piece 4, whilst the boom 9 will also be pivotable about the pivot 15 with respect to the connecting piece 4, from the position of the boom 9 that is illustrated in dotted lines to a position 180° opposite thereto (not shown). An intermediate position is shown in full lines. As a result of the substantially U-shaped configuration of the brackets 11, said pivoting can take place without obstruction from the upper ear 2 and the lower ear 3 and the plate-shaped parts 5 and 6, as will be apparent from the figure.

[0010] Hereinafter, a second embodiment of a boom construction according to the invention as shown in Figs. 2 and 3 will be discussed. The boom construction that is shown in Figs. 2 and 3 comprises a supporting structure 1, which may be made up of, for example, a mast mounted on a ship or the like, which comprises two vertically extending plate-shaped elements 20 and 21. Disposed between the plate-shaped elements 20 and 21 is a connecting piece 4, which comprises a lip 22 in the illustrated embodiment. The plate-shaped elements 20 and 21 are provided with recesses 23 and 24, which are open at side edges 25 and 26 of the plate-

shaped elements 20 and 21. Retaining plates 27 and 28 are fixed to the plate-shaped elements 20 and 21 by means which are known per se, one of which means is indicated by numeral 29 by way of illustration. A pivot 30 bears in recesses 23 and 24. The retaining plates 27 and 28 are provided with openings, through which the pivot 30 extends. The lip 22 is freely pivotable about pivot 30 by means of a bush 31, which is fixed to lip 22. Lip 22 is engaged between tongues 33 and 34. A pivot 32 extends through lip 22. The pivot 32 is mounted in the lip 22 and the tongues 33 and 34 by means of elements 35 and 36. The tongues 33 and 34 pivot about the pivot 32, or the pivot 32 pivots in the lip 22. Only one of these two options is required, although both may be provided, for pivotally connecting the connecting piece 37 of which the tongues 33 and 34 form part with respect to the lip 22. The connecting piece 37 further comprises a part 38, stiffening ribs 39 and 40 and means for connecting the boom 9 to the connecting piece 37 in a manner which is known per se.

[0011] Figs. 2 and 3 show a lip 22, which is connected to a bush 31, and a connecting piece 37, which is connected to tongues 33 and 34. The arrangement may also be the other way around, that is, two tongues may be connected to bush 31, between which a lip forming part of connecting piece 37 may extend.

[0012] By mounting the lip 22 with a tight fit between the tongues 33 and 34, a connection has been effected which, in order to provide strength in a direction perpendicularly to the plane of drawing of Fig. 2, has a thickness which equals the sum of the thicknesses of the tongue 33, the lip 22 and the tongue 34. In this manner, buckling of the tongues 33 and 34 is substantially prevented, even if play develops around the pivots 32 and 30 after some time.

[0013] The design of the boom construction in which the second pivot is a horizontal pivot, and in which the first pivot is pivotable in a vertical plane about the second pivot, ensures that the places where the boom bears on the pivots, generally via a metal-on-metal connection without the use of roller bearings or other types of bearings, will be subjected to limited forces, which will hardly, if at all, lead to scoring of parts that pivot with respect to each other. As a result, the life of the construction according to the invention will be significantly longer than that of the constructions as known from the prior art, in which the boom is pivotable about a horizontal pivot, and wherein the boom is coupled to the connecting piece, which is pivotable about a vertical pivot with respect to the a supporting structure, which vertical pivot crosses the horizontal pivot. Especially if the boom extends practically vertically, a considerable force is exerted on the lower bearing of the vertical pivot in a construction according to the prior art, as a result of which scoring of said pivot with respect to a lower ear in which the vertical pivot bears will occur relatively quickly.

[0014] All kinds of embodiments will be apparent to a person skilled in the art after perusal of the above, which embodiments are all considered to fall within the scope of the invention.

Claims

1. A boom construction comprising a boom which is pivotally coupled to a connecting piece about a first pivot, which connecting piece is pivotable with respect to a supporting structure about a second pivot which crosses the first pivot, **characterized in that** the second pivot is a horizontal pivot, and **in that** the first pivot is pivotable in a vertical plane about the second pivot.

2. A boom construction according to claim 1, **characterized in that** the connecting piece is built up of two parts extending at an angle to the second pivot, through which the second pivot extends, and of a plate-shaped member arranged between said parts extending at an angle to the second pivot, through which plate-shaped member the first pivot extends.

3. A boom construction according to claim 2, **characterized in that** said angle is approximately 90°.

4. A boom construction according to claim 1, 2 or 3, **characterized in that** a substantially U-shaped coupling member is mounted on the end of the boom that faces towards the second pivot, in such a manner that one end of a leg of the substantially U-shaped coupling member is connected to the end of the boom, whilst the first pivot is passed through the free end of the other leg of said substantially U-shaped coupling member.

5. A boom construction according to claim 3, **characterized in that** the U-shaped coupling member comprises two spaced-apart, substantially U-shaped brackets, between which the plate-shaped part of the connecting piece and the second pivot are disposed.

6. A boom construction according to claim 1, **characterized in that** the connection of the boom to the connecting piece comprises a first member and a second member, wherein the connecting piece is either one of said first or said second member, wherein the first pivot extends through said first member and said second member and wherein the second pivot is positioned in either one of said first and said second member.

7. A boom construction according to claim 6, **characterized in that** either one of said first and said second member is mounted on the end of the boom that faces towards the second pivot, and the other one of said first and said second member is pivotally

connected to the second pivot.

8. A boom construction according to claim 6 or 7, **characterized in that** either one of said first and said second member is a forked element, and the other one of said first and said second member is a lip which is mounted between the tongues of said forked element.

9. A boom construction according to claim 8, **characterized in that** the lip is mounted between the tongues of said forked element with a tight fit.

10. A boom construction according to claim 9, **characterized in that** said second pivot bears in the supporting structure.

11. A boom construction according to claim 10, **characterized in that** said supporting structure comprises two elements, in which and between which the second pivot bears.

12. A boom construction according to claim 11, **characterized in that** said two elements are plate-shaped, that a recess being open at one side edge and extending from said side edge is formed in each plate-shaped element, and that the second pivot bears in said recesses.

13. A boom construction according to claim 12, **characterized in that** said recesses are open in upward direction.

14. A boom construction according to claim 13, **characterized in that** said recesses comprise a more or less horizontally extending part near the end that faces away from the side edge.

15. A boom construction according to any one of the claims 12 - 14, **characterized in that** a retaining plate for the second pivot is mounted on at least one of said two plate-shaped elements.

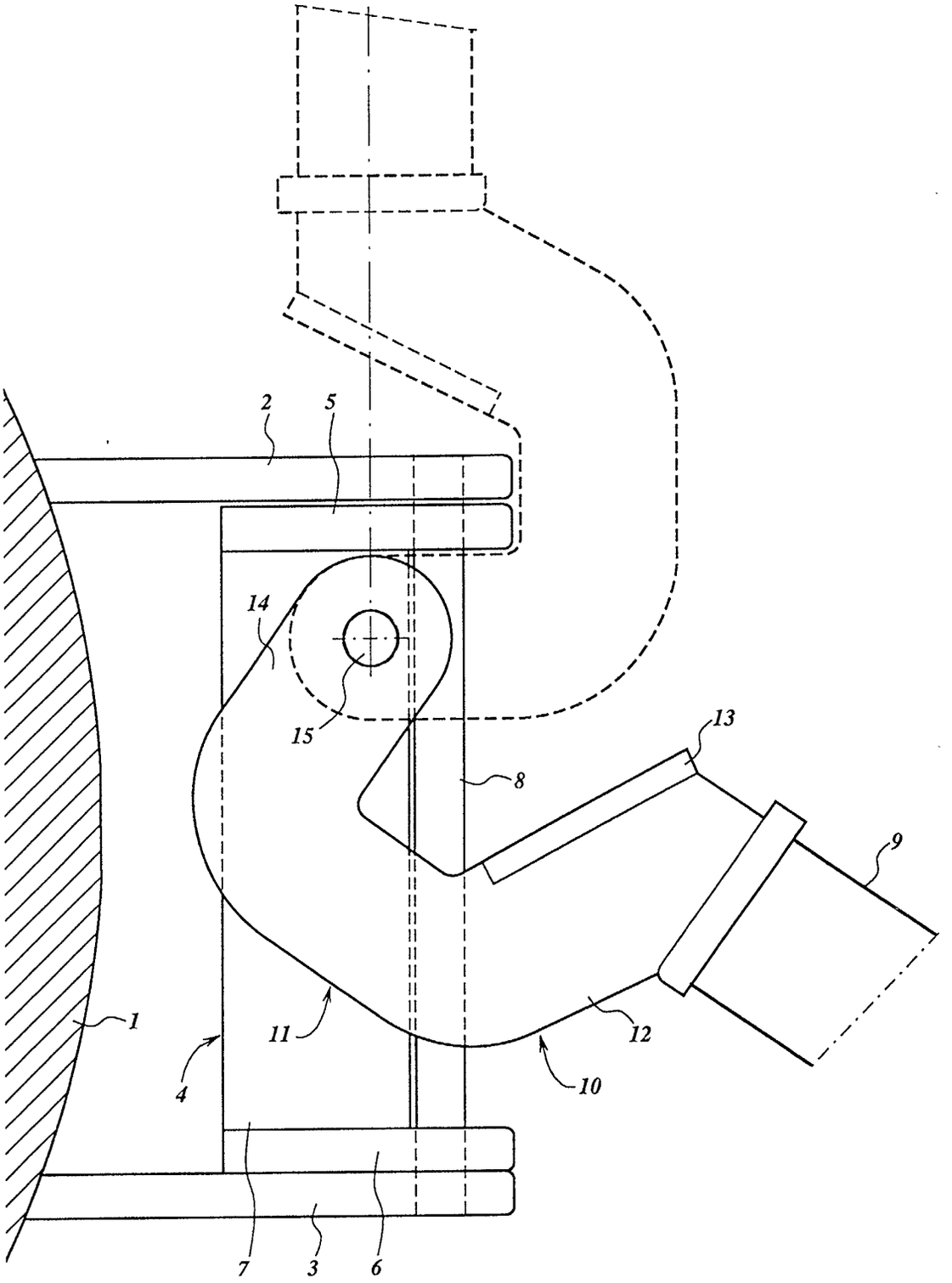

Fig. 1

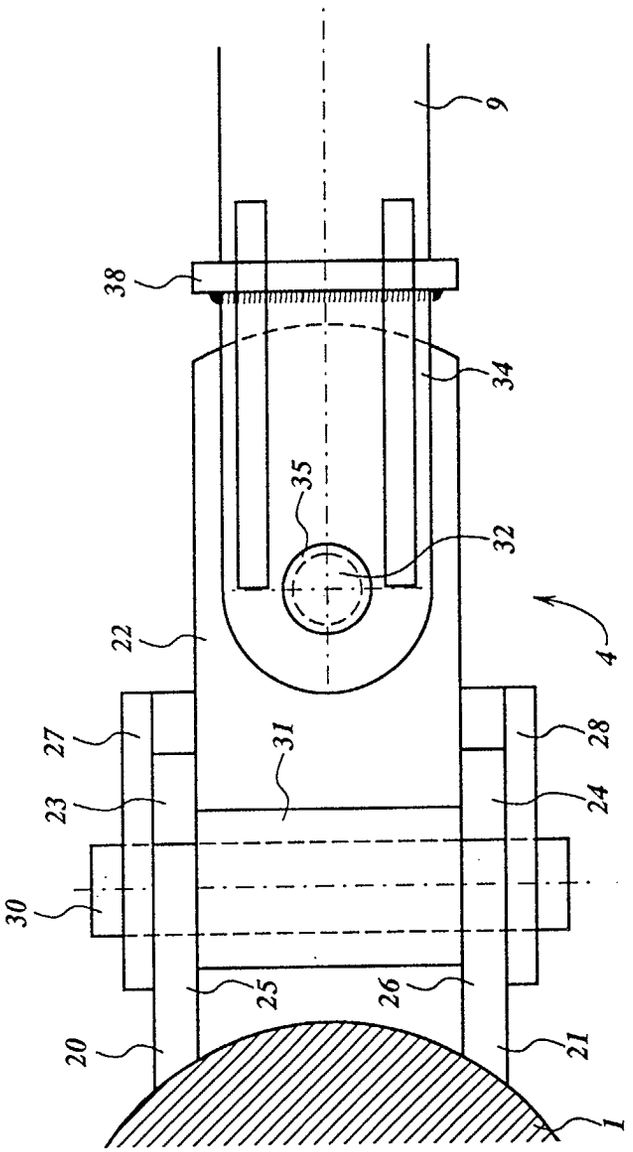

Fig. 2

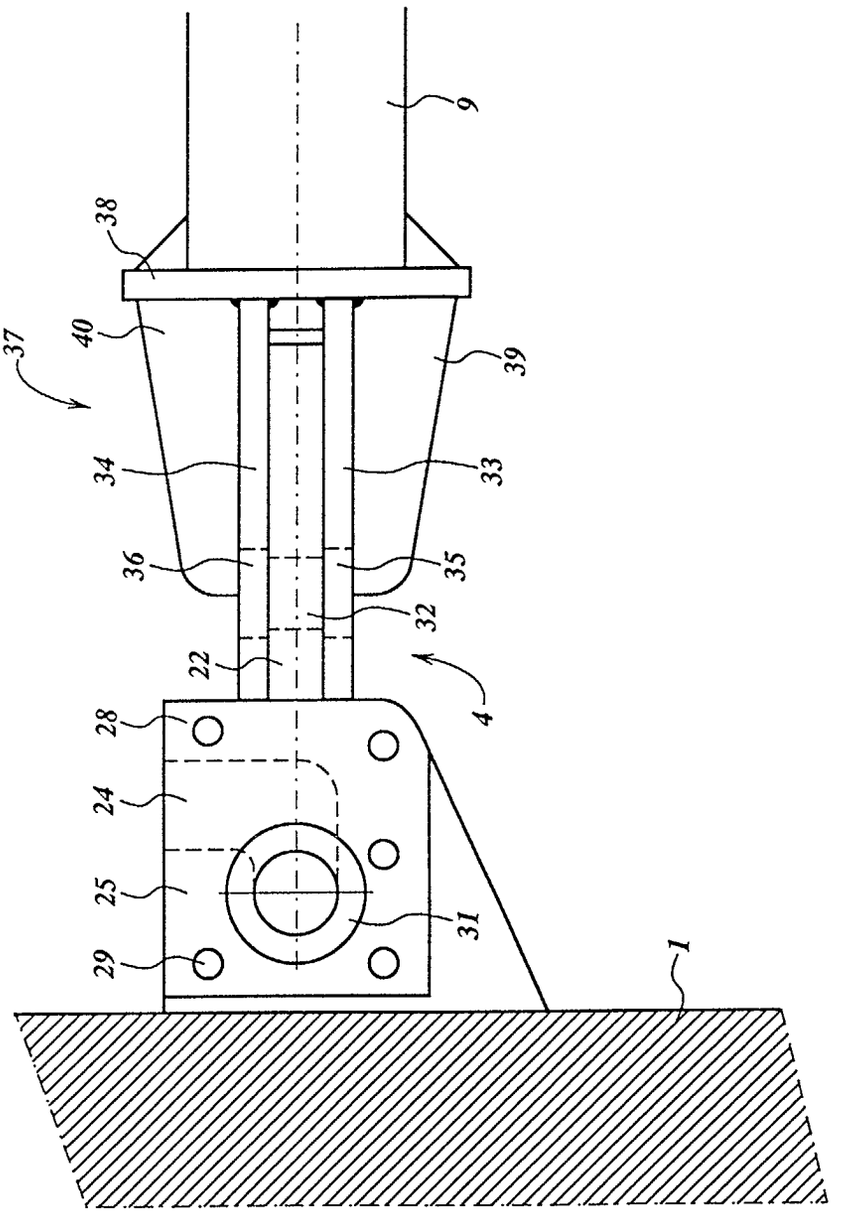

Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 20 4767

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	US 3 435 960 A (HALLEN ALF ESKIL) 1 April 1969 (1969-04-01)	1-4	B63B27/04
A	* column 2, line 63 - column 3, line 5; figure 4 *	5-15	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 April 2002	De Schepper, H

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
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 20 4767

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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24-04-2002

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