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71 Applicant: **N.V. Philips' Gloeilampenfabrieken**
Groenewoudseweg 1
NL-5621 BA Eindhoven(NL)

72 Inventor: **Wets, Lucien Louis, c/o INT.**
OCTROOIBUREAU B.V.
Prof. Holstlaan 6
NL-5656 AA Eindhoven(NL)

74 Representative: **Melio, Jan Dirk et al**
INTERNATIONAAL OCTROOIBUREAU B.V.
Prof. Holstlaan 6
NL-5656 AA Eindhoven(NL)

54 **Annular spacer for panel radiators and method of manufacturing a spacer.**

57 The invention relates to an annular spacer (2) for panel radiators having openings (5) in radial direction. The spacer (2) is composed of outer layers (7, 9) consisting of annular elements (19) and intermediate layers (10, 12) consisting of ring sectors (15).

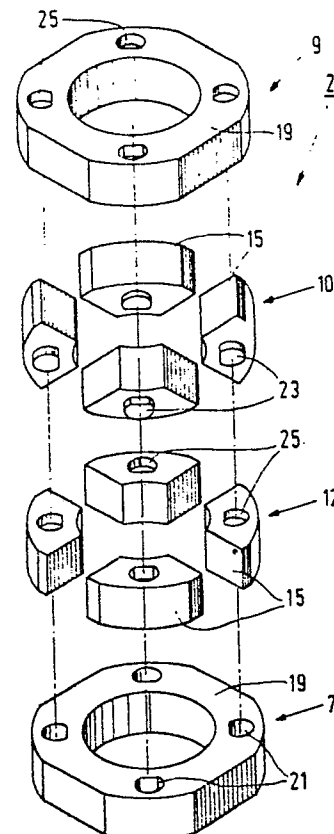


FIG.2B

EP 0 382 305 A1

Annular spacer for panel radiators and method of manufacturing a spacer

The invention relates to an annular spacer for panel radiators provided with at least one opening in radial direction and to a method of manufacturing a spacer.

A spacer for panel radiators serves to keep two panels of a radiator at a certain relative distance, more particularly during the operation of welding the water supply or discharge nipple. The opening in radial direction then serves together with the central axial opening in the annular spacer as supply or discharge duct for water flowing into or out of the radiator. The term "annular" should be interpreted here in a very wide sense. The term "annular spacer" is to be understood to mean a spacer provided with a central axial opening. This opening is preferably circular, but may have any other desired shape. A known spacer is obtained by subjecting a tube to machining operations, such as turning or drilling. The use of these machine techniques for obtaining a spacer ring is time-consuming and expensive.

The invention has for its object to provide a spacer for panel radiators, which can be manufactured more economically than the known spacer. The invention further has for its object to provide a spacer, which can be manufactured completely automatically.

According to the invention, this object is mainly achieved in that the spacer is composed of at least three layers, of which a first and a second outer layer consist of a ring and of which an intermediate layer consists of at least one ring sector. The opening in radial direction in the spacer is limited by the first and a second outer layer and by the ring sector. The rings and the ring sector can be manufactured in a simple and economical manner by stamping.

A preferred embodiment of a spacer according to the invention is characterized in that the layers are joined together in that the ring of the first outer layer is provided with at least one hole in axial direction coinciding with at least one projection of the ring sector of the intermediate layer and the side of the ring sector remote from the first outer layer is provided with at least one depression coinciding with at least one projection of the ring of the second outer layer. Due to the projections and depressions, the rings and ring sectors can be stacked and joined together rapidly and efficiently.

The number of holes in the ring of the first outer layer is equal to the number of projections and depressions of the ring sector of the intermediate layer and to the number of projections of the ring of the second outer layer. The holes, depressions and projections can also be provided by

means of stamping in the rings and the ring sector. When stamping the depression in one side of the ring or the ring sector, a projection is automatically obtained on the opposite side of the ring or the ring sector. The various layers can be stacked during the stamping operation.

Another embodiment of a spacer according to the invention is characterized in that the intermediate layer consists of four ring sectors. The four ring sectors constitute together with the rings of the outer layers four openings in radial direction. Water flows through leads, through a central axial opening constituted by the spacer and subsequently through the radial openings uniformly into the radiator. Water is discharged from the radiator in inverse order.

A further embodiment of a spacer according to the invention is characterized by at least one further intermediate layer, which consists of at least one ring sector, which is provided on the side facing the first intermediate layer with at least one projection coinciding with at least one depression in a ring sector of the first intermediate layer and is provided on the side remote from the first intermediate layer with at least one depression coinciding with at least one projection of the ring of the second outer layer. Thus, spacers in various thicknesses can be manufactured in a simple manner solely by varying the number of intermediate layers.

Due to this construction, a larger opening in radial direction is obtained. When all layers are equally thick, the opening obtained is two times larger, while the thickness of the spacer increases by only 33.3 %. The rings and the ring sectors can be stamped out of the same sheet of material.

In a still further embodiment of a spacer according to the invention, the surface area of the opening in radial direction is at least equal to the surface area of a circle enclosed by the spacer. The water is not prevented by the opening in radial direction from flowing out of or into the radiator. In the case of several openings, the overall surface area of the openings in radial direction is at least equal to the surface area of the central axial opening.

The invention further relates to a method of manufacturing a spacer for panel radiators, in which the rings and the ring sector are stamped out of metal and corresponding shapes of the different rings or the ring sector are stamped by means of the same press tool. The holes and depressions and projections are stamped in the rings and the ring sector by the same press tool; corresponding contours of the rings and the ring

sector are also stamped by the same stamp. This method permits of manufacturing by means of a limited number of stamps a large variety of products.

The invention will be described more fully with reference to the drawing. In the drawing:

Figure 1 shows an embodiment of a spacer according to the invention,

Figures 2a and b show a spacer according to the invention in another embodiment.

Figure 1 shows an annular spacer 1 for panel radiators having a circular circumference, a circular opening 3 in axial direction and an opening 5 in radial direction. The spacer 1 is composed of three layers, i.e. a first and a second outer layer (7, 9) and an intermediate layer 11. The first and the second outer layer (7, 9) consist of a ring 13 and the intermediate layer 11 consists of a ring sector 15. The opening 5 in radial direction is limited by the rings 13 and by the ring sector 15. The different layers are joined together, for example, by means of glue.

Figure 2a shows another embodiment of a spacer 2 according to the invention. The circumference 17 of the spacer 2 is square with rounded corners. The spacer 2 has a circular opening 3 in axial direction and four rectangular openings 5 in radial direction. The spacer 2 is composed of four layers, i.e. a first and a second outer layer (7, 9) and a first and a second intermediate layer (10, 12).

Figure 2b is an exploded view of the spacer 2 shown in Figure 2a. The four different layers can now be clearly distinguished. The first outer layer 7 consists of an annular element 19, in which four holes 21 are provided. The first intermediate layer 10 consists of four ring sectors 15. The sides of the ring sectors 15 facing the first outer layer 7 are provided with projections 23; the opposite side is provided with depressions 25. The second intermediate layer 12 is identical to the first intermediate layer 10. The second outer layer 9 consists, like the first outer layer 7, of an annular element 19. This annular element, however, has projections 23 on the side facing the first ring and depressions 25 on the opposite side. When assembling the spacer 2, the projections 23 of one layer fall into the holes 21 and depressions 25 of another layer. The eight ring sectors 15 constitute together with the annular elements 19 four openings 5 in radial direction is larger than the surface area of the opening 3 in axial direction. The ring sectors 15 and the annular elements 19 are manufactured by means of stamping. The circumference of the spacer may have, like the opening in axial direction, an arbitrary shape.

Claims

1. An annular spacer for panel radiators provided with at least one opening in radial direction, characterized in that the spacer is composed of at least three layers, of which a first and a second outer layer consist of a ring and of which an intermediate layer consists of at least one ring sector.
2. An annular spacer for panel radiators as claimed in Claim 1, characterized in that the layers are joined together in that the ring of the first outer layer is provided with at least one hole in axial direction coinciding with at least one projection of the ring sector of the intermediate layer and the side of the ring sector remote from the first outer layer is provided with at least one depression coinciding with at least one projection of the ring of the second outer layer.
3. An annular spacer for panel radiators as claimed in Claim 1 or 2, characterized in that the intermediate layer consists of four ring sectors.
4. An annular spacer for panel radiators as claimed in claim 1, 2 or 3, characterized by at least one further intermediate layer, which consists of at least one ring sector, which is provided on the side facing the first intermediate layer with at least one projection coinciding with a depression in a ring sector of the first intermediate layer and is provided on the side remote from the first intermediate layer with at least one depression coinciding with a projection of the ring of the second outer layer.
5. An annular spacer for panel radiators as claimed in any one of the preceding Claims, characterized in that the surface area of the opening in radial direction is at least equal to the surface area of a central axial opening in the spacer.
6. A method of manufacturing a spacer for panel radiators as claimed in any one of the preceding Claims, in which the rings and ring sectors are stamped out of metal, characterized in that corresponding shapes of the various rings or ring sectors are stamped by means of the stamp.



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.5)
A	DE-C- 817 647 (SCHMIEG) * Whole document * ---	1	F 28 F 9/26 F 28 D 1/03
A	DE-A-2 506 778 (BERG) * Whole document * ---	1	
A	FR-A-2 199 105 (SOLEDEC) * Whole document * ---	1	
A	DE-A-3 145 380 (BICKEL) * Whole document * ---	1	
A	DE-A-3 102 188 (KERMI) * Whole document * ---	1	
A	DE-A-3 440 272 (HANS BERG) * Whole document * ---	1	
A	FR-A- 507 163 (GOUDARD) * Whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F 28 F F 28 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02-05-1990	Examiner SMETS E.D.C.
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	