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(54) **Radiating plate radiator**

(57) Radiating plate radiator of the type comprising one or more shells containing a fluid, each one having at least one inlet and one outlet connector of fluid connected to each other by means of a plurality of channels

that are mutually separated by lowered portions of the shells, having means of electrical heating comprising at least one flexible heating panel applied to a dry surface of the radiator.

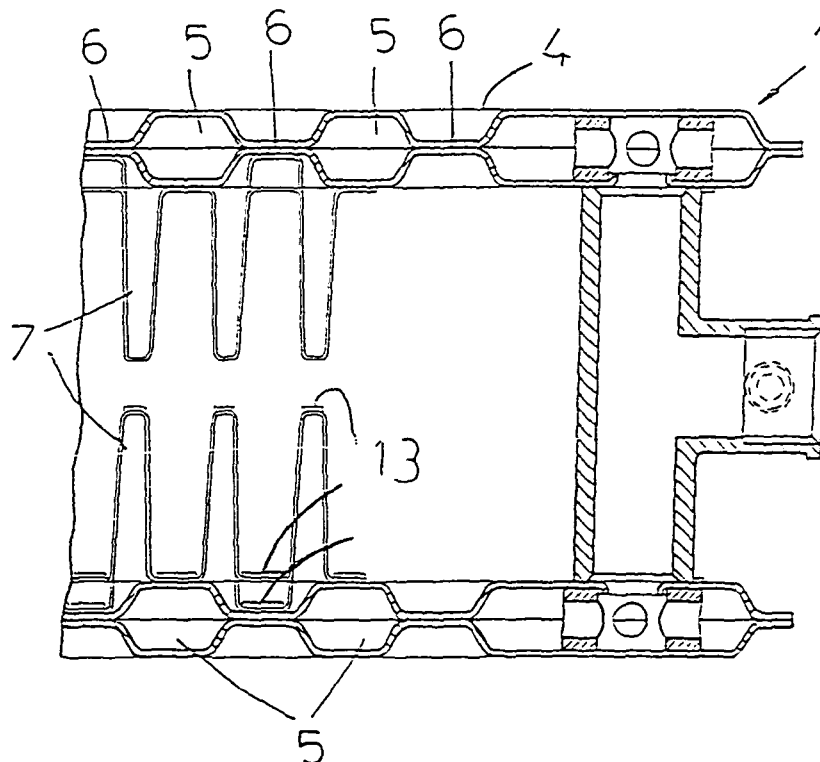


FIG 1

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Description

[0001] The present invention relates to a radiating plate radiator for room heating. Open circuit, centralised or self-contained radiating plate radiators connected to the water supply line of the room to be heated are known to the art.

[0002] These radiators sometimes present disadvantages, which limit the possibility of their use.

[0003] In fact, it is currently impossible to use traditional radiators in rooms where a centralised or self-contained water heating installation does not exist.

[0004] Furthermore said radiators are not employed in countries where, because of necessity or tradition, electricity is used as a source of heating energy.

[0005] The technical task of the present invention is to realise a radiating plate radiator that is able to eliminate the technical problems present in the known art.

[0006] Within the context of the present technical task, one aim of the invention is to realise a radiator that can be used even where centralised or self-contained heating installations are not present; in particular, said radiator can be either fixed (applied to a wall) or mobile (mounted on wheels for transport).

[0007] Another aim of the invention is to realise a radiating plate radiator that uses electricity as its energy source.

[0008] A further aim of the invention is to realise a mixed type radiating plate radiator; in other words, a radiator that can work both in open, centralised or self-contained circuits supplied by hot water and/or electrical resistors, as well as in electrically supplied closed circuits.

[0009] Yet another aim of the invention is to realise a method to realise said radiator which is basically a completely automatic method, and that can be performed by traditional type production equipment without the need for substantial modification.

[0010] The technical task, as well as these and other aims according to the present invention, is achieved through the realisation of a radiating plate radiator of the type comprising one or more shells containing a fluid, each shell comprising at least one inlet header and one outlet header for said fluid connected to each other by a plurality of channels that are mutually separated by lower portions of said shells, characterised in that they present electrical heating means comprising at least one flexible heating panel applied to a dry surface of said radiator.

[0011] Compared to traditional electrical household type air heaters, the radiating plate radiator of the present invention has the advantage of being able to reach lower temperatures, thus resulting in improved comfort.

[0012] Other characteristics of the present invention are also defined in the other claims.

[0013] Further characteristics and advantages of the invention will be made more clear in the description of a preferred but not exclusive embodiment of the radiating plate radiator according to this finding, and illustrated as

an example but by no means limitative, in the appended drawings wherein:

- Figure 1 shows a top plan view of a portion of a radiator according to a first embodiment of the finding, with a horizontal cross-section at the level of the upper headers;
- Figure 2 shows a top plan view of a portion of the radiator according to a second embodiment of the finding, with a horizontal cross-section at the level of the upper headers;
- Figure 3 shows a top plan view of a portion of the radiator according to a third embodiment of the finding, with a horizontal cross-section at the level of the upper headers;
- Figure 4 shows a perspective view of a flexible resistor according to the finding.

[0014] In all the figures described, the radiating plate radiator is indicated throughout with the identification numeral 1.

[0015] Radiator 1 comprises two shells for containing a fluid, each one having a fluid inlet header (for example, the upper header not illustrated) and a fluid outlet header 4 (for example the lower header) connected to each other by a plurality of water channels 5 that are mutually separated by lowered portions 6 of said shells 2.

[0016] Moreover, radiator 1 shown in this example comprises one or more convector elements 7 in folded sheet metal, each one being connected to a corresponding shell 2 preferably by means of spot welding.

[0017] Each convector surface 7 comprises a first portion connected to channels 5 and/or the lowered surfaces 6 and at least one second portion connected to one of the fluid inlet and/or outlet headers 4.

[0018] Advantageously, radiator 1 presents electrical heating means comprising at least one electrical heating panel 10 applied to a dry surface.

[0019] The panel 10 is basically composed of an electrical resistor coated with an electrical insulating material.

[0020] The electrical resistor is preferably in the form of thin foil sheeting, but can alternatively be in the form of wiring.

[0021] In the case where the electrical resistor is in foil form, this is preferably obtained through an "etching" process, in other words, the selective chemical erosion of a foil sheet made from an electrically conductive material.

[0022] Basically, said foil (for example in steel, aluminium, copper or similar product) will remain unaltered in the area protected by ink that is acid resistant, in those sectors that form the resistor, but will be completely corroded in the areas left unprotected. The foil thus treated is then incorporated inside an electrical insulating support (such as for example silicon or polyester). Thereby acting on the width of the channel of the resistor, it is possible to obtain different resistivity values, varying thermal charges in different areas, and optimised specific power

capacity in those positions where the resistor is applied. For example if the resistor is applied to channel 5, it could have a greater specific capacity than that applied to the lowered surface 6. Furthermore, once the radiator has been assembled, the part of the resistor that is in the lowest position can be charged more than that in the upper position to ensure improved heat exchange and to trigger convection action inside the heating fluid.

[0023] The heating panel 10, originally flat, can be shaped (if necessary) in order to match the form of the dry surface to which it is applied.

[0024] The thickness of the wall of panel 10 does not exceed 3 mm, and is preferably approximately 1 mm thick.

[0025] The adhesives and the materials used for panel 10 are processed to ensure they emit no odour into the room.

[0026] The dry surface to which the flexible panel 10 is applied can belong to one of the shells 2 (figures 2 and 3) or a convector element 7 (figure 1), or a cover panel on one of the shells 2 of the radiator (not illustrated).

[0027] With reference to figure 4 in particular, the flexible panel 10 comprises a base 12 from which extend a plurality of slats 13 arranged alternately on two different planes, one of which coincides with the plane where base 12 lies.

[0028] The electric resistor present therein extends along base 12 and along each slat 13, crossed by forward and return branches, shown as parallel in this example but not necessarily parallel elsewhere.

[0029] With reference to figures 2 and 3 each slat 13 arranged on one of the two planes is associated with a corresponding wall of the water channels 5 of shells 2, while each slat 13 arranged on the other plane is associated with a corresponding wall of the lowered portions 6 of the shells 2.

[0030] On the other hand, with reference to figure 1, each slat 13 arranged on one of the two planes is associated with a corresponding protruding wall of the convective element 7, while each slat 13 arranged on the other plane is associated with a corresponding recessed wall of the convective element 7.

[0031] Naturally, the panel is preferably manufactured flat, as already mentioned, and the alternating arrangement of the slats on the two different planes is obtained by bending the slats 13 in an alternate manner along folding lines 14 crosswise to their lengthwise direction.

[0032] Lastly, the radiator also includes temperature adjustment and control means for the flexible resistor 10, comprising in particular, a thermal switch (not illustrated) applied to its surface, as well as an electronic or electromechanical component for switch-on and adjustment.

[0033] The radiator according to the finding may be closed or open circuit (centralised or self-contained) and preferably the heating fluid is composed of a mixture of water and glycol.

[0034] In the case of closed circuits, after assembly, the radiator is filled with a mixture of water and glycol,

and action is guaranteed by the natural water circulation after heating by the heater panel. The filling operation is balanced so that the heating liquid can reach the correct level to permit the required operation and to limit the pressure value.

[0035] Given the limited pressure value, on closed circuit models only, the plate shells can be manufactured with sheet thickness lower than that used for traditional plates.

[0036] However, in the case of mixed circuits, the radiator presents water supply and discharge piping from the installation and the bleeding connections.

[0037] The minimum configuration of the radiator according to the invention, foresees a single shell without any convector element 7, and from this minimum configuration the number of shells and convector elements can be increased as desired.

[0038] The flexible heating panel can be of any shape or size.

[0039] In particular, the flexible heating panel can occupy the available dry surface either partially or totally, for example, covering one side of the shell, or the convector element, or the radiator cover panel either partially or totally.

[0040] Moreover, the flexible heating panel can be placed in any position whatsoever.

[0041] In particular, the flexible heating panel can be positioned on the shell facing the room, or on the shell facing the wall on which the radiator is installed, or on the side of a shell facing the exterior or interior of the radiator, or on a side of a convector element, or again on the external or internal side of a radiator cover panel.

[0042] The flexible heating panel can be applied, for example glued; either before or after the radiator is painted, and will require no modifications to the previous production equipment other than the addition of a workstation where the heating panel is applied to the radiator.

[0043] Naturally the same radiator can include more than one heating panel applied in different zones.

[0044] The radiator thus conceived is subject to numerous modifications and variants, while remaining within the context of the present invention; furthermore, all components can be replaced by other technically equivalent elements.

[0045] Basically, the materials employed, as well as the size of said elements can be of any type according to necessity and the technical state of the art.

Claims

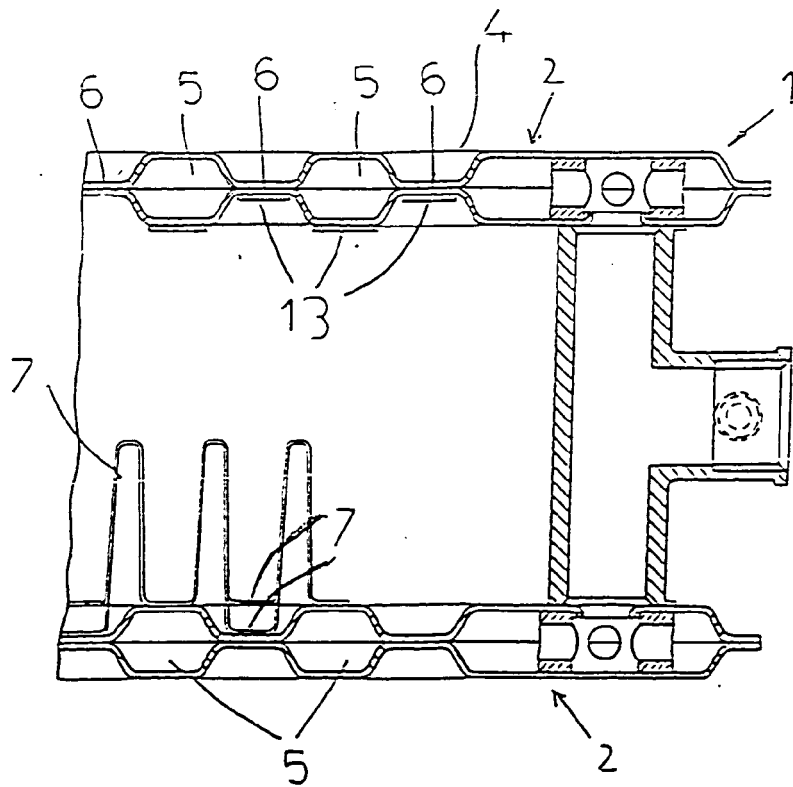
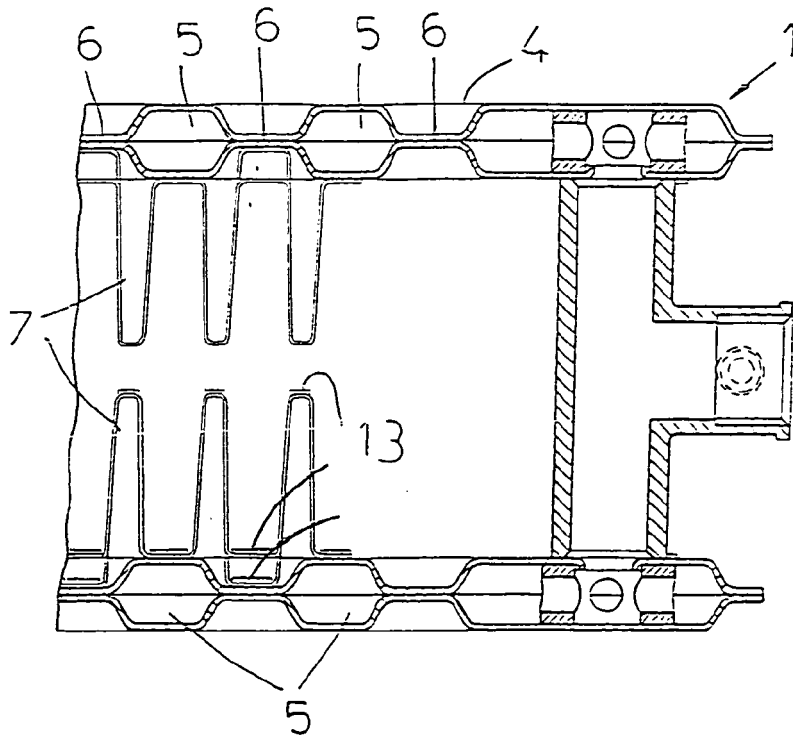
1. Radiating plate radiator of the type comprising one or more shells containing a fluid, each one having at least one inlet and one outlet connector of said fluid connected to each other by means of a plurality of channels that are mutually separated by lowered portions of said shells, **characterised in that** it includes means of electrical heating comprising at

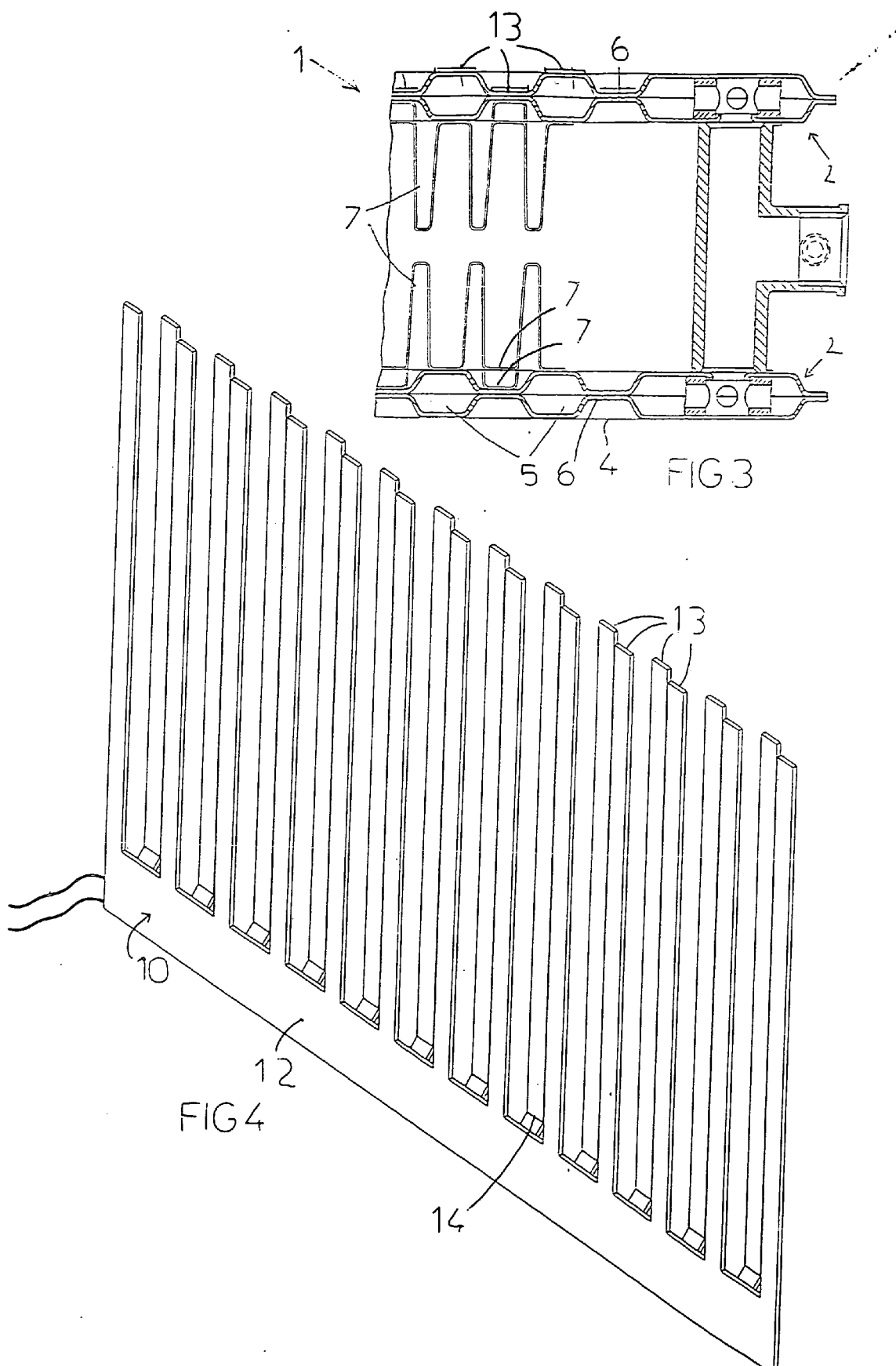
least one flexible heating panel applied to a dry surface of said radiator.

2. Radiating plate radiator according to claim 1 **characterised in that** said heating panel comprises an electric resistor coated with an electrical insulation material. 5
3. Radiating plate radiator according to one or more of the previous claims **characterised in that** said electrical resistor has a thin foil sheeting shape. 10
4. Radiating plate radiator according to one or more of the previous claims **characterised in that** said electrical resistor is made of wiring. 15
5. Radiating plate radiator according to one or more of the previous claims **characterised in that** said electrical resistor made thin foil shaped is obtained by means of an "etching" process. 20
6. Radiating plate radiator according to one or more of the previous claims **characterised in that** said heating panel is shaped in a manner so that it matches the form of said dry surface. 25
7. Radiating plate radiator according to one or more of the previous claims **characterised in that** said dry surface belongs to one or more fluid container shells. 30
8. Radiating plate radiator according to one or more of the previous claims **characterised in that** said dry surface belongs to a convector element applied to one or more fluid container shells. 35
9. Radiating plate radiator according to one or more of the previous claims **characterised in that** said dry surface belongs to a cover panel of said radiator. 40
10. Radiating plate radiator according to one or more of the previous claims **characterised in that** said heating panel includes a base from which a plurality of slats extends, arranged in an alternating manner on two different planes. 45
11. Radiating plate radiator according to one or more of the previous claims **characterised in that** one of said two different planes coincides the plane where said base lies. 50
12. Radiating plate radiator according to one or more of the previous claims **characterised in that** the thickness of the wall of said heating panel does not exceed 3 mm. 55
13. Radiating plate radiator according to one or more of the previous claims **characterised in that** it is equipped with temperature adjustment and control

means for said heating panel.

14. Radiating plate radiator according to one or more of the previous claims **characterised in that** said adjustment and control means comprise a thermal switch applied to said heating panel
15. Radiating plate radiator according to the descriptions and claims herein.







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 01 5955

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 742 524 A (ELECTRICITE DE FRANCE) 20 June 1997 (1997-06-20)	1-3,6,9, 12-14	F24D13/04 F24H3/00
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E	WO 2005/080886 A (BASIC HOLDINGS) 1 September 2005 (2005-09-01) * page 5, line 8 - page 8, line 29; figures 1,2 *	1-4,6,9, 12-14	

Y	US 4 870 388 A (SUGATA ET AL) 26 September 1989 (1989-09-26) * example 1 *	5	

A	US 5 537 506 A (FENNESZ ET AL) 16 July 1996 (1996-07-16) * column 9, line 37 - line 62; figure 2 *	1	

			TECHNICAL FIELDS SEARCHED (IPC)
			F24D F24H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 January 2006	Examiner Arndt, 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			

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EPO FORM 1503 03.82 (P04C01)

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

EP 05 01 5955

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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