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(11)

EP 1 367 352 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

03.12.2003 Bulletin 2003/49

(51) Int Cl.7: **F28F 9/02**

(21) Application number: **02027918.8**

(22) Date of filing: **13.12.2002**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SI SK TR**

Designated Extension States:

AL LT LV MK RO

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(30) Priority: **27.05.2002 IT TO20020448**

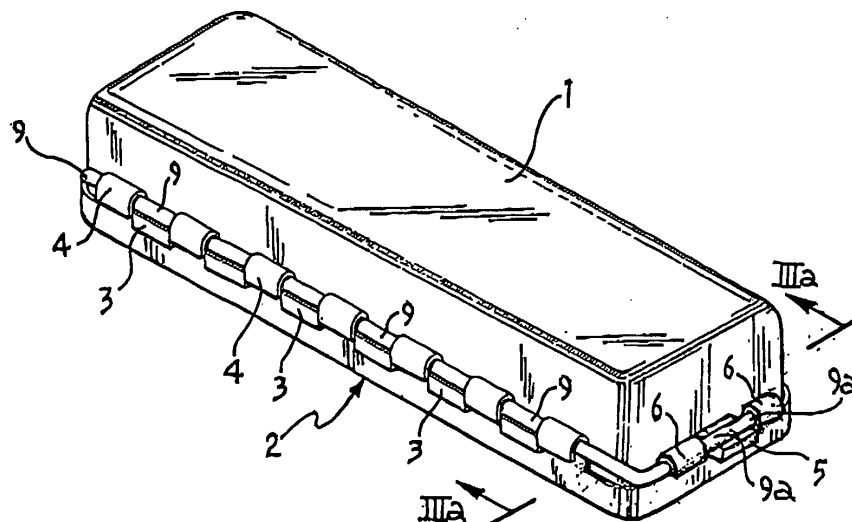
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(54) **A system for sealed coupling and clamping of a tank to the manifold of a heat exchanger**

(57) The system enables coupling and clamping of a tank (1) to an end manifold (2) of a heat exchanger with interposition of an elastically compressible sealing gasket (7). The system comprises a first plurality of aligned external formations (3), pre-arranged along a rim portion of the tank (1), and a second plurality of aligned external formations (4), pre-arranged along a corresponding rim portion of the manifold (2). The arrangement of the first formations (3) and the second formations (4) is such that the former (3) can be interspersed between the latter (4) when the tank (1) is fitted to the manifold (2) with interposition of said gasket (7),

and the former formations (3) can be set at least partly beyond the latter formations (4) as a result of a further approach of the tank (1) to the manifold (2) designed to cause an elastic compression of the interposed gasket (7) in such a way that, between said first formations (3) and said second formations (4), there is defined a passage (8), which is essentially parallel to the direction of alignment of said formations (3, 4). At least one clamping member (9) is set in said passage (8) and is withheld between the first formations (3) and the second formations (4) and is gripped therein as a result of the elastic reaction of the gasket (7).

FIG. 3



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Description

[0001] The present invention relates to a system for coupling and clamping a tank to an end manifold of a heat exchanger, such as, for instance, a radiator for motor-vehicles.

[0002] Currently, coupling and clamping of a tank to the manifold is obtained by clinching, i.e., by means of plastic deformation, of a plurality of perimetral tabs of the manifold on a flange of the associated tank. The said technique involves the use of a specific press and die. Once clinching has been carried out, it proves problematical, in the event of leaks, to perform uncoupling of the two elements for carrying out repairs and, hence, their subsequent recoupling and clamping.

[0003] A purpose of the present invention is therefore to provide an improved system for coupling and clamping a tank to the manifold of a heat exchanger.

[0004] The above purpose is achieved, according to the invention, with a system characterized in that it comprises:

- a first plurality of aligned external formations, pre-arranged along a rim portion of the tank;
- a second plurality of aligned external formations, pre-arranged along a corresponding rim portion of the manifold;

the arrangement of said first formations and said second formations being such that the former can be interspersed between the latter when the tank is fitted to the corresponding manifold with interposition of an elastically compressible sealing gasket, and the former formations can, moreover, be set at least partly beyond the latter formations as a result of a further approach of the tank to the manifold, designed to cause an elastic compression of the interposed gasket in such a way that, between said first formations and said second formations, there is defined a passage, which is essentially parallel to the direction of alignment of said formations; and

- at least one clamping member designed to be set in the aforesaid passage and to be withheld between said first formations and said second formations and be gripped therein as a result of the elastic reaction of said gasket.

[0005] The system according to the invention enables extremely rapid and repeatable unclamping and uncoupling of the tank from the manifold, as well as their subsequent recoupling and reclamping.

[0006] Further characteristics and advantages of the invention will emerge clearly from the ensuing detailed description provided purely by way of non-limiting example with reference to the attached drawings, in which:

- Figure 1 is an exploded perspective view illustrating a tank and a manifold prior to coupling and clamping

using the system according to the invention;

- Figure 2 is a perspective view illustrating the tank and manifold of Figure 1 in a condition of mutual coupling;
- Figure 2a is a partial cross-sectional view at an enlarged scale according to the line IIa-IIa of Figure 2;
- Figure 3 is a perspective view illustrating the tank and manifold of Figure 2 in the condition of coupling and clamping using the system according to the invention; and
- Figure 3a is a partial cross-sectional view at an enlarged scale according to the line IIIa-IIIa of Figure 3.

[0007] In Figure 1, the reference number 1 designates a tank designed to be fitted to an end manifold 2 of a heat exchanger (not illustrated), such as for instance a radiator.

[0008] The tank 1 is made, for example, of glass-fibre-reinforced polyamide.

[0009] The manifold 2 is instead made, for example, of metal material. It has, in a way of itself known, a main wall 2a (see Figure 1), in which there is made a plurality of openings 2b, to which the ends of the corresponding pipes of the heat exchanger are fixed, for example by means of brazing or mechanical expansion.

[0010] The wall 2a of the manifold 2 has a basically rectangular shape and is surrounded by a perimetral border or rim 2c, which is integral therewith.

[0011] Along each of the main sides of the manifold 2, from the rim 2c there extends a respective plurality of formations 4 set aligned to and at a distance from one another, basically shaped like hooks facing outwards.

[0012] With reference to the drawings, the hook formations 4 of the manifold 2 have the concavity facing downwards.

[0013] Preferably, but not necessarily, in a position corresponding to each of the smaller sides of the manifold (2), from the rim 2c there extend upwards two further formations or appendages 6.

[0014] Also the tank 1 has a basically rectangular border or rim and, along each of its main sides, in a position corresponding to the rim thereof that is to be coupled to the manifold, has a plurality of projecting formations 3 set aligned to and at a distance from one another.

[0015] In the embodiment illustrated by way of example, the above projecting formations 3 have on top a respective longitudinal furrow 3a. Said furrows 3a are basically aligned to one another.

[0016] In a position corresponding to each smaller side, adjacent to the rim facing the manifold 2, the tank 1 has a further projecting formation 5 provided on top with a respective furrow 5a.

[0017] The arrangement of the formations 3 and 5 of the tank 1 and of the formations 4 and 6 of the manifold 2 is such that the former can be interspersed with the latter when the tank 1 is fitted to the manifold 2 (see Figure 2) with interposition of an elastically compressi-

ble sealing gasket 7.

[0018] Figure 2 illustrates the tank 1 fitted to the manifold 2 on the gasket 7.

[0019] Starting from the condition illustrated in Figures 2 and 2a, as a result of a further approach of the tank 1 to the manifold 2, such as to bring about an elastic compression of the interposed gasket 7, the formations 3, 5 of the tank 1 set themselves at least partly beyond the corresponding formations 4 and 6 of the manifold 2 (see Figure 3a), in such a way that, between the formations 3 and 4, there is defined a passage 8 (see Figure 3a), which is essentially parallel to the direction of alignment of said formations. In said passage 8 there can be inserted a rod-shaped clamping member, such as one of the members designated by 9 in Figures 1, 3 and 3a.

[0020] In the embodiment illustrated by way of example, each clamping member 9 is basically L-shaped, with a shorter branch 9a, designed to extend in a passage accordingly defined between the formation 5 of one side of the tank 1 and the corresponding formations 6 of the manifold 2. In this case, each formation 6 is conveniently folded downwards over the branch 9a of the clamping member 9, as illustrated in Figure 3, so as to block it in turn and prevent it from sliding out.

[0021] The system described enables extremely fast and convenient unclamping and uncoupling of the tank 1 from the manifold 2. For this purpose, it is, in effect, simply necessary to raise the end tabs 6 of the manifold 2, and then, after compression of the tank-manifold assembly, slide out the clamping member or members 9.

[0022] Also subsequent recoupling and reclamping of the tank to the manifold can be carried out in an extremely fast and convenient way.

[0023] The equipment necessary for coupling and clamping and possible uncoupling and unclamping is extremely simple, as will certainly be appreciated by the person skilled in the sector.

[0024] Of course, without prejudice to the principle of the invention, the details of construction and the embodiments may vary widely with respect to what is described and illustrated herein purely by way of non-limiting example, without thereby departing from the scope of the present invention as defined in the annexed claims.

[0025] Thus, for example, the formations 4 and 6 of the manifold could have a C-shaped or L-shaped profile and be folded towards the inside of the manifold instead of towards the outside.

Claims

1. A system for coupling and clamping a tank (1) to an end manifold (2) of a heat exchanger with interposition of an elastically compressible sealing gasket (7), **characterized in that** it comprises:

- a first plurality of aligned external formations (3), pre-arranged along a rim portion of the tank

(1); and

- a second plurality of aligned external formations (4), pre-arranged along a corresponding rim portion of the manifold (2);

the arrangement of said first formations (3) and said second formations (4) being such that the former can be interspersed between the latter when the tank (1) is coupled to the manifold (2) with interposition of said gasket (7), and the former formations (3) can be set at least partly beyond the latter formations (4) as a result of a further approach of the tank (1) to the manifold (2) designed to cause an elastic compression of the interposed gasket (7) in such a way that, between said first formations (3) and said second formations (4), there is defined a passage (8), which is essentially parallel to the direction of alignment of said formations; and

- at least one clamping member (9) designed to be set in said passage (8) and to be withheld between the aforesaid first formations (3) and second formations (4) and be gripped therein as a result of the elastic reaction of said gasket (7).

2. The system according to Claim 1, **characterized in that** said first formations (3) comprise a plurality of projections (3), which extend from the outer surface of the tank (1).

3. The system according to Claim 2, in which said projections (3) are provided with respective longitudinal furrows or slots (3a) aligned to one another and set facing opposite the manifold (2).

4. The system according to any one of the preceding claims, in which the tank (1) has a basically rectangular shape, with external formations (3, 5) aligned along its larger sides and at least one of its smaller sides.

5. The system according to any one of the preceding claims, **characterized in that** the formations (4) of the manifold (2) are basically shaped like hooks facing outwards.

6. The system according to any one of the preceding claims, in which the manifold (2) has formations (4) in a position corresponding to its larger sides, and at least one further formation (6) in a position corresponding to one of its smaller sides.

7. The system according to any one of the preceding Claims 1 to 6, **characterized in that** the formations (4) of the manifold comprise appendages (4) having a basically C-shaped or L-shaped profile facing inwards.

8. A system for coupling and clamping of a tank to the manifold of a heat exchanger substantially as described and illustrated and for the purposes herein specified.

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FIG. 1

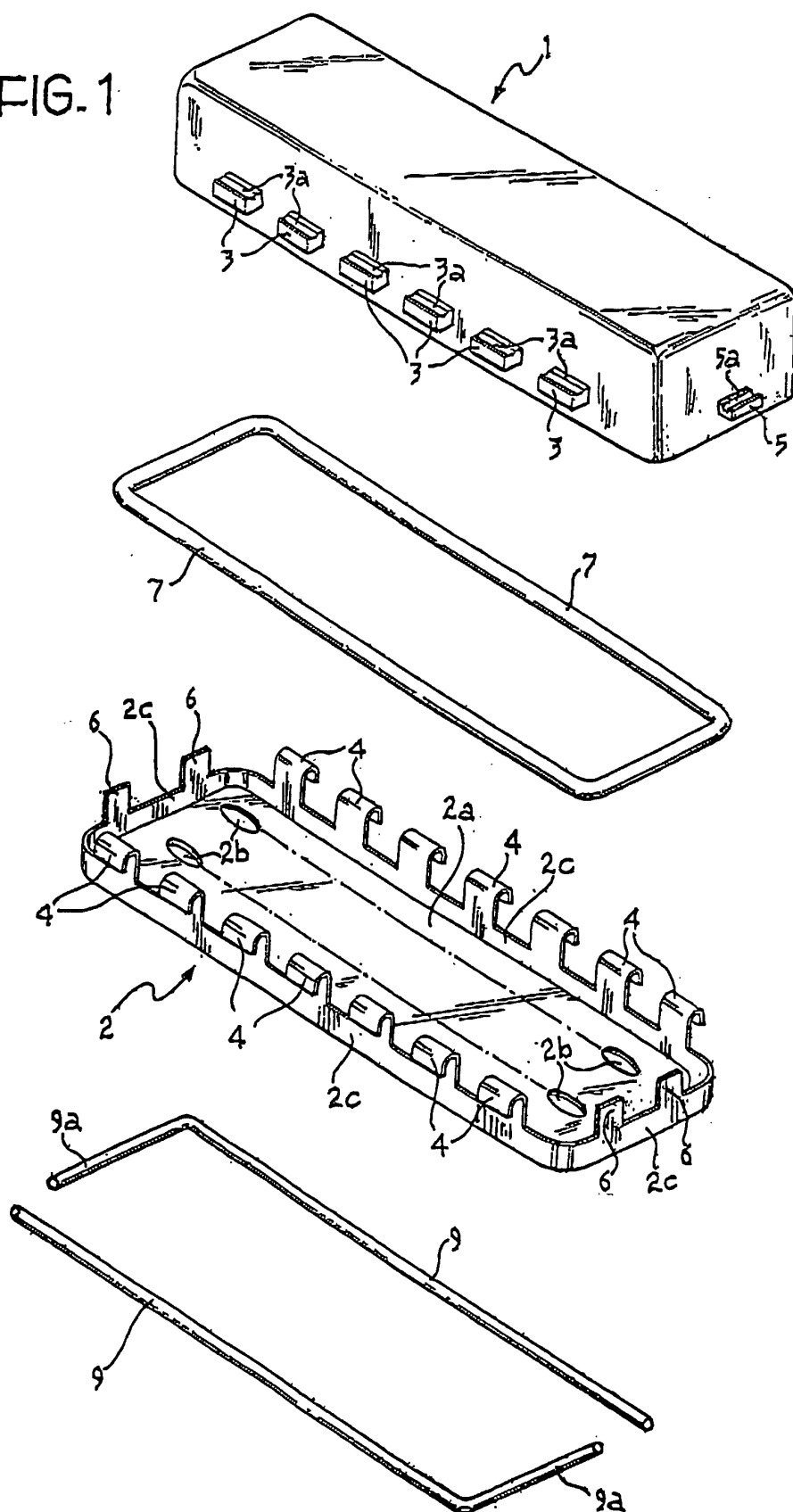


FIG. 2

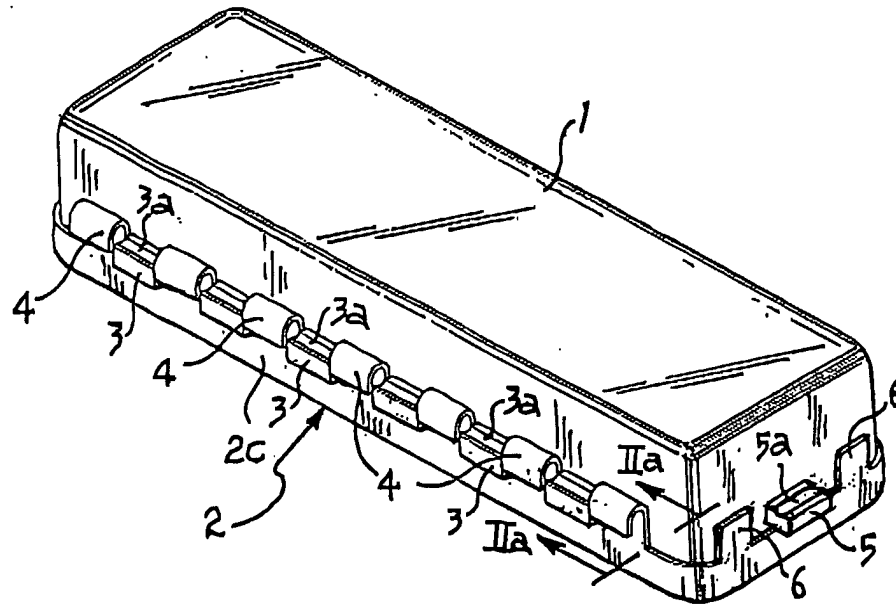


FIG. 3

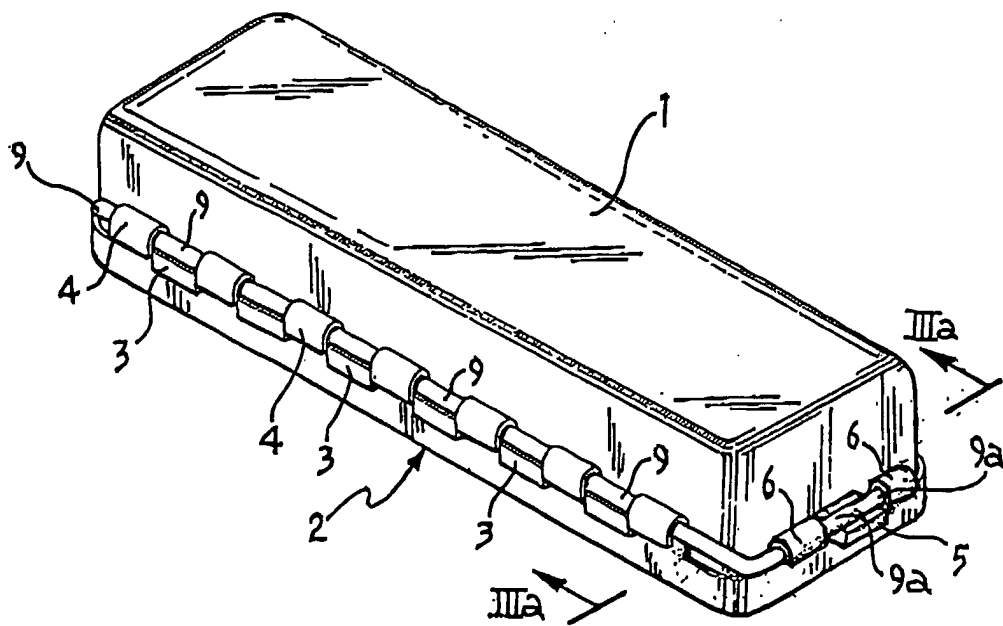


FIG. 2a

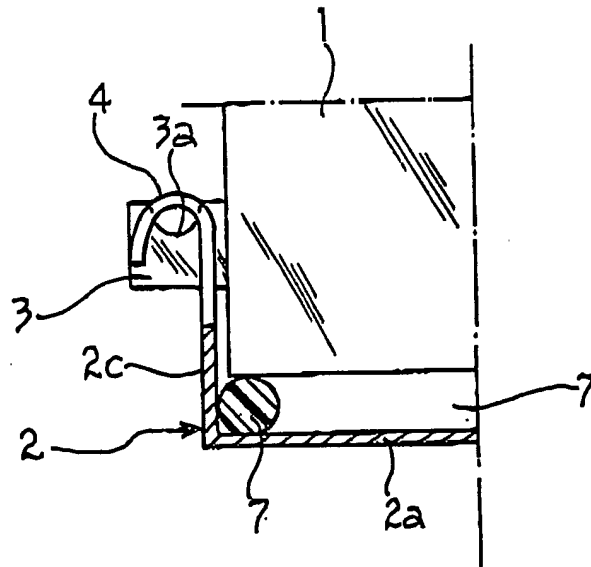
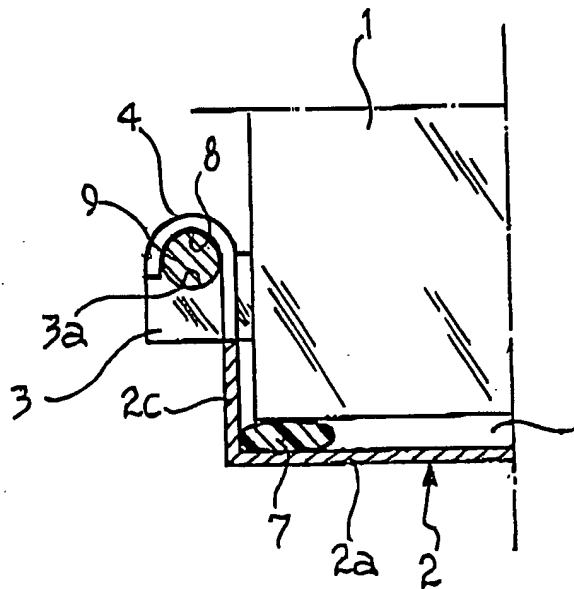


FIG. 3a





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EUROPEAN SEARCH REPORT

Application Number
EP 02 02 7918

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	GB 1 303 040 A (S.A. DES USINES CHAUSSON) 17 January 1973 (1973-01-17) * page 1, line 58 - page 2, line 8; figures 1,2 *	1-8	F28F9/02
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			F28F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 April 2003	Examiner Beltzung, F
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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 02 02 7918

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The members are as contained in the European Patent Office EDP file on
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14-04-2003

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