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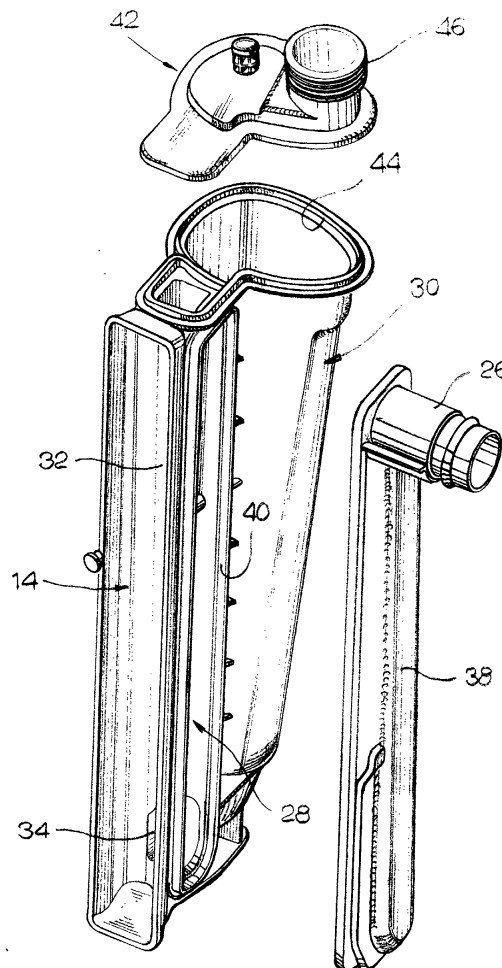
(54) **A radiator for motor vehicles with piping integrated on a manifold tank**

(57) A radiator for motor vehicles, comprising:

- a first manifold tank (12) and a second manifold tank (14), which are set parallel to one another and set vertically in the position in which the radiator (10) is mounted on a vehicle;
- a plurality of pipes (18) set parallel to one another connected at their ends to the manifold tanks (12, 14); and
- an inlet connector (24) and an outlet connector (26) of the heat-exchange liquid, connected, respectively, to the first manifold tank (12) and second manifold tank (14), in which the inlet connector (24) is set at the top end of the first manifold tank (12).

The radiator comprises an outlet channel (28) for the heat-exchange liquid, which extends parallel to the second manifold tank (14). The outlet channel (28) communicates with the manifold tank (14) by means of an opening (34) located at the bottom end of the second manifold tank (14) and carries the aforesaid outlet connector (26) at its top end.

Fig. 2



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## Description

**[0001]** The present invention relates to a radiator for vehicles, which has the characteristics defined in the preamble of the main claim.

**[0002]** There are known radiators for vehicles provided with two manifold tanks, which are set parallel to one another, and a plurality of pipes, which extend between the manifold tanks and are set so that, when the radiator is mounted on a vehicle, the manifold tanks extend in a vertical direction. Radiators of this type have an inlet connector for the heat-exchange liquid set at the top end of a first manifold tank and an outlet connector for the heat-exchange liquid set at the bottom end of the second manifold tank.

**[0003]** Vehicle manufacturers tend to design the new models of vehicles so as to simplify and reduce the costs of maintenance operations. In particular, it would be preferable to be able to remove and re-install the radiator with an upward movement, without having to set the vehicle on a hydraulic power lift or over a pit.

**[0004]** The purpose of the present invention is to provide a radiator for vehicles which will enable simplification of the operations of removal and installation performed from above.

**[0005]** According to the present invention, said purpose is achieved by a radiator having the characteristics forming the subject of the annexed claims.

**[0006]** The present invention will now be described in detail with reference to the attached drawings, provided purely by way of non-limiting example, and in which:

- Figure 1 is a perspective view of a radiator according to the present invention,
- Figure 2 is a perspective view of the part indicated by the arrow II in Figure 1, and
- Figures 3, 4 and 5 are cross sections according to the lines III-III, IV-IV and V-V of Figure 1.

**[0007]** With reference to Figure 1, number 10 designates a radiator for the cooling circuit of an internal-combustion engine of a motor vehicle. The radiator 10 comprises a first manifold tank 12 and a second manifold tank 14, both preferably made of injection-moulded plastic material. The manifold tanks 12, 14 are set parallel to one another and are set on opposite sides of a heat-exchange core 16. The heat-exchange core 16 comprises a plurality of pipes 18 set parallel to one another, the ends of which are set in fluid communication with the manifold tanks 12, 14. In a known way, the ends of the nest of pipes 18 are fixed to bottom plates 20, 22 connected in a fluid-tight way to the respective manifold tanks 12, 14.

**[0008]** Figure 1 illustrates the radiator 10 in the position in which it is mounted on a vehicle. In said position of installation, the manifold tanks 12, 14 extend in a vertical direction, and the pipes 18 in a horizontal direction.

**[0009]** The first manifold tank 12 is provided with an

inlet connector 24 for the flow of coolant. The inlet connector 24 is set at the top end of the manifold tank 12 and is preferably obtained integrally with the tank 12 during the moulding of the latter.

**[0010]** The radiator 10 according to the present invention has an outlet connector 26, which is set, like the inlet connector 24, in the vicinity of the top edge of the radiator. In order to obtain both of the connectors 24, 26 being set at the top edge of the radiator, the present invention envisages an outlet channel 28 for the coolant, which extends parallel to the second manifold tank 14. With reference to Figures 2 to 5, according to a preferred aspect of the present invention, the second manifold tank 14 is obtained integrally with the outlet channel 28 and with an expansion tank 30. The outlet channel 28 is separated from the manifold tank 14 by a wall 32. The manifold tank 14 communicates with the outlet channel 28 by means of an opening 34 located at the bottom end of the manifold tank 14. The outlet channel 28 communicates with the outlet connector 26 located at the top end of the outlet channel 28 and at the top end of the manifold tank 14. The outlet channel 28 further communicates with the expansion tank 30 by means of a passage 36 formed at the bottom end of the outlet channel 28. As is illustrated in Figure 2, the outlet connector 26 is formed in an integral way with a side wall 38, which constitutes a closing lid for closing the outlet channel 28. For reasons of conformation of the dies, the wall 38 cannot be obtained integrally with the channel 28, so that it is produced as a separate component, which is welded, for example via ultrasonic welding, along the perimeter 40 of the outlet channel 28. Once again with reference to Figure 2, the top part of the outlet channel 28 and the top part of the expansion tank 30 are open, and a closing element 42 is fixed, for example by means of ultrasonic welding, on the open top edge 44. The closing element 42 may be provided with an opening 46 for pouring the coolant into the expansion tank 30.

**[0011]** With reference, in particular, to Figures 3 and 4, the radiator according to the present invention further comprises an auxiliary channel 48, which sets in communication the top part of the manifold tank 14 with the expansion tank 30, in a point of the latter located below the normal level of the liquid. The auxiliary channel 48 has the function of transferring the gas which collects at the top of the manifold tank 14 into the expansion tank 30.

**[0012]** In operation, the flow of coolant enters the radiator 10 through the inlet connector 24 and, after traversing the pipes 18, collects in the manifold tank 14. The coolant passes into the outlet channel 28 through the opening 34 and comes out through the outlet connector 26. The outlet channel 28 basically has the purpose of enabling positioning of the outlet connector 26 at the top edge of the radiator 10. In this way, both of the connectors 24, 26 are readily accessible from above for the operations of removal of the radiator. The positioning upwards of both of the connectors 24, 26 pre-

vents the need for the operator who is carrying out removal of the radiator 10 to intervene in the bottom part of the vehicle, with the consequent need to set the vehicle on a hydraulic power lift or over a pit.

tank (30) located below the normal level of the liquid contained in said expansion tank.

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## Claims

1. A radiator for motor vehicles, comprising:

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- a first manifold tank (12) and a second manifold tank (14), which are set parallel to one another and set vertically in the position in which the radiator (10) is mounted on a vehicle,
- a plurality of pipes (18) set parallel to one another, connected at their ends to the manifold tanks (12, 14), and
- an inlet connector (24) and an outlet connector (26) of the heat-exchange liquid, connected, respectively, to the first manifold tank (12) and the second manifold tank (14), in which the inlet connector (24) is set at the top end of the first manifold tank (12),

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**characterized in that** it comprises an outlet channel (28) for the heat-exchange liquid, which extends parallel to the second manifold tank (14), in which said outlet channel (28) communicates with the manifold tank (14) by means of an opening (34) located at the bottom end of the second manifold tank (14) and carries the aforesaid outlet connector (26) at its top end.

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2. The radiator according to Claim 1, **characterized in that** the aforesaid outlet channel (28) is obtained integrally with the second manifold tank (14).

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3. The radiator according to Claim 2, **characterized in that** it comprises an expansion tank (30) obtained integrally with the second manifold tank (14) and with the outlet channel (28).

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4. The radiator according to Claim 2, **characterized in that** the aforesaid outlet connector (26) is obtained integrally with a side wall (38) of the outlet channel (28) obtained as separate component and fixed along a perimeter (40) of the outlet channel (28).

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5. The radiator according to Claim 3, **characterized in that** it comprises a closing element (42) welded to the top end of the outlet channel (28) and of the expansion tank (30).

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6. The radiator according to Claim 3, **characterized in that** it comprises an auxiliary channel (48), which sets in communication the top end of the second manifold tank (14) with an area of the expansion

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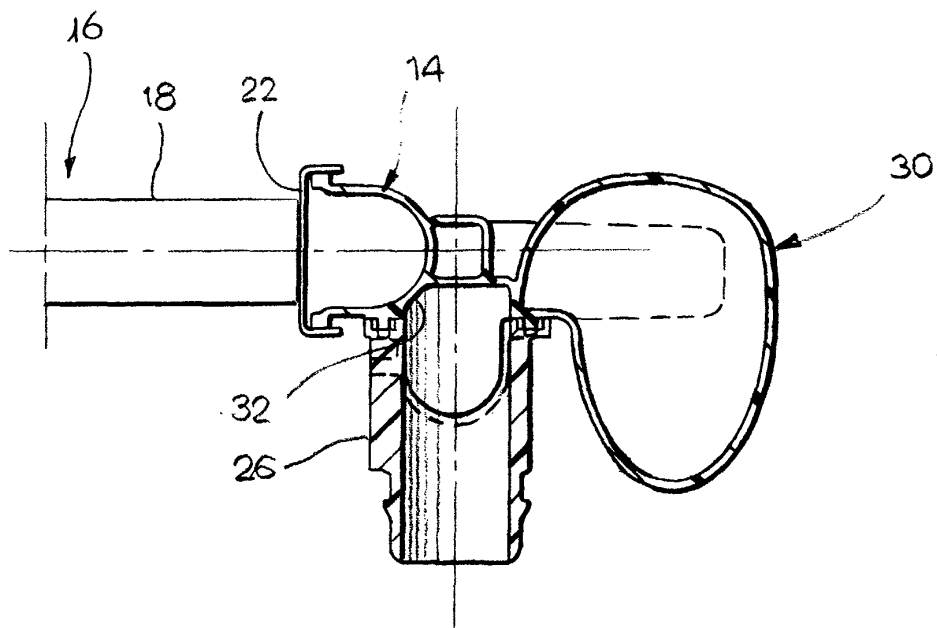
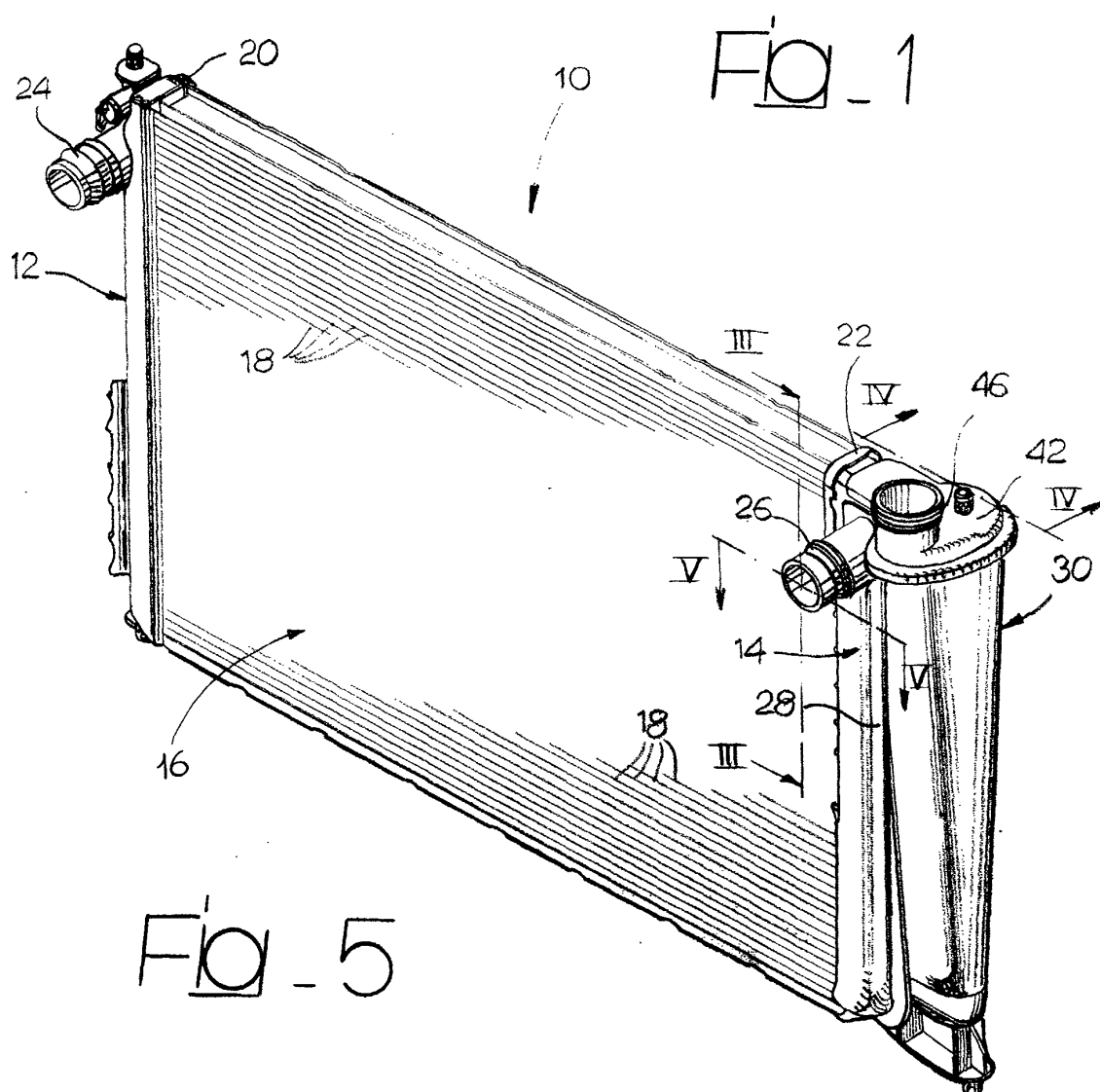


Fig. 3

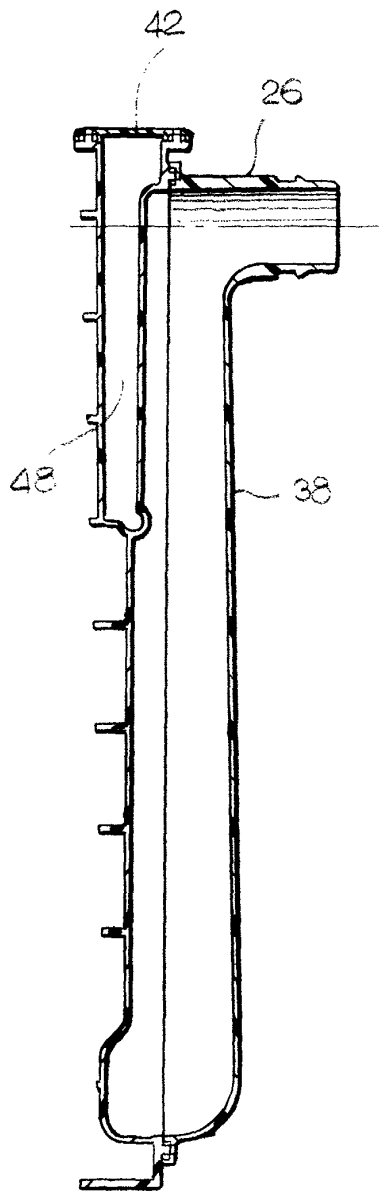


Fig. 4

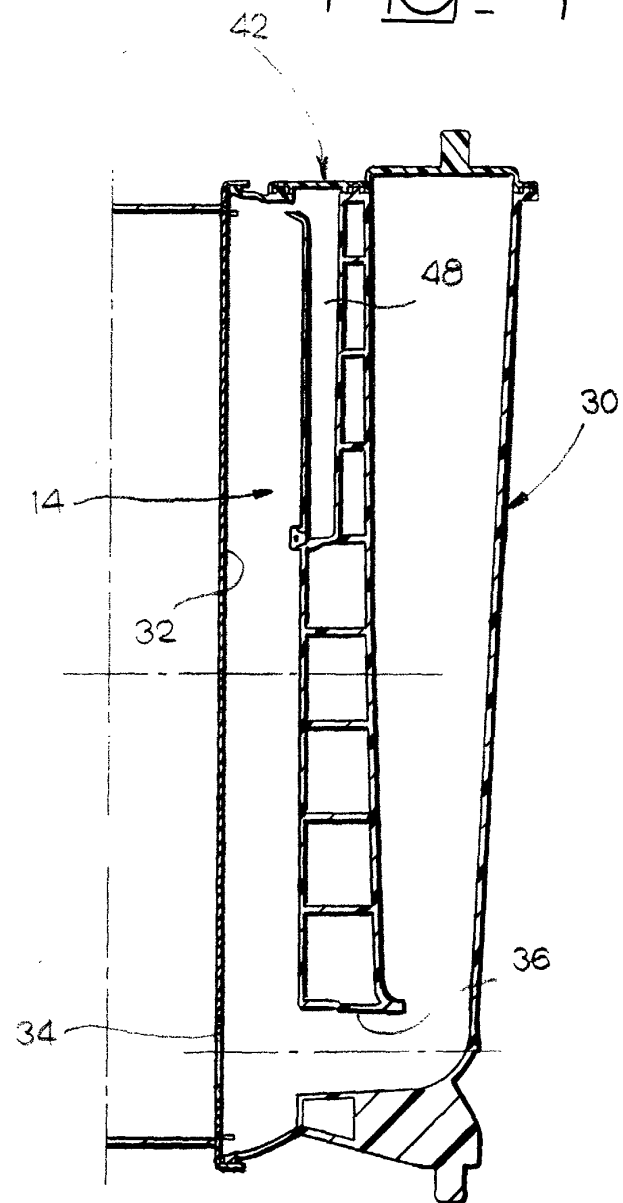
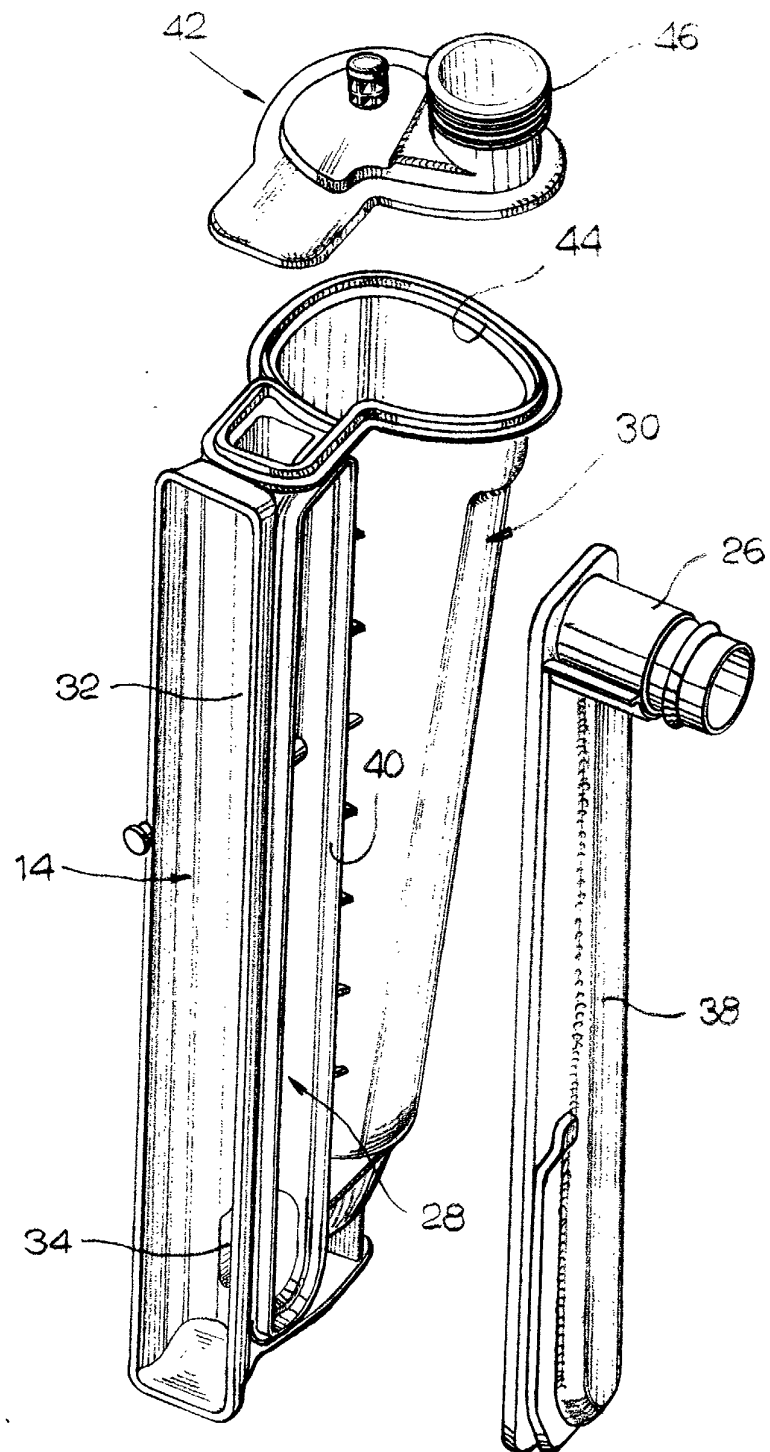


Fig. 2





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# EUROPEAN SEARCH REPORT

Application Number  
EP 02 42 5704

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 2002/056541 A1 (KOKUBUNJI HIROSHI ET AL) 16 May 2002 (2002-05-16) * the whole document *	1	F28F9/26
A	EP 0 970 833 A (MAGNETI MARELLI CLIMAT SRL) 12 January 2000 (2000-01-12) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F28F B60K
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 8 May 2003	Examiner Tamme, H-M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 &amp; : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.02 (P04C01)

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

EP 02 42 5704

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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08-05-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002056541 A1	16-05-2002	JP 2002081884 A	22-03-2002
EP 0970833 A	12-01-2000	IT T0980612 A1	10-01-2000
		BR 9902720 A	08-03-2000
		DE 69903884 D1	19-12-2002
		EP 0970833 A1	12-01-2000