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(54) Hydrothermic radiator composed of aluminium alloy extruded segment sections, joined by means of permanent fixing parts.

(57) The hydrothermic heating radiator is composed by aluminium alloy extruded bar sections, permanently joined by means of a connecting component, fixed both to the collector and to the heating element by sticking and/or mechanical shrinking.

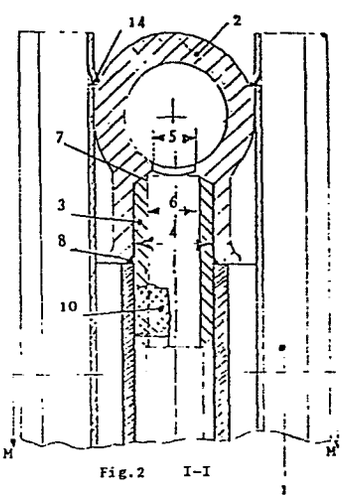

Fig.2 I-I

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Hydrothermic radiator composed of aluminium alloy extruded segment sections, joined by means of permanent fixing parts

Radiators built in extruded and/or die-casted aluminium alloy are known, whose elements or groups of elements are composed as follows:

a) die-casted collectors provided with small cylindrical or slightly conical collars, which are inserted into the tubular cavities of extruded elements (heating bodies) and sticked to them, the junction eventually being improved by further mechanical forcing of small area of the collars;

b) die-casted collectors, fixed to the extruded heating elements by means of self-threading screws with through-holes on collector blades, and screwed on the extruded element appropriate grooves, the collector being eventually covered by a carter acting as hot air conveyor or having merely aesthetic functions;

c) extruded aluminium alloy heating elements, whose tubular sockets are limited, on the upper and lower sides, by collectors in aluminium alloy or cast-iron or other material and gaskets, inserted into transversally executed holes on the heating element and clamped to it by means of tightening screws;

d) extruded aluminium heating elements, closed at low and top ends by welded bottoms, and then joined together by means of threaded holes and nipples;

e) extruded aluminium alloy collector and heating elements, joined together by means of hollow-screws of the same or different material, inserted both through corresponding appropriate hole in the collector to be successively closed, both through the same collector hole.

Difficulties to meet with are evident, and due to not-anodizable die-cast parts, with low heat exchange coefficient, respectively to the use of gaskets, screws and similar for the radiator single element (or elements groups) assembly for the extruded type.

The present invention has for an objective the avoiding of such disadvantages, by means of an hydrothermic heating element built up with aluminium alloy extruded sections, suitably machined and stably connected each other to form heating elements or groups of elements before being further assembled by means of common types, commercially available, of nipples, in case suitably finished, as is customary for more complex packages assemblies.

According to the present invention, each junction between element parts, namely collector and heating element, is made by means of a nearly cylindrical connecting componet or better by means of a tubular pin which is fixed both to the collector and to the heating element by sticking and/or by mechanical forcing, jonction being made with suitable clearance and/or interference.

The same material is used for collector, heating element and connecting pins, that is an aluminium alloy.

Yet the expert may use alloys and metals also different each other, provided that their chemical-physical characteristic are compatible.

The particular radiator type and its manufacturing technology allow to embed the collector within the element end permitting functional and structural advantages (solidity and stiffness) and allow the obtention of any required height. Sticking material may be one of the many types commercially available, such as Loctite ones.

Further scope and advantages of the present invention will be evident from the following description, with reference to the attached drawings.

Fig. 1a, Fig. 1b and Fig. 1c represent respectively a front view, a lateral view and a top view of a group of two heating elements 1 connected through collector 2. Note the collector totally embeded within the element end.

Fig. 2 shows in a different scale the three connected parts according to the cross section I-I of Fig. 1b, and namely: the heating element 1 shown in datail in its transversal section M-M, Fig. 3; the upper collector 2 - the lower one is in this solution symmetric compared to an horizontal plane which is shown in its vertical section in Fig. 4; and the connecting pin 3.

The collector 2 connecting hole, into which pin 3 is fitted, presents two cylindrical surfaces of different diameter 4 and 5 and one truncated cone linking the two above cylinder surfaces. Diameter 4 is nominally equal to the pin other one; diameter 5 is slightly minor than the pin inner one 6.

The above described condition $5<6$ is applied to secure

the scaling and to avoide the liquid inner pressure effect on the pin; loosening effects are avoided since even the truncated cone shaped surfaces 7 of collector and pin are adherent and sticked.

This condition makes easier the assembling as far as is possible first to fix the pins on the collector and after to joint the collector with fitted pins on the elements.

Fig. 2 makes evident a chamfer 8 at the collector hole end whose function is to receive sticking material, which is intentionally more than sufficient in order to improve sealing, and automatically fills its recess by assembling.

Fig. 5 makes evident the small groove 9 allowing overflow of redundant stick.

Connecting pin 3 is provided with external knurl or shagreeing relieves, whose function is to realize shrinking interferences in spite of the large tollerances of the extruded hole of the element.

For this reason the element hole may be provided with longitudinal relieves 15 Fig. 3 obtained during the extrusion. The whole thus realized economically allows usefull interference to obtain a solid structure and metallic contact for establishing an electrical connection between radiator parts, in view to favour stray currents, when advisable.

Connection is carried out by preparing surfaces to be coupled with the clearances and/or interferences required for the specific and proper selected sticking material commercially available, then by smearing them according to the required stick prescriptions, and at last, coup-

ling them by means of suitable assembly fixture. Correspondently to collector 2 and heating element 1, the pin may show two esternal portions of different diameter, commected through jutted out collar 11, see Fig. 6.

Fig. 7 shows a further coupling change where, in detail, connecting pin 3 has a head 12 which prevents, in any case, its ejection from collector. This solution requires that pin 3 is inserted through collector 2 inner hole and enables to avoide the sticking to collector.

To make this change, one must smear glue on the collector hole and the pin 3 and insert the pin 3 into the collector hole 2, block it by means of suitable fixture, smear again glue on the pin 3 and possibly also on the inner surface of the heating element 1 to which pin will be joined, and by means of suitable fixture, press the parts so that a fast and lasting assembly is provided.

A particular advantage of this invention is that in order to align the heating elements during their assembling, the extruded segments are provided with restrained references, fins references, or wings 13, Fig. 3, and similar for their angular orientation.

The wings forced over the collector, may be, after the assembling conveniently deformed (finger nail shape or other shape) by punching (14 Fig. 2 and Fig. 5) and the rerelief acting as a lock against the sharp edge of the collector to encrease the solidity of the whole.

When these fins references are used, it is necessary to remove that part which would prevent to receive the collector for the whole (Fig. 1) or partial length of the said section (Fig. 8).

Though three realizations of the invention have been described, they fix no limit: changes may be made by the man of the art without departing from the spirit and scope of the invention.

Claims:

1. An hydrothermic radiator composed by a single element or groups of two, three or more heating elements, of extruded aluminium alloy or extruded and/or die-casted different alloys having compatible chemical-physical properties, characterized by the fact that the said elements are fixed to the collectors by means of a fast and lasting junction comprising tubular pins sticked into through holes having the same nominal diameter.

2. An hydrothermic radiator according to claim 1 characterized by the fact that the connecting assembly by means of tubular pins, between collector and heating elements, may be realized without stick, through interference when assembly is made with suitable apparatus with or without help of temperature differences, at the moment of the juction, between parts to be assembled and coupling surfaces with possible slight conicity.

3. An hydrothermic radiator according to claims 1 or 2, characterized by the fact that the collector may be wholly embeded within the element end in order to form a rigid and strong structure or partially embeded in view of being used, properly modified, for conveying the ascensional hot air movement and/or possibly acting as shelf.

4. An hydrothermic radiator according to claim 1, characterized by the fact that the tubular pin has the external cylindrical surface ending with two truncated

cones, the first internal to collector and with the same conicity serving to improve stick-adhesion and avoid pressure ejection effect and the second serving to speed assembly and collect redundant stick, in such a way that solidifying stick improves hydraulic sealing.

5. An hydrothermic radiator according to claims 1 and 2, characterized by the fact that pins, in correspondance respectively of collector and heating element, may have two different diameters, eventually divided by a small collar of bigger diameter.

6. An hydrothermic radiator according to claims 1 and 2, characterized by the fact that the tubular pin has a head which prevents the ejection of the collector, enabling to avoid the sticking to collector and then to reduce the height of the same collector.

7. An hydrothermic radiator according to claims 1 and 2, characterized by the fact that over the internal tubular surface of the element are longitudinal relieves obtained through extrusion and/or over the external surface of the pin knurl or similar operation are realized in view to economically obtain interference, suitable forcing and electrical continuity of the parts in spite of the large tollerances of the inside diameter of the extruded element hole.

8. An use of the fix and permanent junction between metallic sections according to the previous claims, particularly between collector and thermal exchange

elements, obtained through connecting pin of the same material or other materials having compatible properties, characterized by the fact that this coupling system may be used for other heating exchangers, such as solar panels or frigorific generators.

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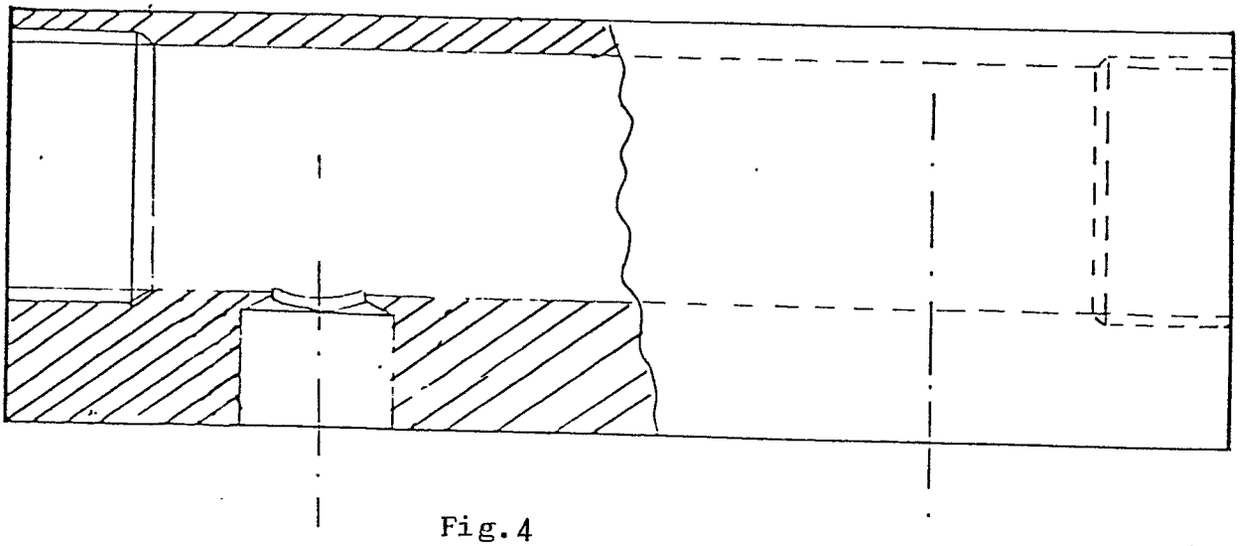

Fig.4

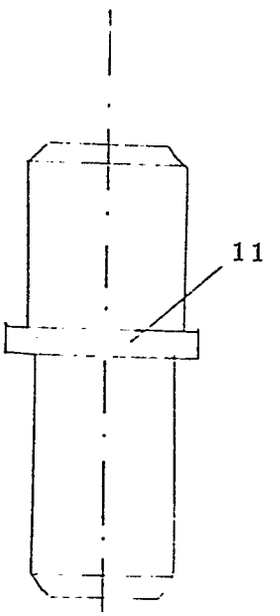

Fig.6

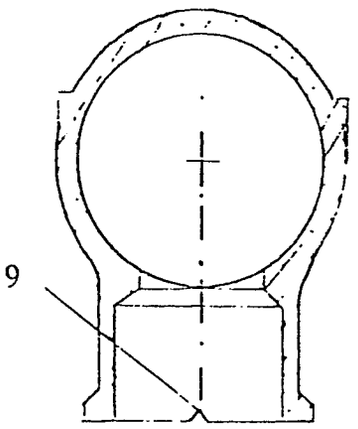

Fig.5

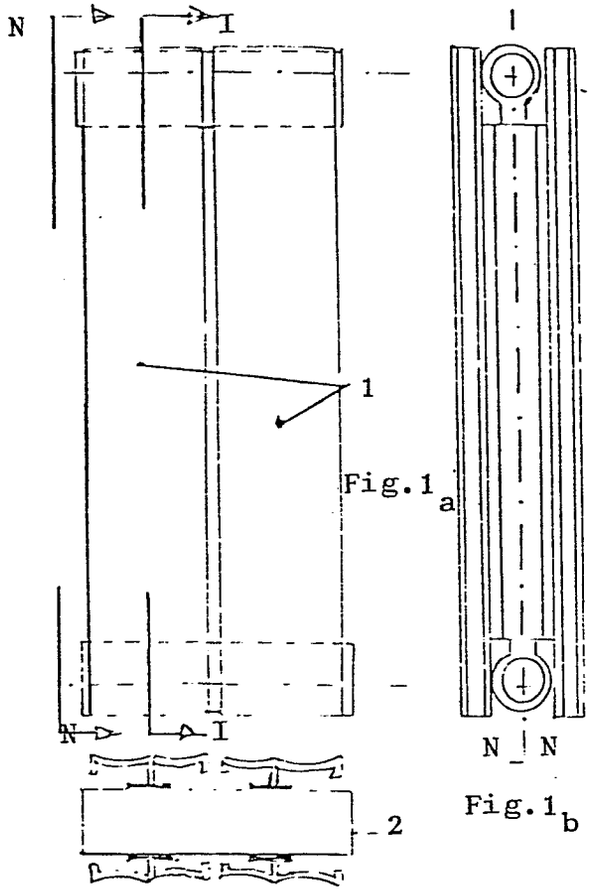

Fig.1a

Fig.1b

Fig.1c

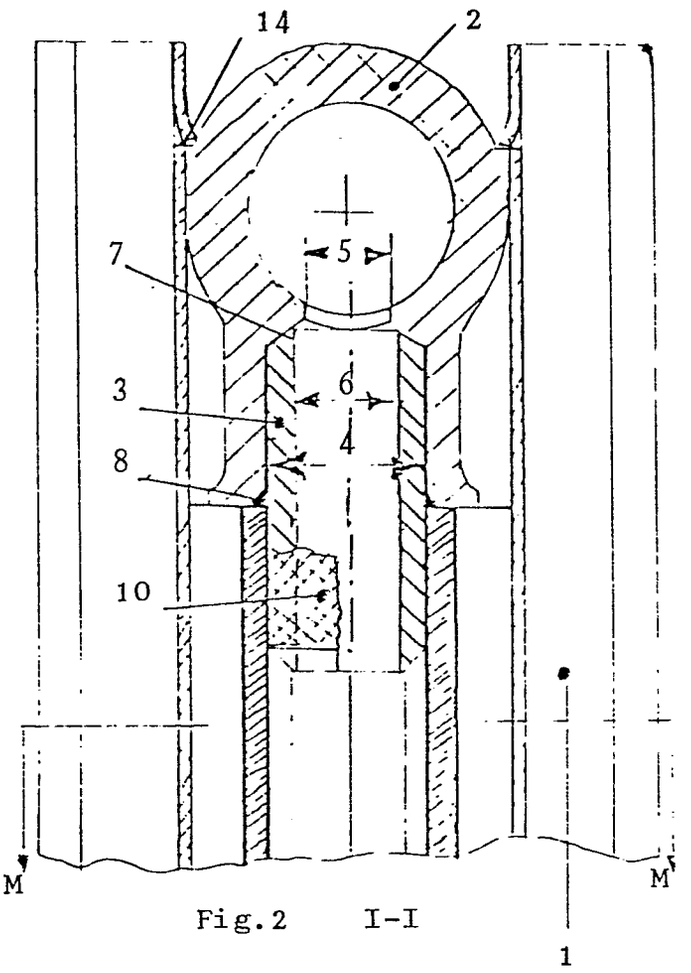

Fig.2 I-I

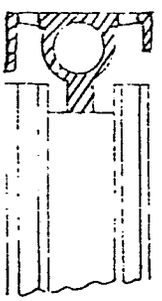

Fig.8

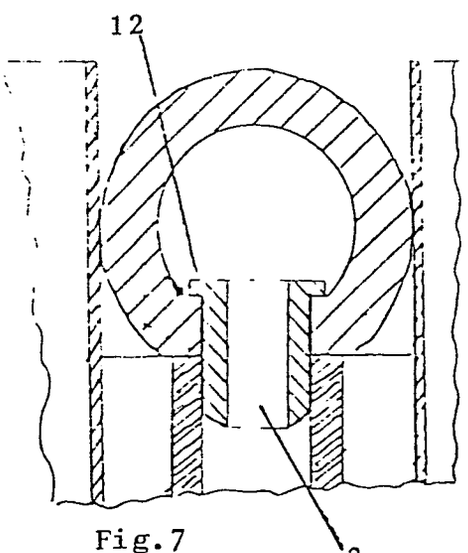

Fig.7

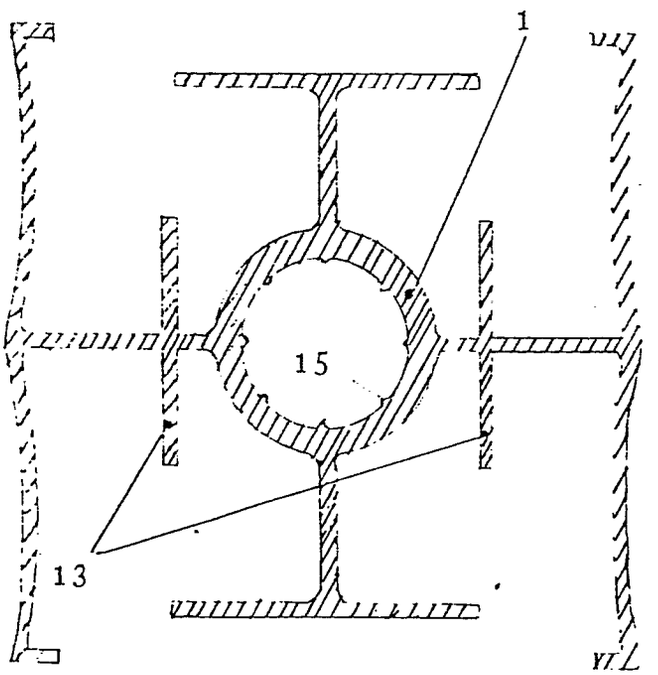

Fig.3

M-M

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EUROPEAN SEARCH REPORT

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Application number

EP 82 83 0163

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. 3)
X	FR-A-2 205 655 (ALUMASC) * the whole document *	1,2,3, 4,5	F 28 F 9/26 F 28 D 1/04
X	FR-A-2 259 340 (FIRME IWET) * page 7, line 17 - page 9, line 9; figure 4,6 *	1,3,7	
A	BE-A- 809 318 (LAFFUT) * page 5, last paragraph; figures 5,8,11 *	1,2,5	
A	DE-A-2 412 735 (LUDWIG) * page 8, lines 15-23; page 12, last 3 lines; figure 4 *	1,4,6	
A	GB-A-1 492 916 (LYNCH) * page 2, lines 69-124; page 3, lines 41-55; figures 4,5 *	1,8	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
A	FR-A-1 530 882 (BÖLKOW)		F 28 F F 28 D
A	FR-A-2 357 847 (KELLER)		
A	DE-A-2 815 465 (E.E.S.I.)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16-09-1982	SCHOUFOUR F.L.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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