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Datasheet for the decision of 23 June 2010

Case Number: T 0794/07 - 3.5.02

Application Number: 02016274.9

Publication Number: 1286449

IPC: H02K 11/02

Language of the proceedings: EN

Title of invention:
Capacitor assembly for an alternator and a method for the manufacture thereof

Applicant:
MITSUBISHI DENKI KABUSHIKI KAISHA

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 56, 84, 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Claims - clarity (yes)"
"Inventive step - (yes) after amendment"

Decisions cited:
-

Catchword:
-

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Case Number: T 0794/07 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 23 June 2010

Appellant: MITSUBISHI DENKI KABUSHIKI KAISHA
7-3, Marunouchi 2-chome
Chiyoda-ku
Tokyo 100-8310 (JP)

Representative: HOFFMANN EITLE
Patent- und Rechtsanwälte
Arabellastraße 4
D-81925 München (DE)

Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 11 December 2006 refusing European patent application No. 02016274.9 pursuant to Article 97(1) EPC 1973.**

Composition of the Board:

Chairman: M. Ruggiu
Members: G. Flyng
P. Mühlens

Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing the European patent application no. 02 016 274.9.

II. The examining division refused the application on the grounds that the feature "elastic resin" as defined in claims 1 and 6 of the main and the first and second auxiliary requests on file at the time lacked clarity, Article 84 EPC.

The following documents were listed in the decision:

D1: US-A-4 459 499;
D2: Patent Abstracts of Japan vol. 1999, no. 02, 26 February 1999 and JP 10 304638 A;
D3: FR-A-2 544 581;
D4: Patent Abstracts of Japan vol. 010, no. 356 (E-459), 29 November 1986 and JP 61 154057 A;
D5: US-B1-6 236 557.

The decision also referred to a dictionary definition of the term "elastic" from A*nswers.com* that was filed by the appellant with a letter dated 21 September 2006.

In a section which was presented as not forming part of the decision, the examining division, referring to documents D2 and D5, observed that the claims of all requests did not involve an inventive step, Article 56 EPC.

III. With the written statement setting out the grounds of appeal (letter of 23 April 2007), the appellant filed

independent claims 1 and 6 of revised main and first and second auxiliary requests. Independent claim 1 of each request included a feature that connection portions between the positive terminal and the capacitor positive electrode terminal and between the negative terminal and the capacitor negative electrode terminal are "embedded in an elastic resin (57)". Independent method claim 6 of each request included a corresponding method step.

IV. The Board summoned the appellant to attend oral proceedings. In an annex to the summons the Board observed that the term "elastic resin", though perhaps rather broad, was sufficiently clear in the context. Referring to a machine translation of document D2 annexed to the summons, the Board made observations on the disclosure of document D2, questioning whether it would not be obvious, starting from D2, to embed the exposed soldered connections between the electrode terminals 3b and insertion terminals 1a using an elastic resin. In this regard the Board referred to the following prior art document and a machine translation thereof that were annexed to the summons:

D6: JP 10-241110, published 11 September 1998, and its abstract.

V. With a letter dated 7 May 2010 the appellant filed new independent claims 1 and 6 of the main and first and second auxiliary requests and noted that in these the term "single molding resin" had been amended to "single resin portion". The appellant addressed the points raised in the annex to the summons, arguing in

particular that document D2 did not disclose a single resin portion.

VI. Oral proceedings were held on 23 June 2010, during which the appellant presented amended claims 1 and 6 of a new main request.

The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 and 6 filed during the oral proceedings of 23 June 2010 and claims 2 to 5, 7 and 8 filed with the letter of 13 September 2005.

VII. Independent claims 1 and 6 (main request) read as follows:

"1. A capacitor assembly for an alternator, comprising:

a resin-molded part (38, 41C, 53, 60) composed of a single resin portion and formed by molding using a first molding resin, said resin-molded part being mountable to an alternator case (3);

a positive terminal (27a, 37a, 44b) and a negative terminal (37b, 44d) insert-molded into said resin-molded part (41C, 53, 60); and

a capacitor component (35) to be installed between a battery terminal end and ground, said capacitor component having a capacitor positive electrode terminal (36a, 44a) and a capacitor negative electrode terminal (36b, 44e) for electrical connection to said positive terminal (27a, 37a, 44b) and said negative terminal (37b, 44d), wherein

said capacitor component (35) is molded integrally into said resin-molded part (38, 41C, 53, 60) so as to be embedded in the single resin portion of said

resin-molded part such that only connection portions between said positive terminal (27a, 37a, 44b) and said capacitor positive electrode terminal (36a, 44a) and between said negative terminal (37b, 44d) and said capacitor negative electrode terminal (36b, 44e) are exposed, wherein

said connection portions are embedded in an elastic resin (57)."

"6. A method for manufacturing a capacitor assembly for an alternator, said capacitor assembly comprising a positive terminal (27a, 37a, 44b), a negative terminal (37b, 44d) and a capacitor component (35) to be installed between a battery terminal end and ground, said capacitor component having a capacitor positive electrode terminal (36a, 44a) and a capacitor negative electrode terminal (36b, 44e) for electrical connection to said positive terminal (27a, 37a, 44b) and said negative terminal (37b, 44d), comprising the steps of:

integrally molding said positive terminal (27a, 37a, 44b), said negative terminal (37b, 44d), and said capacitor component (35) using a first molding resin so as to form a resin-molded part (38, 41C, 53, 60) composed of a single resin portion and so as to embed the capacitor component (35) in the single resin portion of said resin-molded part (38, 41C, 53, 60) and to expose only connection portions between said positive terminal (27a, 37a, 44b) and said capacitor positive electrode terminal (36a, 44a) and between said negative terminal (37b, 44d) and said capacitor negative electrode terminal (36b, 44e) from said first molding resin;

connecting said connection portions between said positive terminal (27a, 37a, 44a) and said capacitor

positive electrode terminal (36a, 44a) and between said negative terminal (37b, 44d) and said capacitor negative electrode terminal (36b, 44e), and

embedding said connection portions into an elastic resin (57)."

Claims 2 to 5 and claims 7 and 8 are dependent on claims 1 and 6, respectively.

VIII. The appellant argued essentially that the claims as amended did not introduce fresh subject-matter, were clear and were novel and inventive over the cited prior art.

In particular, the appellant argued that the term "elastic" was clear, and the skilled person would have a clear idea how it was to be construed in connection with the resin embedding the connection portions.

Furthermore, the appellant argued that document D2 did not disclose a resin-molded part composed of a single resin portion, nor molding a capacitor component integrally into the resin-molded part so as to be embedded in said single resin portion of said resin-molded part such that only connection portions between the positive terminal and the capacitor positive electrode terminal and between the negative terminal and the capacitor negative electrode terminal are exposed. Furthermore, D2 did not disclose to embed such connection portions in an elastic resin.

The appellant held that these features were furthermore not obvious in view of the cited prior art.

Reasons for the Decision

1. The appeal is admissible.

2. Amendments, Article 123(2) EPC

2.1 Independent claim 1 filed during the oral proceedings before the board differs from claim 1 as originally filed in substance in that (emphasis added):

- The resin-molded part is composed of a single resin portion;

- The capacitor component is embedded in said single resin portion of said resin-molded part such that only the connection portions between the positive terminal and the capacitor positive electrode terminal and between the negative terminal and the capacitor negative electrode terminal are exposed; and

- Said connection portions are embedded in an elastic resin.

A basis for the feature "composed of a single resin portion" is to be found in paragraphs [0037] and [0040] of the application as filed (see EP 1 286 449 A1), which mentions a "first resin portion 38" being composed of a "single molding resin". Whilst this passage refers specifically to "embodiment 1", which does not fall within the scope of claim 1, it is evident that also in the embodiment of figure 17, Embodiment 8, which does fall within the scope of present claim 1, the first resin portion 38D described

in paragraph [0089] is composed of a single molding resin and thus constitutes a single resin portion.

It is further evident from figure 17 that the capacitor component is embedded in the single resin portion 38D such that only the connection portions between the positive terminal and the capacitor positive electrode terminal and between the negative terminal and the capacitor negative electrode terminal are exposed.

Paragraphs [0087] and [0089] of the application as filed, which refer to Embodiment 8, disclose that the connection portions are embedded in an elastic resin 57.

For the above reasons, the amendments to the claim 1 do not offend Article 123(2) EPC.

2.2 Present independent method claim 6 differs from originally filed claim 9 by corresponding features and does not offend Article 123(2) EPC for the same reasons as claim 1.

3. Clarity, Article 84 EPC

The adjective "elastic" refers generally to the ability of a material that has been subjected to a deformation, to return to its initial shape.

In the contested decision, referring in particular to the second sense of the term "elastic" given in the dictionary definition provided by the applicant, a sense that is applicable in physics, the examining division held that any material may be described as

elastic as it will return to its original shape provided the deformation applied is not too great. Whilst this may be true in the purely physical sense, the board does not believe that the skilled person considering the present application would construe the term "elastic" in such a theoretical manner. Rather, the skilled person would construe the term in a more general, practical sense, for example as given in the first sense of the above mentioned dictionary definition, i.e.:

> "Easily resuming original shape after being stretched or expanded; flexible".

With such a practical interpretation, the board considers that the term "elastic resin", though perhaps rather broad, is sufficiently clear to the person skilled in the art in the present context.

4. Novelty and inventive step, Articles 54 and 56 EPC

4.1 Novelty was not contested in the appealed decision or in the observations attached thereto. The Board has found no document that discloses all the features of claim 1 or claim 6 in combination, in particular no document disclosing a capacitor assembly for an alternator in which connection portions of the capacitor are embedded in an elastic resin. Thus, claims 1 and 6 are considered to be novel.

4.2 Document D2 may be taken as a suitable starting point for the assessment of inventive step. It discloses a structure for fixing a noise preventing capacitor 3 to

a resin regulator case 1 or brush holder for a vehicle alternator.

The noise-preventing capacitor 3 of D2 is constituted by inserting a capacitor element 3c into a resin capacitor case 3a, and injection moulding material 3d such as epoxy (see abstract). Two metallic terminal electrodes 3b extend from the capacitor element 3c and out of the moulding material 3d of the capacitor 3 (see figures 2, 6 and 7).

In the embodiment of figures 1, 2 and 6, the metallic terminals 3b are small-diameter lead wires, whereas in the embodiment of figures 3, 4 and 7, the metallic terminals 3b are thin tabs (see paragraph [0010] of the machine translation).

In the embodiment of figures 1, 2 and 6, the lead wires 3b are inserted into holes formed in insertion terminals 1a of the regulator case 1. In the embodiment of figures 3, 4 and 7, the tabs 3b are placed "in piles" on the insertion terminals 1a of the regulator case 1. In both embodiments, the tabs 3b are connected to the insertion terminals 1a by soldering or welding after moulding the regulator case 1 (see paragraph [0010]). Thus, it is evident that these connections are exposed from the moulding material of the regulator case 1.

4.3 The question arises, whether the capacitor element 3c or the capacitor 3 of document D2 may be considered to represent a "capacitor component" in the sense of the present application.

Paragraphs [0002] to [0004] of the application as filed describe a capacitor assembly in a conventional alternator. There it is explained that (emphasis added):

> *"The capacitor component is accommodated inside a cup-shaped capacitor receptacle, being integrated with the capacitor receptacle by a filler resin injected inside the capacitor receptacle and hardened. The capacitor assembly is constructed by inserting the capacitor receptacle containing the capacitor component into an insertion aperture disposed through a brush holder which is a rear-end built-in molded part, and joining component terminals to holder terminals by a joining means such as soldering."*

From this passage it is evident that in the terminology of the present application, the "capacitor component" does not include the "cup-shaped receptacle" and the "filler resin", but rather is accommodated inside, and integrated by them.

Thus, comparing the disclosure of document D2 with the terminology established in paragraphs [0002] to [0004] of the application, it can readily be seen that the capacitor element 3c of D2 represents a "capacitor component" in the sense of the present application, whereas the capacitor 3 as a whole does not.

4.4 Having established the above, it can be seen that the subject-matter of claim 1 differs from the disclosure of document D2 in that:

– the resin-molded part is composed of a single resin portion;

– the capacitor component is molded integrally into the resin-molded part so as to be embedded in said single resin portion of said resin-molded part such that only connection portions between the positive terminal and the capacitor positive electrode terminal and between the negative terminal and the capacitor negative electrode terminal are exposed; and

– said connection portions are embedded in an elastic resin.

4.5 Referring to paragraphs [0009] and [0010] of the application, it is evident that embedding the capacitor component in the single resin portion of the resin-molded part would solve the problem of insulation failure caused by salt water penetration between the capacitor filler resin and the resin-molded part, as well as the problem of the lengthy manufacturing time required for the hardening of the resin used in D2 to secure the capacitor element into the capacitor case. Leaving the connection portions exposed from the single resin portion allows them to be joined using solder, which has a low melting temperature (see paragraph [0086]). Embedding the connection portions in an elastic resin prevents corrosion, whilst allowing thermal expansion without cracking.

4.6 None of the prior art documents referred to in the contested decision discloses an arrangement in which a resin-molded part is composed of a single resin portion

and a capacitor component is embedded in that single resin portion such that connection portions between its positive and negative electrodes and positive and negative terminals molded into the resin-molded part are left exposed.

Specifically, in document D1, a connection plate of molded material is shown in figure 4. According to column 2, lines 25 to 31, three connection leads 32, 33, 34 are "embedded in the connection plate" (emphasis added). In figure 4, these leads are depicted with dashed lines, which is consistent with the fact that they are embedded. According to column 2, lines 32 to 48, a capacitor 36 is "integrated into the connection plate" (emphasis added) and it is stated that the "capacitor 36, together with its connection hardware 37-41, forms a prefabricated component which is inserted into the pressure mold of the connection plate 31 ...". However it is not disclosed that the capacitor is embedded in the molding material of the connection plate and in figure 4 the capacitor 36 is depicted with solid lines, suggesting it is not embedded. Thus, in the wording of present claim 1, it is not directly and unambiguously derivable from D1 that the capacitor 36 is embedded in the single resin portion of the resin-molded part. Furthermore, it is not evident that the positive and negative electrodes of the capacitor are connected to positive and negative terminals that are molded into the resin-molded part, with connection portions left exposed.

In document D3, a conductive plate 16 is provided that comprises symmetrical positive and negative terminals, which are initially linked by a bridge 17 (see page 4,

lines 5 to 22 and figure 2). Pairs of holes 26, 27 are pierced in the plate 16 for soldering the connecting leads of a capacitor 30 (see page 4, lines 11 and 12). After the capacitor 30 has been mounted on the plate 16 and connected electrically, the plate and the capacitor are moulded in a block of insulating material. Thus, it seems that the connection portions 26, 27 between the capacitor electrodes and the terminals are embedded in the insulating material, not exposed as claimed.

In document D4, connections to electrodes of a capacitor 13 are likewise embedded in resin material 12 (see figure 1).

In document D5, a capacitor element 50 is inserted into the inside space of a capacitor container portion 41 of a first resin part 40 that is made from PPS resin. A filling resin 53 is charged into the gap between the capacitor container portion 41 and the capacitor element 50 (see column 4, lines 9 to 24 and column 4, line 64 to column 5, line 11). Thus, the resin-molded part is not composed of a single resin portion, and the capacitor component is not embedded in such a single resin portion as claimed.

4.7 As none of the available documents discloses embedding a capacitor component in a resin-molded part composed of a single resin portion as specified in claim 1, the Board concludes that the subject-matter of claim 1 is not obvious to the person skilled in the art and hence shall be considered as involving an inventive step.

4.8 Independent claim 6 specifies method steps that correspond to the apparatus features of claim 1 and thus involves an inventive step for the same reasons.

4.9 Claims 2 to 5, 7 and 8 involve an inventive step at least in view of their dependency on claim 1 or claim 6.

5. It is apparent that the dependent claims and the description may need to be adapted for conformity with the new claims 1 and 6. For this reason the board considers it appropriate to make use of its power under Article 111(1) EPC to remit the case to the department of first instance for further prosecution.

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 for further prosecution.

The Registrar: The Chairman:

U. Bultmann M. Ruggiu