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D E C I S I O N
of 8 October 2002

Case Number: T 0017/00 - 3.5.2

Application Number: 91310975.7

Publication Number: 0501070

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Language of the proceedings: EN

Title of invention:
Small sized electromagnetic relay

Patentee:
TAKAMISAWA ELECTRIC CO., LTD.

Opponent:
Siemens AG Zentralabteilung Technik ZT PA 6

Headword:
-

Relevant legal provisions:
EPC Art. 56, 123(2), (3)

Keyword:
"Inventive step - main request (yes)"
"Added subject-matter, extension of the protection - main request (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0017/00 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 8 October 2002

Appellant: (Proprietor of the patent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 9 November 1999 revoking European patent No. 0 501 070 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: W. J. L. Wheeler
Members: J.-M. Cannard
P. H. Mühlens

Summary of Facts and Submissions

I. The proprietor appealed against the decision of the opposition division to revoke the European patent No. 0 501 070. The reason given for the revocation was that claim 1 according to the request filed on 30 September 1999 during the oral proceedings before the opposition division did not involve an inventive step.

II. Prior art documents:

D1: EP-A-0 332 181,

D3: EP-A-0 161 473,

E1: EP-B-0 075 393, and

E4: DE-A-2 952 271,

cited in support of the opposition, remain relevant to the present appeal.

Documents:

U1: DE-U-8 433 019,

cited by the respondent in the reply to the statement of grounds of appeal dated 25 September 2000, and

E8: EP-A-0 249 025,

cited in the letter of the respondent dated 30 August 2002, were referred to during the appeal proceedings.

III. Claim 1 according to main request filed with the letter dated 5 September 2002, now the only request, reads as follows:

"An electromagnetic relay comprising:

an electromagnet assembly (X) having a core (4), a bobbin (1) for inserting said core thereinto, a yoke (5) fixed to an end of said core, and an armature (7) coupled to the other end of said core;

a hinge spring (6) for the armature; and

a base block assembly (Y) having a base block (8) and a contact spring assembly (9, 10, 11) including a movable contact (9a) and a stationary contact (10a, 11a) adhered to said block,

characterised in that said armature (7) is coupled via said hinge spring (6) to said joke (5), said armature is adjustably mounted relative to said contact spring assembly (9, 10, 11) by adjustable mounting of said electromagnet assembly (X) relative to said base block assembly (Y) and the adjusted position of said electromagnet assembly (X) is fixable relative to said base block (8)."

Claims 2 to 7 are dependent on claim 1.

IV. Oral proceedings were held on 8 October 2002.

V. The arguments of the appellant proprietor can be summarised as follows:

Article 123(2)

Claim 1 resulted from the incorporation in granted claim 1 of a restricting feature which was disclosed in the application as filed (see column 2, lines 3 to 6 of the published application).

Inventive step

In the very similar relays according to documents D3 (Figure 1) and E8 (Figure 1), the armature was disposed in a recess of an extension of the bobbin and not physically anchored to the yoke. This had the disadvantage that the armature could be displaced during the assemblage of the relay. The spring (43) shown in Figure 6 of D3 exerted no restoring force on the armature. Moreover, no adjustment of the positions of the armature and the electromagnet assembly was envisaged in D3 or E8, neither of which disclosed a selection of the mounting positions of these elements. The relay according to claim 1 thus differed from the relays disclosed in D3 and E8 by having an armature coupled to the yoke via a hinge spring, which overcame the residual magnetism when the relay was de-energised, and by having an adjusted position of the armature and electromagnet assembly for compensating for the tolerances of the various components. This resulted in the relay of the invention having a smaller size and a lower power dissipation. Neither document D1 nor document E1 disclosed a hinge spring coupling the armature to the yoke of the relay or an adjusted position of the electromagnet assembly. E4 was not concerned with a small relay and it was not possible to apply the teaching of E4 to the micro-relays according to D3 and E8.

VI. The arguments of the respondent opponent can be summarised as follows:

Article 123(2)

According to the application as filed (column 2, lines 3 to 6) the adjustable mounting of the armature relative to the contact spring assembly was linked to the adjustable mounting of electromagnet assembly relative to the base block assembly. Claim 1 of the granted patent contravened Article 123(2) since it also covered a mere independent adjustable mounting of the armature relative to the contact spring assembly. The incorporation in the present claim 1 of the link between the adjustable mounting of the armature relative to the contact spring assembly and that of the electromagnet assembly relative to the base block assembly was not permissible because this feature has been deleted from the granted patent. Moreover, deletion of the "limiting extension" from present claim 1 would contravene Article 123(3).

Inventive step

Claim 1 lacked an inventive step in view of document D3, or document E8, taken in combination with D3 or U1. D3 disclosed an electromagnetic relay according to the preamble of claim 1. A hinge spring (43) for the armature of the relay was disclosed in the embodiment of realisation according to Figure 6 of D3. Figure 1 of D3 showed a hollow space between the extension (11) of the bobbin (5) and a step in the bottom of the base block assembly (1) for allowing slidable insertion of the electromagnet assembly into the base block assembly (1). An adjusted position and a

fixation of the electromagnet assembly relative to the base block assembly were implicit in D3, and known per se from documents D1 (column 9, lines 17 to 29), E1 (column 4, lines 45 to 62) and E4 (pages 5 and 6, the bridging paragraph). In any case, the adjustment of the armature and of the electromagnet assembly was only defined as an optional feature in claim 1.

E8 disclosed a small relay similar to that of D3. According to E8 the electromagnet assembly (1) was adjustably mounted relative to the base block assembly (14) and the adjusted position of the electromagnet assembly was fixed relative to the base block assembly (Figures 4 and 5; column 5, lines 17 to 19). The relay of E8 thus merely differed from the relay according to claim 1 in that the former did not comprise a hinge spring for coupling the armature to the yoke. However hinge springs for coupling the armature to the yoke of a relay were disclosed in D3 (Figure 6, 43) and in U1 (Figure 1, 35), and the incorporation of such hinge springs in the relay shown in Figure 1 of E8 was obvious.

VII. The appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form in the following version:

- claims 1 to 6 of the then main request filed with letter of 5 September 2002, claim 7 as filed in the oral proceedings;

- description page 1 as filed with letter of 5 September 2002, page 2 as filed in the oral proceedings, column 2, line 14, to column 6, line 28, of patent specification;

- drawings, Figures 1 to 10, of patent specification.

VIII. The respondent requested that the appeal be dismissed.

Reason for the Decision

1. The appeal is admissible.

Admissibility of the amendments

2. Claim 1 now specifies, *inter alia*, that "said armature is adjustably mounted relative to said contact spring assembly (9, 10, 11) by adjustable mounting of said electromagnet assembly (X) relative to said base block assembly (Y)". The present claim thus differs from granted claim 1 in that it restricts the adjustable mounting of the armature relative to the contact spring assembly to being by adjustable mounting of the electromagnet assembly relative to the base block assembly.

2.1 That an adjustment of the relative position of the electromagnet assembly to the base block is identified with an adjustment of the armature to the contact spring assembly is explicitly mentioned in the description of the application as filed (column 2, lines 3 to 6). The subject-matter of present claim 1 thus does not extend beyond the content of the application as filed and is therefore allowable under Article 123(2) EPC.

2.2 It is true that the passage of column 2, lines 3 to 6 of the application as filed has been deleted from the patent in suit. However, a disclosure of an adjustable mounting of the armature relative to the contact spring

assembly being obtained by adjustable mounting of the electromagnet assembly relative to the base block assembly has not been deleted from the description of the patent in suit. The adjustment is disclosed in detail at column 4, line 47, to column 5, line 32, of the patent. The Board can see no reason why this feature could not be incorporated in the present claim 1.

2.3 Claim 7 has been amended to be consistent with the description at column 4, lines 31 to 35 of the patent specification.

2.4 The Board is satisfied that the present claims 1 and 7 satisfy the requirements of Article 84 EPC and do not contravene Article 123(2) and (3) EPC.

Novelty

3. The novelty of the claimed subject-matter has not been disputed.

Inventive step-Argument starting from document D3

4. The electromagnetic relay disclosed in D3 was considered by the opponent as one of the possible starting points. This electromagnetic relay (see D3, page 3, line 19 to page 5, line 22; Figures 1 and 2) comprises the following features in common with the relay according to claim 1:

an electromagnet assembly (3) having a core (4), a bobbin (5) for inserting said core thereinto, a yoke (7) fixed to an end of said core, and an armature (8) coupled to the other end of said core; and

a base block assembly having a base block (1) and a contact spring assembly (17 to 19) including a movable contact (26, 27) and a stationary contact (28 to 31) adhered to said block.

5. However this electromagnetic relay comprises neither a hinge spring for the armature nor the features recited in the characterising part of claim 1.

5.1 According to the embodiment of Figure 1 of D3, the bobbin which is made of a non conductive material is provided with an extension (11) at its extremity which is located at the end of the core coupled to the armature. This extension has a recess (12) for inserting an end of the armature (8) and has a protrusion (13) in contact with the armature so that the armature is movable with respect to the extremity of the core and maintained in its resting-place by means of the elastic properties of the material forming the extension (D3: page 4, lines 4 to 20). However the extension (11) does not form a hinge spring coupling the armature to the yoke as recited in claim 1.

5.2 According to the opponent Figure 1 of D3 shows an insertion guide used for slidably inserting the electromagnet assembly (3) into the base block assembly (1). It is true that Figure 1 shows a hollow space to the right of the extension (11) between it and a step in the bottom of the base block assembly (1). However a function of this hollow space is neither derivable from the drawings nor indicated anywhere in D3. Moreover it appears from Figure 1 that the yoke at its end which is fixed to the core abuts a vertical wall of the base block assembly which supports the stationary contact (28), so that the electromagnet assembly is

inserted all the way into the base block assembly. There is no indication in D3 that the position of the electromagnet assembly relative to the base block assembly is adjusted. Accordingly, neither an adjustable mounting of the armature relative to the contact spring assembly nor an adjusted position of the electromagnet assembly relative to the base block assembly is disclosed in, or implied by, D3.

6. Starting from the embodiment according to Figure 1 of D3, the objective technical problem underlying the present invention can be seen as compensating for the tolerances of the components of the relay in order to reduce the size and the power dissipation of the relay. This corresponds to the technical problem identified in the application as filed (column 1, lines 32 to 54) and in the patent in suit (column 1, lines 34 to 51). According to claim 1 this problem is solved by a hinge spring coupling the armature to the yoke and by adjusting the mounting of the armature relative to the contact spring assembly by mounting the electromagnet assembly in an adjusted position relative to the base block assembly.

7. The opponent submitted that this solution to the technical problem was disclosed in the cited prior art known from D1, E1 and E4. The Board cannot share this view.

7.1 D1 (Figure 1) discloses an electromagnetic relay in which an electromagnet assembly (30) is inserted into a base block assembly (casing 10) having a contact spring assembly (20). D1 mentions (column 9, lines 25 to 29) that "since the contact unit and the electromagnet unit can be mounted on the casing individually, the

adjustment of their positioning is simplified". However, in D1, the armature (40) is not coupled via a hinge spring (50) to the yoke (36), but to the casing (10) which comprises the contact spring assembly (20). The electromagnet unit is inserted in the casing until "the vertical portion of the yoke (36) abuts the inner surface of the end wall (17) of the casing (10)" (column 6, lines 34 to 36). Accordingly, D1 neither discloses an adjustable mounting of the armature relative to the contact spring assembly nor an adjusted position of an armature and electromagnet assembly relative to the base block assembly.

7.2 The electromagnetic relay according to E1 (Figure 1) does not comprise a hinge spring but a mere return spring (5). The position of the contact spring assembly (6 to 12) can be adjusted by adjusting the position of the sidewalls (14) disposed between the electromagnet assembly (2) and the base block assembly (casing 1) (column 4, lines 45 to 62), but neither the position of the armature (3) nor that of the electromagnet assembly (2) is adjusted.

7.3 The relay disclosed in E4, which is not a small size relay, has an overall construction which is totally different from that of the small size relay according to D3 and more specifically is not equipped with a hinge spring for coupling the armature (6) to the yoke (2, 3). The armature (6) and the electromagnet assembly (1, 5) are adjustably mounted relative to the contact spring assembly (13 to 16) and the base block assembly (11, 12), but this adjustment requires the use of a spacer (page 6, lines 1 to 5: Distanzstück) between the armature (6) and the yoke (3) and thus cannot suggest the characterising features of claim 1.

8. U1 (Figure 1) discloses a small size relay wherein the armature (14) is coupled to the yoke (13) via a hinge spring (35). However the configuration of the base block assembly (17) does not allow a position adjustment of the electromagnet assembly relative to the base block assembly or an adjustment of the position of the armature relative to the contact spring assembly (19).

9. The opponent also argued that the subject-matter of claim 1 lacked an inventive step because the skilled man would replace the extension (11) in the embodiment according to Figure 1 of D3 by the extension shown in Figure 6 of D3, which the opponent alleged contains a hinge spring (43). The Board cannot share this view.

9.1 According to Figure 6 of D3, the extension (11) of the bobbin contains a metallic angle-plate (43) forming a spring in contact with the armature. However, this spring does not form a hinge spring for coupling the armature to the yoke, as this appears also explicitly from D3 (page 8, lines 21 to 23). Consequently a relay resulting from a combination of the embodiments shown in Figures 1 and 6 of D3 would still differ from the relay according to claim 1 by not having a hinge spring coupling the armature to the yoke, or any of the other features of the characterising part of the claim.

10. Consequently, it would not be obvious to the skilled person starting from D3 and knowing D1, E1, E4 and U1, to provide the relay according to D3 with a hinge spring for coupling the armature to the yoke and make the position of the electromagnet assembly relative to the base block assembly adjustable for adjusting the armature relative to the contact spring assembly.

Inventive step-Starting from document E8

11. E8 (Figure 1, column 3, lines 7 to 46) discloses an electromagnetic relay which comprises the following features in common with the relay according to claim 1:

an electromagnet assembly (1) having a core (5), a bobbin (10) for inserting said core thereinto, a yoke (6) fixed to an end of said core, and an armature (8) coupled to the other end of said core; and

a base block assembly having a base block (14) and a contact spring assembly (11) including a movable contact (19) and a stationary contact (12) adhered to said block.

12. The opponent submitted that the electromagnetic relay disclosed in E8 comprises, apart from a hinge spring for coupling the armature to the electromagnet assembly, all the features recited in the characterising part of claim 1. However, the Board finds that the disclosure of E8 does not go beyond that of D3.

12.1 In E8 (Figure 1; column 3, lines 35 to 46) the armature is coupled to the second end of the core via a support (7) forming part of the bobbin (10). E8 thus does not disclose a hinge spring coupling the armature to the yoke.

12.2 The electromagnet assembly of E8 is slidably inserted into the base block assembly as this appears from Figures 4 and 5 and is glued in the base block assembly (column 5, lines 17 to 19). This however does not imply that the electromagnet assembly is glued into an adjusted position, i.e. a particular selected position.

The relay shown in Figure 1 of E8, which is similar to Figure 1 of D3, has a hollow space between the support for the armature and a step in the bottom of the base block assembly (14). However, the function of this hollow space is not derivable from the drawings and there is no indication in E8 that the position of the electromagnet assembly is adjusted. The yoke is fixed at one end of the core and is shown abutting a vertical wall of the base block assembly which supports the stationary contact (12) so that the electromagnet assembly is inserted all the way into the base block assembly. E8 discloses neither an adjustable mounting of the armature relative to the contact spring assembly nor an adjustable mounting of the electromagnet assembly relative to the base block assembly.

13. The opponent argued that the subject-matter of claim 1 lacked an inventive step in view of the teaching of E8 taken in combination with that of document D3 or U1 because the skilled man would replace the extension (7) supporting the armature (8) by the extension according to Figure 6 of D3 or by the hinge spring disclosed in U1. Since the disclosure of E8 does not go beyond that of D3, the Board cannot share this view for reasons similar to those given above at paragraphs 6 to 9.

14. In view of the above considerations, the Board concludes that the subject-matter of claim 1 involves an inventive step within the meaning of Article 56 EPC.

15. In the Board's judgement, the amended patent and the invention to which it relates satisfy the requirements of the Convention.

Order

For these reasons it is decided:

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:

   - claims 1 to 6 of the then main request filed with letter of 5 September 2002, claim 7 as filed in the oral proceedings;

   - description page 1 as filed with letter of 5 September 2002, page 2 as filed in the oral proceedings, column 2, line 14, to column 6, line 28, of patent specification;

   - drawings, Figures 1 to 10, of patent specification.

The Registrar: The Chairman:

D. Sauter W. J. L. Wheeler