(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 658 483 A1**

# (12) EUROPEAN PATENT APPLICATION

(21) Application number: **94118345.1**

(51) Int. Cl.[6]: **B65D 51/00**

(22) Date of filing: **22.11.94**

(30) Priority: **17.12.93 IT TO930272 U**

(43) Date of publication of application:
**21.06.95 Bulletin 95/25**

(84) Designated Contracting States:
**DE ES FR GB SE**

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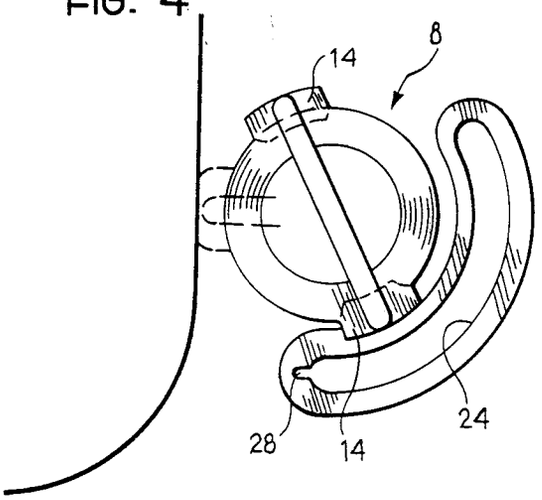
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## (54) A collecting tank for heat-exchangers for motor-vehicles, with an improved breather plug.

(57) A collecting tank made of plastics material for heat-exchangers for motor-vehicles is provided with a breather hole (4) and a removable plug (8) for closing the hole. In correspondence with the hole (4), the tank is provided with an annular flange (10) perpendicular to the axis of the breather hole (4) and provided with sloping surfaces (16) for cooperating with anchoring fins (14) on the plug (8) with a substantially L-shaped profile.

FIG. 4




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The present invention relates to a collecting tank made of plastics material for heat exchangers for motor-vehicles, provided with a breather hole and a removable plug for closing the hole.

In the solutions known hitherto, the plug is secured in the relative seat, provided in correspondence with the breather hole, by means of a thread.

With respect to plastics components, producing a thread in correspondence with the breather hole of the tank and on the plug involves considerable complications with respect to the moulds for constructing these components. In fact, having to provide a thread on an injection-moulded plastics part requires components which can move helically in the moulds which, in addition to rendering the moulds more expensive and complex, require constant maintenance and constitute a critical aspect in relation to the quality of the product.

In order to overcome the above disadvantages, the subject of the present invention is a collecting tank of the type described above, characterised in that, in correspondence with the breather hole, the tank is provided with an annular flange perpendicular to the axis of the breather hole and provided with sloping surfaces for cooperating with anchoring fins on the plug with a substantially L-shaped profile.

Further characteristics and advantages of the present invention will become clear from the following detailed description, given purely by way of non-limiting example, with reference to the appended drawings, in which:

- Figure 1 is a partial side elevation view of a collecting tank according to the present invention;
- Figure 2 is a partial section along the line II-II of Figure 1;
- Figure 3 is a section on enlarged scale along the lines III-III and IV-IV of Figure 1, with the plug inserted in the relative seat;
- Figure 4 is a view of the plug according to the invention, along the arrow V of Figure 3; and
- Figure 5 is a perspective view of the plug along the arrow V of Figure 3.

With reference to the drawings, a collecting tank to be connected to a heat-exchanger network of a motor-vehicle radiator is indicated 1.

In the example illustrated in Figure 1, the collecting tank 1, produced by injection moulding of plastics material, is produced integrally with a support structure 2 for an electric fan associated with the heat exchanger.

One of the side walls of the collecting tank 1 has a breather hole 4 enabling the air in the heat-exchanger network to be evacuated when the cooling circuit is filled with the diathermic liquid.

In correspondence with the breather hole 4, the body of the tank 1 has an integral seat 6 for locking a removable plug 8. The seat 6 has an annular flange 10 which is perpendicular to the axis of the breather hole 4. The annular flange 10 is divided into two sectors diametrically opposite two notches 12 which can permit the passage of two diametrically opposite coupling fins 14 (see in, particular Figure 5) provided integrally with the body of the plug 8. The coupling fins 14 of the plug 8 have a generally L-shaped profile and are to cooperate with respective sloping surfaces 16 on the wall of the annular flange 10 opposite the flat surfaces adjoining the inlet of the breather hole 4.

As is shown in Figure 3 in particular, the plug 8 has an annular duct 18 on which an elastomeric sealing ring 20 is fitted which, in the mounted configuration of the plug 8, is supported on a shoulder 22 and the circular wall 12' of the seat 6.

With reference to Figures 4 and 5, the plug 8 also has a channel 24 which is to engage a pin 26 adjacent the breather hole 4. The angular width of the channel 24 corresponds to the amplitude of the angular movement necessary for bringing the anchoring fins 14 from the unlocking position, in which they are in correspondence with the notches 12, to the point of maximum thickness of the sloping surfaces 16 which corresponds to the correct locking position of the plug 8. By virtue of the effect of the rotation of the plug 8 from the unlocking position into the locking position (both positions defined by the pin 26 striking the respective ends of the guide channel 24), the sloping surfaces 16 exert a progressively increasing axial force on the plug 8 which compresses the seal 20 against the shoulder 22 and the circular wall 12' of the seat 6.

The guide channel 24 is provided integrally with the plug 8 and is provided with a notch 28 which enables the channel 24 to widen slightly and enables it to be fitted on the enlarged head of the pin 26.

The system according to the present invention permits a firm closure of the breather hole 4 without having to provide threaded coupling devices between the plug 8 and the tank 1 which create problems from the point of view of cost and complexity of the moulds, as well as requiring maintenance of the movable parts of the moulds for producing these threads. This system further permits the closure to be produced without having to use closure torque wrenches for indicating the correct tightening torque of the plug 8. In fact, when the plug 8 reaches its locking configuration indicated by the pin 26 striking one end of the channel 24, it is certain that the correct axial load on the seal 20 has been reached.

A further advantage of the solution according to the invention consists in the fact that, in the unlocking position of the plug 8, the latter is retained by the pin 26; thus it is possible to vent the system without having physically to remove the plug 8 from the hole 4.

## Claims

1. A collecting tank made of plastics material for heat exchangers for motor-vehicles, provided with a breather hole (4) and a removable plug (8) for closing this hole, characterised in that, in correspondence with the breather hole (4), the tank (1) is provided with an annular flange (10) which is perpendicular to the axis of the breather hole (4) and is provided with sloping surfaces (16) for cooperating with anchoring fins (14) of the plug (8) with a substantially L-shaped profile.

2. A tank according to Claim 1, characterised in that the tank (1) and the plug (8) are provided with stop means (26, 24) defining an unlocking position and a locking position.

3. A tank according to Claim 2, characterised in that the above annular flange (10) has two sectors separated from one another by notches (12) which permit the passage in the axial direction of the anchoring fins (14) of the plug (8) when the latter is in the unlocking position.

4. A tank according to Claim 2, characterised in that the stop means comprise a pin (26) provided on the tank (1), the axis of which is parallel to the axis of the hole (4) and a guide channel (14) developing in a curved manner which is integral with the plug (8) and can engage the pin (26).

FIG. 1

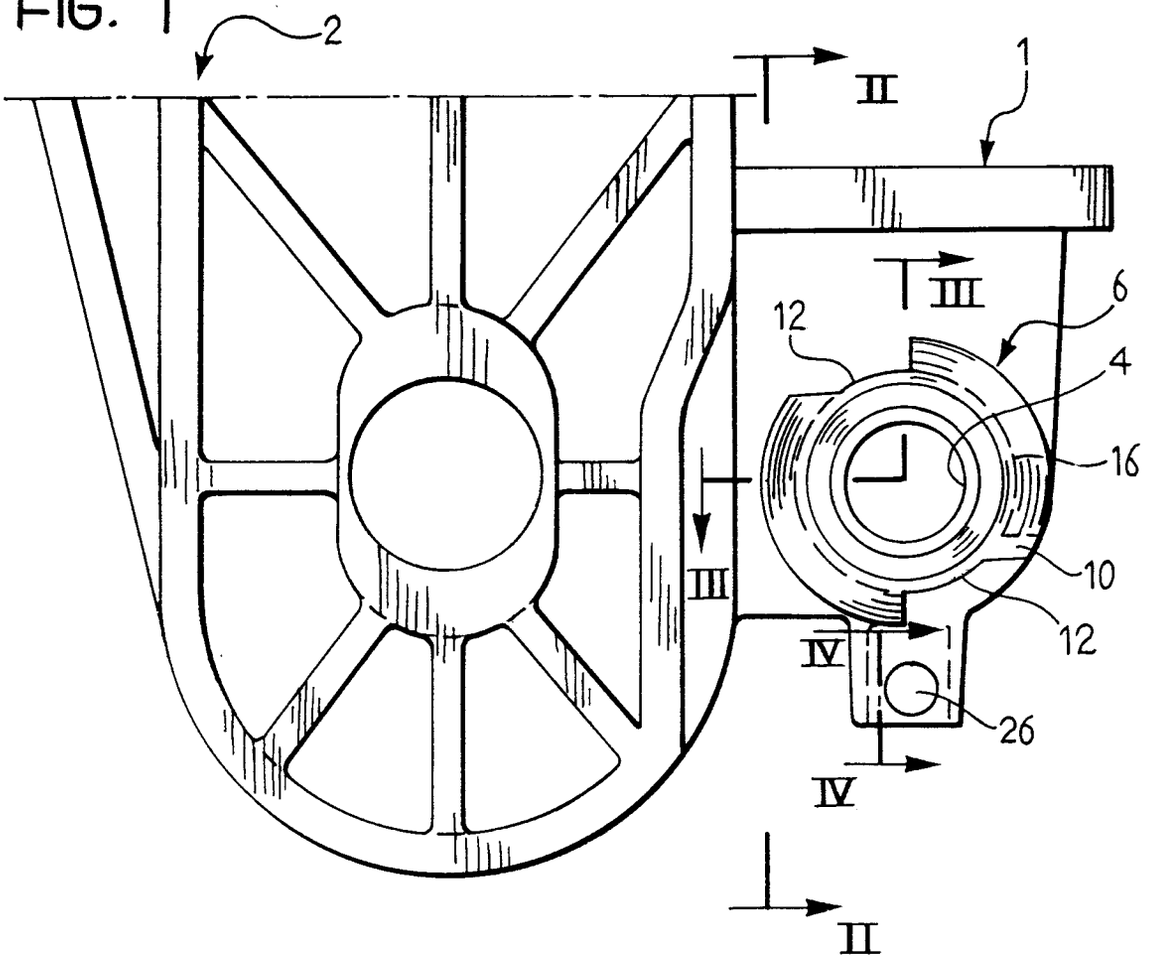



FIG. 2

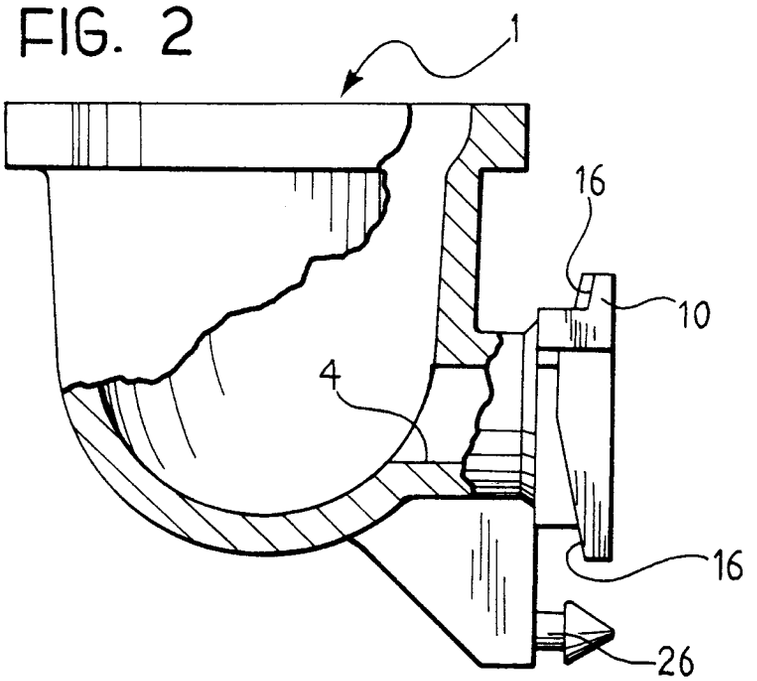


FIG. 3

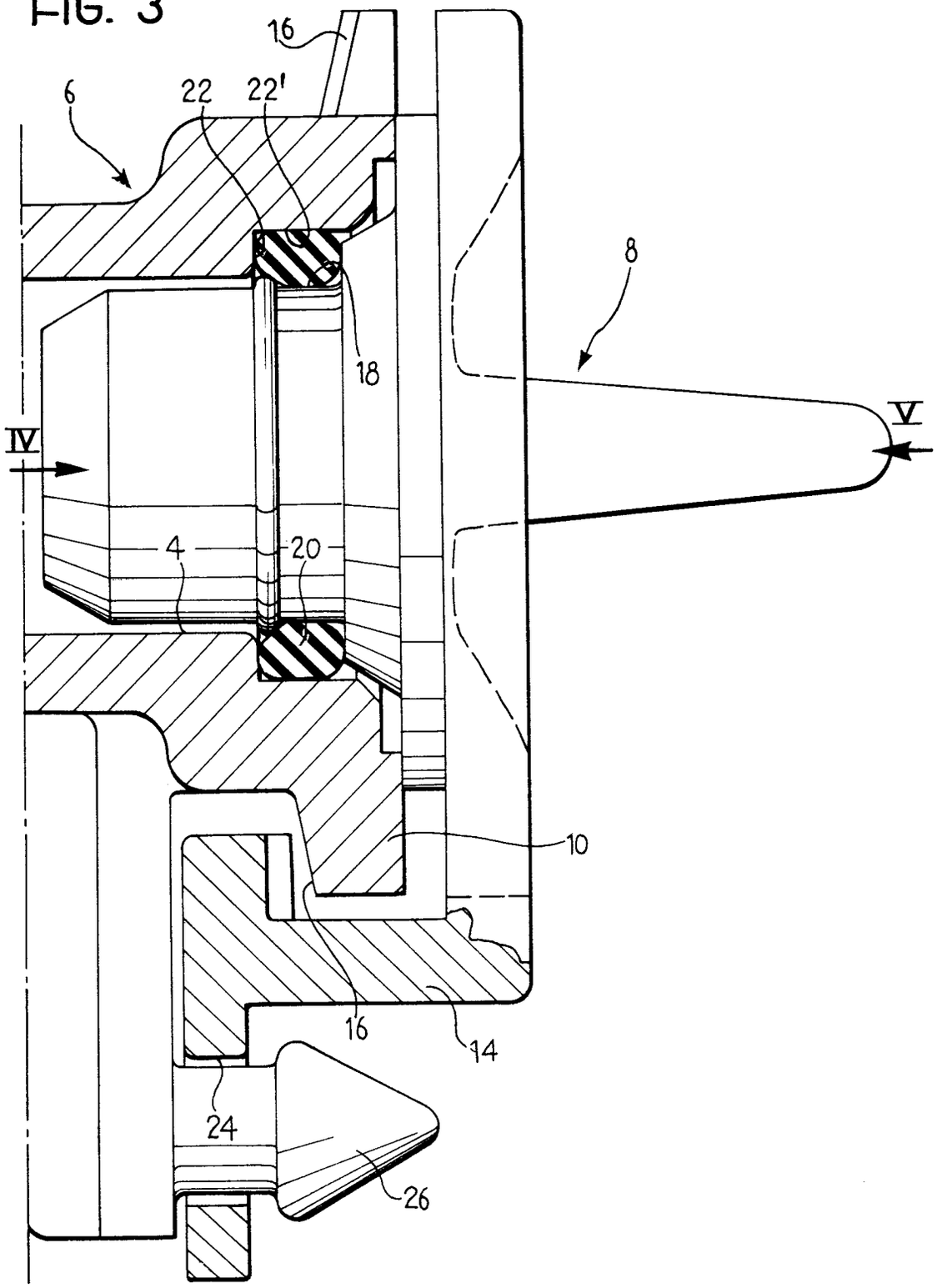


FIG. 4

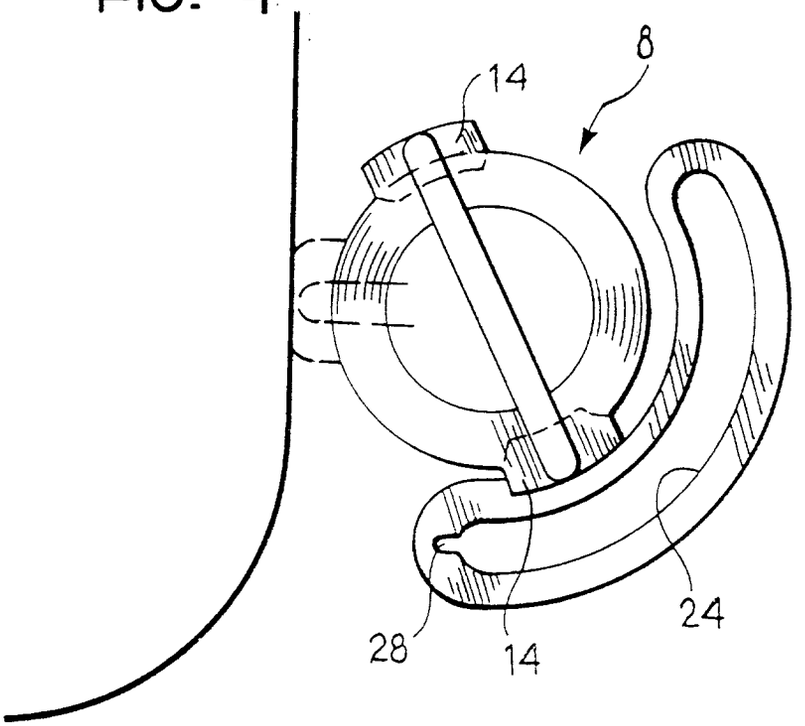
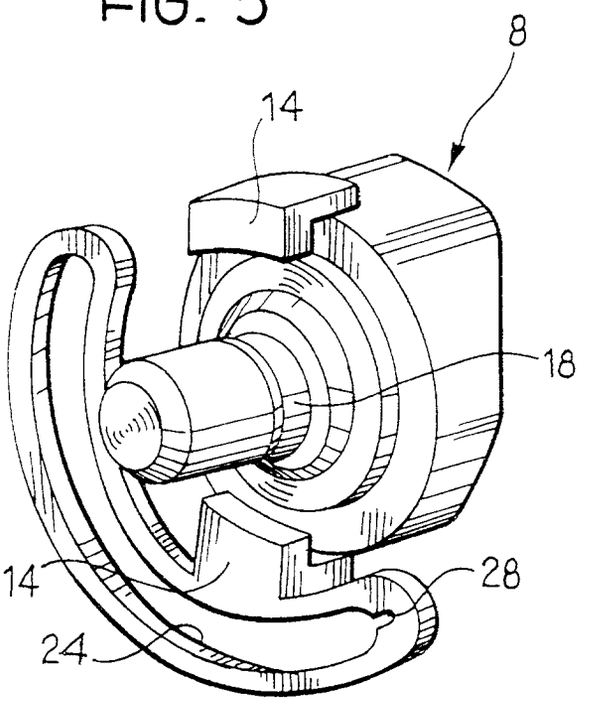



FIG. 5



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# EUROPEAN SEARCH REPORT

Application Number
EP 94 11 8345

## 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.6) |
|---|---|---|---|
| X | EP-A-0 370 234 (REUTER METALLWARENFABRIK GMBH)<br>* abstract * | 1,3 | B65D51/00 |
| A | GB-A-659 146 (WESTWOOD RIM & PATENTS LIMITED)<br>* figures * | 1,3 | |
| A | BE-A-429 952 (SA L'ACCESSOIRE DE PRÉCISION)<br>* figures 5-7 * | 1,2,4 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65D
B60H
F28F

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 5 April 1995 | Van Gestel, H |

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