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File Number: T 466/90 3.5.2
Application No.: 82 900 259.1
Publication No.: 0 070 904
Title of invention: Method for bonding a contact

Classification: H01H11/06

D E C I S I O N
of 26 June 1991

Proprietor of the patent: Mitsubishi Denki Kabushiki Kaisha
Opponent: Robert Bosch GmbH

Headword:

EPC Article 56

Keyword: "inventive step - no"
"technique acknowledged as prior art in a cited document
considered as prior art in its own right"

Headnote



Case Number : T 466/90 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 26 June 1991

Appellant :
(Proprietor of the patent)

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Respondent :
(Opponent)

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Decision under appeal :

Decision of Opposition Division of the European
Patent Office dated 18.04.90 revoking European
patent No. 0 070 904 pursuant to Article 102(1)
EPC.

Composition of the Board :

Chairman : W.J.L. Wheeler
Members : A.G. Hagenbucher
J.P.B. Seitz

Summary of Facts and Submissions

I. The Appellant contests the decision of the Opposition Division revoking European patent No. 0 070 904 on the ground that Claims 1 to 3 (filed 25 April 1989) did not involve an inventive step.

II. Claims 1 and 2 are worded as follows:

"1. A process of joining a contact (5) for electric equipment to a base (6) by sandwiching the contact and the base between upper and lower electrodes (1,2) under a constant pressure, and supplying an electric current to the upper and lower electrodes (1,2), said process comprising the steps of detecting displacements (h) of said electrodes (1,2) and controlling the amount of supplied electric current on the basis of the detected displacements, characterized in that an interval of time during which said electrodes are supplied with the electric current is controlled to surpass the time interval (200) needed for reaching a displacement maximum value (18) and in that said electric current is cut-off when a deviation from a maximum (18) reaches a predetermined value after said displacements (h) have reached said maximum (18).

2. A process of joining a contact (5) for electric equipment to a base (6) by sandwiching the contact and the base between upper and lower electrodes (1,2) under a constant pressure, and supplying an electric current to the upper and lower electrodes (1,2), said process comprising the steps of detecting displacements (h) of said electrodes (1,2) and controlling the amount of supplied electric current on the basis of the detected displacements, characterized in that the interval of time

during which said electrodes are supplied with the electric current is controlled to surpass the time interval (200) needed for reaching a displacement maximum value and in that said electric current is cut-off a predetermined interval (Δt) of time after said displacements (h) have reached a maximum."

Claim 3 is dependent on Claim 1 or 2.

III. The following prior art documents, inter alia, were considered in the proceedings before the Opposition Division:

D1: DE-A-1 918 306

D3: GB-A-1 222 443 (belonging to the same patent family as D1)

D5: DE-A-2 555 792.

IV. Oral proceedings were held on 26 June 1991 during which the Respondent cited the further prior art document

D6: "Schweißen und Schneiden", July 1964, pages 263-269

V. The Appellant substantially argued as follows:

The problem underlying the invention was to provide a process as described in the preambles of Claims 1 and 2 in which a proper amount of joining material was melted to achieve a good, uniform and stable joining interface (cf. the originally filed description, page 2, lines 17 to 19 and page 4, lines 17 to 19). In contrast thereto D1 (and D3) dealt with the solution of a different problem, namely providing a more satisfactory indication of splashed welds (cf. D3, page 1, lines 79 to 89; page 2, lines 48 to 54).

To this end the solution according to D1 (and D3) did not allow current to flow after the electrode displacement had reached its maximum value. Regarding the prior art acknowledged on page 1, lines 69 to 73 of D3, no document was indicated there and the problem solved by that proposal was not clear. In view of the other proposals and their disadvantages mentioned there, a person skilled in the art would conclude that the reversal of the direction of the electrode movement was used only to determine that the maximum electrode displacement had been reached. The Headnote to decision T 56/87 made it clear that it was not justified to arbitrarily isolate parts of a document from their context in order to derive therefrom technical information which would be distinct from or even in contradiction with the integral teaching of the document.

The invention had enjoyed considerable acclaim, as could be seen from the certificate of commendation, filed with Appellant's letter dated 12 June 1991.

- VI. The Respondent argued that the disclosure of the patent in suit was not sufficient. In all the embodiments silver was used as cladding material, but was not mentioned in Claims 1 and 2.

Concerning inventive step, the Respondent argued in effect that it was clear from D1 (cf. page 3, lines 7 to 21) and D3 that the electric current could be switched off either before the maximum value of the electrode displacement was reached or afterwards. It was clear from D1 (page 3, lines 7 to 9, 13 to 24 and page 5, lines 7 to 12) that to achieve consistency of the diameter of a molten weld nugget, the upward movement of the upper electrode before reaching the maximum displacement was of interest. But it was also clear from the preview of the first prior art example in D1, page 3, lines 7 to 13, that one could use

the reversal of electrode movement as the electrodes begin to sink into the work pieces in order to provide a signal for terminating the flow of current. The Respondent drew attention to D6, especially the control loop of Figure 16 and corresponding description, according to which the electric current was cut off after the electrode displacement had reached its maximum.

As far as welding parameters are concerned the patent in suit did not disclose more than was already known from D1, D3 and D5.

The subject-matter of Claims 1 and 2 differed from the first prior art example in D1 (D3) only by cutting off the electric current when the deviation from the displacement maximum value reached a predetermined value after said displacement had reached that maximum (Claim 1) or by cutting off the current at a predetermined interval (Δt) of time after said displacement had reached the maximum (Claim 2). This was not inventive.

VII. The Appellant (patentee) requested that the decision under appeal be set aside and that the patent be maintained on the basis of Claims 1 to 3 as filed on 25 April 1989, or, as a subsidiary request, on the basis of Claims 1 to 3 as filed during the oral proceedings.

The claims of the subsidiary request differ from those of the main request (see paragraph II above) in that the words "said contact (5) comprising a contact material (3) clad by a silver layer (4)" are added at the end of Claims 1 and 2.

If the late-filed document D6 were decisive for the decision, the Appellant's representative requested the

opportunity to consult his client and the appointment of further oral proceedings.

The Respondent (opponent) requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. Main request
 - 2.1 It is not in dispute that a process of joining a contact for electric equipment to a base according to the prior art portions of Claims 1 and 2 is known from D3 (and D1).
 - 2.2 The Board accepts the Appellant's explanation that the problem underlying the patent in suit is to provide a process as described in the preamble of Claim 1 or 2 in which a proper amount of joining material is melted to achieve a good, uniform and stable joining interface.
 - 2.3 According to Claims 1 and 2 this is to be achieved by controlling the interval of time during which the electrodes are supplied with current to surpass the time interval needed for reaching a displacement maximum value and cutting off the electric current either when a deviation from the maximum reaches a predetermined value (cf. Claim 1) or a predetermined time interval (cf. Claim 2) after the displacements have reached the maximum value. There is no limitation in the claims (or any disclosure in the patent in suit) concerning the proper choice of the predetermined value of deviation or the predetermined time interval.

2.4 The introductory part of the description of D1 (i.e. from the beginning up to line 12 on page 5) or D3 (up to line 54 on page 2) reviews the state of the art, as it was then, and discusses the advantages and disadvantages of switching off the electric current in a welding process at different times. According to lines 4 to 12 on page 5 of D1, if it is more important to achieve molten weld nuggets of a consistent diameter than to obtain a maximum weld diameter, the current should be switched off before the maximum electrode displacement is reached. However, in order to avoid a weak undersized weld when the electric current is switched off too early several welding cycles may be necessary; cf. page 11, second paragraph. D1 also explains that oversized welds result when there has been too great a heat input (current switched off too late) which leads sometimes to the expulsion of weld metal. Such welds are known as splashed welds and are of low strength; cf. page 1, line 12 to page 2, line 3. According to D1, a good weld results when the weld diameter is substantially equal to the electrode diameter; cf. page 2, last sentence, this being assumed to be the case when the electrode displacement has reached its maximum (except in the case of splashed welds), cf. page 4, lines 5 to 9.

2.5 In the opinion of the Board, it is clear to a person skilled in the art from the review of the state of the art in D1 (or D3) that in order to obtain a stable joining interface in a single welding cycle, the welding current should not be switched off too early, or too late, and that good results may be expected with switch-off times in the neighbourhood of the time when the electrode displacement has reached its maximum. As mentioned on page 3, lines 10 to 13 of D1, it was already known to use reversal of electrode movement as the electrodes begin to sink into the workpieces to provide a signal for terminating the flow of current, it being implicit that

this occurs after the electrode displacement has reached its maximum value. In D1 (D3) this is clearly recognisable as one of the previously known practices in its own right, even though it falls outside the inventive concept of D1 (D3) which aims at achieving consistent weld diameter, which, however, is smaller than the maximum obtainable. The present case is therefore not comparable with the cited case T 56/87 (OJ EPO, 1990, 188).

- 2.6 In the opinion of the Board, it is obvious to a person skilled in the art who wishes to obtain maximum diameter welds, to turn to the general idea of using the reversal of electrode movement as the electrodes begin to sink into the workpieces to provide a signal for terminating the flow of current. The process involved in doing this is in accordance with the prior art part of Claims 1 and 2 of the patent in suit and also includes the first characterising feature, namely that the electric current is controlled to surpass the time interval needed for reaching a displacement maximum value. Furthermore, it clearly necessitates determining that reversal of electrode movement has occurred. An obvious way of determining this is to measure the distance between the electrodes and to compare the deviation from the maximum value with a predetermined threshold value. It is also obvious that the current may be switched off after a predetermined interval of time. It therefore appears to the Board that a person skilled in the art who was following this obvious path would inevitably arrive at a process falling within the scope of Claim 1 or Claim 2 of the main request, it being remembered that these claims do not specify any limitation concerning the predetermined values. Hence, no inventive step is involved in the processes according to Claims 1 and 2 of the main request.

3. Auxiliary request

The addition of the words "said contact (5) comprising a contact material (3) clad by a silver layer (4)" at the end of Claims 1 and 2 does not substantially change the reasoning used in judging whether the subject-matter of Claims 1 and 2 of the main request involves an inventive step, because, as acknowledged in column 1, lines 15 to 21 of the granted patent, cladding a contact material with a layer of silver is a conventional process step in spot welding.

4. Thus, the subject-matter of Claims 1 and 2 of the main and auxiliary requests lacks an inventive step in the sense of Article 56 EPC and said claims are therefore not acceptable under Article 52(1) EPC. This conclusion has been reached without taking the late-filed document D6 into account.

5. The fact that the inventor has been awarded a certificate of commendation for several papers on welding cannot outweigh the reasons given in paragraphs 2 to 4 above.

Order

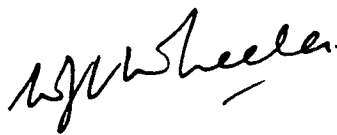
For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:


M. Kiehl

The Chairman:


W.J.L. Wheeler

JPS.

Jfb