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Datasheet for the decision of 24 April 2007

Case Number: T 0965/03 - 3.2.01

Application Number: 95113477.4

Publication Number: 0699547

IPC: B60H 1/04

Language of the proceedings: EN

Title of invention:
Hot water type heating apparatus for vehicles

Patentee:
DENSO CORPORATION

Opponent:
Behr GmbH & Co.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 69(1), 123(3)

Keyword:
"Amendments - opposition proceedings"
"Inventive step - yes"

Decisions cited:

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0965/03 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 24 April 2007

Appellant: (Patent Proprietor)
DENSO CORPORATION
1-1, Showa-cho
Kariya-City
Aichi-Pref. 448 (JP)

Representative:
Klingseisen, Franz
Patentanwälte
Dr. F. Zumstein
Dipl.-Ing. F. Klingseisen
Postfach 10 15 61
D-80089 München (DE)

Respondent: (Opponent)
Behr GmbH & Co.
Mauserstraße 3
D-70469 Stuttgart (DE)

Representative:
Brisch, Georg
Grosse Falterstrasse 1
D-70597 Stuttgart (DE)

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 31 July 2003 revoking European patent No. 0699547 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
G. Weiss

Summary of Facts and Submissions

I. The appeal is directed against the decision posted 31 July 2003 revoking European patent No. 0 699 547.

II. The following state of the art played a role during the appeal:

E2: US-A-4 195 777

E3: Brochure entitled "Behr Air conditioning for motor vehicles", page 20

E7: DE-A-34 47 182.

The opposition division found that the subject-matter of claim 1 then on file did not involve an inventive step in comparison with the disclosures of E2 and E3 in combination.

III. At oral proceedings held on 24 April 2007 the appellant requested that the decision under appeal be set aside and the patent maintained on the basis of claim 1 submitted during the oral proceedings and claims 2 to 12 filed with a letter of 31 October 2005 (main request) or in the alternative on the basis of claims 1 to 10 or 1 to 9 submitted with the letter of 23 March 2007 (first and second auxiliary requests respectively). The respondent requested that the appeal be dismissed.

IV. Claim 1 according to the appellant's main request reads:

"A hot water type heating apparatus for a vehicle having a water cooled engine (1), said heating apparatus comprising:
a heat exchanger (3) constructed and arranged to heat a passenger compartment of said vehicle by heat exchanging air with hot water supplied from the engine, said heat exchanger (3) having a hot water inlet portion and a hot water outlet portion;
means for controlling flow quantity of said hot water supplied from the engine (1) to said heat exchanger (3) and a flow control valve (4) comprising:
a valve housing (18) constructed and arranged to be coupled between said heat exchanger (3) and the engine (1);
a first hot water inlet pipe (19) constructed and arranged such that one end is coupled to said valve housing (18) and another end may be coupled to the engine (1) such that hot water from the engine (1) may flow into said first hot water inlet pipe (19);
a first hot water outlet pipe (20) constructed and arranged to be fluidly connected between said heat exchanger (3) and the engine (1), one end of said first hot water outlet pipe (20) being connected to said valve housing (18) and the other end being connectable to the engine (1), said first hot water outlet pipe (20) returning said hot water to the engine;
a second hot water outlet pipe (22) constructed and arranged such that one end thereof is coupled to said valve housing (18) and another end thereof being coupled to said heat exchanger (3), said second hot water outlet pipe (22) directing said hot water flowing

from said first hot water inlet pipe (19) to said hot water inlet portion of said heat exchanger (3);
a second hot water inlet pipe (21) connected between said valve housing (18) and said heat exchanger (3), which directs said hot water from said hot water outlet portion of said heat exchanger (3) into said valve housing (18);
a bypass circuit (5) defined in said valve housing (18) which selectively connects said hot water from first hot water inlet pipe (19) directly to said first hot water outlet pipe (20); and
a valve body (17) disposed in said valve housing (18) between said first hot water inlet pipe (19) and said second hot water outlet pipe (22) and in fluid communication with said bypass circuit (5), said valve body (17) being constructed and arranged to adjust an opening area between said first hot water inlet pipe (19) and said second hot water outlet pipe (22) while controlling flow through said bypass circuit (5), characterized in that
said flow control valve is a flow quantity control valve (4) for controlling the flow quantity of hot water supplied from the engine (1) to the heat exchanger (3), said flow quantity control valve (4) being detachably integrated with said heat exchanger (3) as a unit and being in fluid communication therewith, and that
a pressure valve (6) is disposed in said bypass circuit (5), said pressure valve being constructed and arranged to open when pressure of said hot water supplied from said engine (1) increases so that a difference in pressure between pressure in said first hot water inlet pipe (19) and pressure in said first hot water outlet pipe (20) is kept in a constant value,

wherein said heat exchanger (3) includes an inlet tank (3a) constructed and arranged to receive said hot water directed from said second hot water outlet pipe (22), an outlet tank (3b) constructed and arranged to return said hot water to said second hot water inlet pipe (21), and a core portion (3c) between said inlet tank (3a) and said outlet tank (3b) comprising a plurality of tubes disposed in parallel allowing hot water to flow from said inlet tank (3a) to said outlet tank (3b), said flow quantity control valve (4) being disposed adjacent to one of said inlet tank (3a) and said outlet tank (3b) and mounted in longitudinal direction of one of said inlet tank (3a) and said outlet tank (3b), and said first hot water inlet pipe (19) and said first hot water outlet pipe (20) extending in parallel and in a perpendicular direction with respect to said longitudinal direction, said flow quantity control valve (4) and said heat exchanger (3) being constructed and arranged to be disposed in said passenger compartment (35), and each end of said first hot water inlet pipe (19) and said first hot water outlet pipe (20) being constructed and arranged to extend into an engine room (34) where the engine (1) is disposed."

Claims 2 to 12 contain features additional to those of claim 1.

V. The respondent's submissions in as far as they are relevant to the appellant's main request may be summarised as follows:

Claim 1 as granted specified that the flow quantity control valve was integrated with the heat exchanger. This meant that it was formed as one piece and the

translations of the claim into German and French confirm this view. Present claim 1, however, specifies that the valve is "detachably" integrated. As a result, the scope of protection is extended, in contravention of the provision of Article 123(3) EPC.

Claim 1 now specifies that the valve is mounted in "longitudinal" direction of one of the end tanks. However, since the tanks may exhibit no clear longitudinal direction the valve location is unclear.

E7 exhibits particularly in figure 5 all features of the preamble of present claim 1 together with those of the construction of the heat exchanger itself, the unitary construction of the valve and heat exchanger, the parallel arrangement of the inlet and outlet pipes and at least in part the arrangement of the valve longitudinally of an end tank. E2 discloses a flow quantity control valve which would be an obvious alternative to the valve arrangement of E7. The remainder of the features relate to the adaptation of the assembly for installation in the space available in a particular vehicle, which is a normal activity in the art.

VI. The appellant submitted essentially that:

The specification that the valve is "detachably" integrated with the heat exchanger is fully in conformity with the description. It follows that the scope of protection when determined in accordance with Article 69(1) EPC is not changed.

As regards the location of the valve it is clear that the claim requires that the end tank has a longitudinal extent and that the valve is mounted in the extension of that direction.

Present claim 1 contains two groups of features directed towards function and installation. The quantity control valve provides heating independent of engine speed and the uni-directional flow through the core provides a constant gradient of heat exchange. The one-way flow and longitudinally mounted valve both allow end tanks of minimal dimensions. The teaching of E7 contains no suggestion to arrange the valve body as a unit with an end tank. A combination with E2 would merely result in exchanging the type of valve. E3 provides no motivation to the skilled person to adopt one of the illustrated arrangements and even if he would do so there is still no disclosure of the detachable integration presently claimed.

Reasons for the Decision

1. The patent relates to a heating apparatus for a motor vehicle in which heat is transferred by means of a heat exchanger from the engine cooling water to air passing into the vehicle interior. The cooling water is circulated by the water pump of the engine and is directed by a valve through the heat exchanger and/or through a by-pass in parallel with the heat exchanger, in accordance with the amount of heat which is to be transferred to the air. A differential pressure valve in the by-pass maintains the flow of cooling water through the heat exchanger at a desired level,

independent of the output of the water pump. The flow quantity control valve, the pressure differential valve and the by-pass passage are included in a housing which is mounted on the end of one of the end tanks of the heat exchanger.

Amendments to claim 1

2. Claim 1 is essentially a combination of claims 1, 11 and 12 as granted together with features from claim 11 as originally filed. The board is satisfied that the amendments do not contravene the provisions of Articles 123(2) and (3) EPC and that they do not introduce any lack of clarity (Article 84 EPC). The respondent, on the other hand, considers that some amendments do lead to the objections which are treated below.

2.1 Claim 1 as granted specified that the flow quantity control valve (implicitly, the valve housing) was integrated with the heat exchanger as a unit. The claim has been amended to now specify that the valve is 'detachably' integrated as a unit and the respondent sees a resulting shift of subject-matter of the claim, contravening the provision of Article 123(3) EPC. However, Article 123(3) EPC relates to the extent of protection conferred by a claim which in accordance with Article 69(1) EPC is to be determined by the terms of the claim when interpreted in the light of the description. It is therefore necessary to examine the relevant content of the description.

2.1.1 The patent specification contains four embodiments illustrated in figures 1 to 7, 8, 9 and 11 respectively. However, all embodiments share the attachment of the valve housing to an end tank illustrated in figure 4. The associated description states the following:

"a unitized structure of the flow quantity control valve and heat exchanger is illustrated." (page 3, line 57);

"Second hot water inlet pipe is directly, watertightly and detachably connected to hot water outlet 3g, which is provided at one end of outlet tank 3b of heat exchanger in a longitudinal direction …" (page 6, lines 33, 34);

"the actuating mechanism for actuating valve body 17 including flow quantity control valve 4 … is configured as a unit and is further attached to heat exchanger 3 as a unit beforehand …" (page 6, lines 37 to 39).

2.1.2 It is clear from the above when taken in combination that the specification in claim 1 as granted that the flow quantity control valve and the heat exchanger are "integrated … as a unit" when properly interpreted in accordance with Article 69(1) EPC does not have the meaning of them being formed in one piece. It follows that the additional specification that they are "detachably" integrated does not contravene the provision of Article 123(3) EPC. The respective texts of claim 1 as translated into German and French have no bearing on this matter since they are not the authentic text (Article 70(1) EPC).

2.2 The specification in claim 1 as granted that the flow quantity control valve is mounted "in an axial direction" of one of the inlet and outlet tanks of the heat exchanger has been amended to replace the term "axial" by "longitudinal". This amendment was made since it previously was unclear which axis of the tank was used as the reference. The respondent considers that the amendment results in a lack of clarity since the tanks may not exhibit a clear longitudinal direction. However, it is implicit from the wording of the claim that the tank does exhibit a longitudinal direction. A further amendment of the claim to explicitly specify that the tank exhibits a longitudinal direction and thereby provide a precedent for this feature would have no influence of the clarity of the claim.

Inventive step

3. E7 relates generally to a heating apparatus for a vehicle, in which water is pumped from the engine through a radiator for cooling. As is conventional, a first by-pass passage and a first, thermostatic diverter valve are provided in parallel with the radiator to reduce the time the engine needs to reach normal operating temperature. As is further conventional a heat exchanger is provided in parallel with the radiator in order to provide heat to the vehicle interior, the supply of hot water to the heat exchanger or to the radiator being controlled by a second diverter valve. The teaching of E7 particularly relates to the provision of an additional heating assembly for heating water and circulating it through the heat exchanger for heating the vehicle interior

before hot water is available from the engine. The assembly includes a third diverter valve and a second by-pass passage in parallel with the heat exchanger and including a pump and an electrical heater, all built into a housing. In one position of this third diverter valve water from the engine passes through the heat exchanger in normal fashion. In its other position a closed circuit is formed, the water being pumped continuously through the electrical heater and the heat exchanger. In the detailed embodiment of figure 5 the heat exchanger is provided with end tanks which are configured to provide bi-directional flow through the core whereby both inlet and outlet pipes are provided at one end of one tank. The ends of these pipes are mutually parallel and join a flange to which is mounted a similar flange on the housing.

4. E2 relates to a flow quantity control valve assembly for use in controlling the supply of hot water to a heat exchanger for heating the interior of a motor vehicle. The assembly includes a by-pass passage in parallel with the heat exchanger and incorporating a differential pressure valve to limit variations in the flow of water through the heat exchanger resulting from changes in the speed of an engine-driven water pump. The inlet and outlet pipes are mutually parallel but it is clear from the form of the pipe ends that they are intended to be connected to flexible hoses. No detail is given as regards any mounting of the valve housing.

5. E3 illustrates six heat exchangers and the text relates generally to some of the features provided, such as aluminium tubes and plastics end tanks. One heat exchanger shown is provided with an additional housing

adjacent to one end, but not in the longitudinal direction, of one of the end tanks. A connection pipe is visible on the other end tank. No written description of these features is provided.

6. The features contained in present claim 1 do not all combine to solve a single problem. Indeed, the appellant itself argues that there are features relating separately to function and installation. However, the features relating to the detachable integration of the valve housing with, and in the longitudinal direction of an end tank do combine to provide a compact and secure mounting without the need for additional parts.

6.1 E7 may be regarded as disclosing the closest state of the art in as far as it provides a more complete apparatus than does E2 and contains additional teaching regarding the mounting of a housing incorporating a number of components. As already set out under point 3 above the by-pass circuits of E7 have two quite different functions, one being to permit circulation of the cooling water through the engine during the warm-up phase and the other being to provide circulation of electrically heated water to the passenger compartment during the warm-up phase. The by-pass circuit defined in the valve housing according to present claim 1, on the other hand, contains a differential pressure valve and is functionally associated with the flow control valve for maintaining the flow of water through the heat exchanger independent of the output of the engine water pump. The presently claimed flow control valve and by-pass therefore do not correspond in function to

the commonly-housed third diverter valve and second by-pass of E7.

6.2 The flow control valve and by-pass of E2 correspond in function to those presently claimed and together are an alternative to the second diverter valve of E7, offering improved control and, as argued by the respondent, their use in the apparatus of E7 would appear to be obvious. However, even if the skilled person were to replace the second diverter valve of E7 by the flow control valve of E2 and in so doing follow the teaching of E7 figure 5 and include the valve and the additional by-pass in a housing directly connected to the heat exchanger, he still would not arrive at the subject-matter of present claim 1. The figure is described as being semi-schematic and the description essentially restricts itself to explanation of the flow arrangement of the heat exchanger and the connection between the pipes and the valve housing by means of flanges. The document is silent as regards the illustration in figure 5 of the spatial relationship between the valve housing and the end tank. Moreover, the illustrated adjacent inlet and outlet pipes of the heat exchanger result from the bi-directional flow through the core of the heat exchanger. There is no teaching towards the presently claimed particular constructional and spatial arrangement of the valve housing and heat exchanger and the uni-directional flow arrangement through the heat exchanger core. The presently claimed features also extend beyond what would be necessary to adapt an assembly resulting from a combination of E7 and E2 to a particular installation.

6.3 E3 does illustrate a housing close to and perhaps mounted on one end of an end tank of a heat exchanger but is silent both as regards the function of the housing and the form of any constructional and functional connections between it and the heat exchanger. The text of E3 also provides no motivation to adopt the illustrated arrangement of the combination of a valve housing and heat exchanger which anyway would not correspond to the arrangement presently claimed.

7. On the basis of the foregoing the board concludes that the subject-matter of present claim 1 is not rendered obvious by the available state of the art. Since claims 2 to 12 contain all features of claim 1 the same conclusion applies equally to those claims.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent as amended in the following version:

   - claim 1 of the main request submitted at the oral proceedings;

   - claims 2 to 12 submitted with letter dated 31 October 2005;

   - description pages 2, 3, 4, 6 and 8 submitted with letter dated 23 March 2007 and pages 5 and 7 as granted;

   - figures 1 to 11 as granted.

The Registrar: The Chairman:

A. Counillon S. Crane