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80 301 953.8

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Title of invention:
Titre de l'invention :

Rectifier power-supply circuits

Klassifikation / Classification / Classement :

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ENTSCHEIDUNG / DECISION

vom / of / du

15 May 1986

Anmelder / Applicant / Demandeur :

Sperry Corporation

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE

Rule 29(1)
Prior art on which to base the preamble of a claim

Leitsatz / Headnote / Sommaire

I. The nature of the technical problem solved by the invention has to be determined on the basis of objectively established facts, in particular as appearing in the prior art revealed in the course of the proceedings, which may be different from the prior art of which the Applicant was actually aware at the time the application was filed. A reformulation of the problem which then may become necessary is not precluded by Article 123(2) EPC if the problem could be deduced by the person skilled in the art from the application as filed when considered in the light of the prior art which is nearest to the invention.

II. The apparatus or process constituting the prior art which is nearest to the invention will in compliance with Rule 29(1)(a) EPC have to figure in the preamble of the claim, stating such features of it as are necessary for the definition of the claimed subject-matter and which are, in combination, already part of this prior art.

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Case Number : T 13 84

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 15 May 1986

Appellant : Sperry Corporation
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Decision under appeal : Decision of Examining Division 064 of the European Patent Office dated 25.08.83 refusing European patent application No 80 301 953.8 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : G. Korsakoff
Member : J. van Voorthuizen
Member : P. Ford

Summary of facts and submissions

I European patent application No. 80 301 953.8 filed on 10.06.80 (publication No. 0021714) claiming a priority of 15.06.79 (US) was refused by a decision of the Examining Division 064 of the EPO of 25.08.83. That decision was based on Claim 1 filed on 27.05.83 and Claims 2-5 as originally filed.

II Claim 1 reads as follows:

A rectifier circuit capable of maintaining a constant output voltage, notwithstanding a substantial temporary drop in input voltage, and comprising a full wave diode bridge rectifier with an output capacitor filter characterised in that the output filter comprises two capacitors in series, and the common point between the capacitors is connected to at least one input terminal of the bridge through a controllable bi-directional current device, and a control circuit switches on the bi-directional device for at least part of each cycle in response to a drop in output voltage whereby the circuit is caused to function at least partially in each cycle as a voltage doubler rectifier.

III The reason given for the refusal was that Claim 1 did not comply with the provisions of Rule 29(1) EPC.

IV The Appellant lodged an appeal against this decision on 20.10.83. The appeal fee was paid on the same date. The Statement of Grounds was filed on 19.12.83.

V In the decision under appeal, the Examining Division held essentially that in compliance with Rule 29(1) EPC the preamble of Claim 1 must be based on DE-A-2 746 504. This document discloses a rectifier circuit comprising a full wave diode bridge rectifier with an output capacitor filter, the

output filter comprising two capacitors in series and the common point between the capacitors being connected to at least one input terminal of the bridge. Two series connected capacitors and a connection to the bridge (but of different type) are also present in the rectifier circuit according to the present application, and therefore the DE-document would seem to be the nearest state of the art, even if it is accepted that the two capacitors and their connection to the bridge do not solve identical problems in the state of the art and in the invention.

VI In the Statement of Grounds, the Appellant on the other hand, essentially argued as follows:

While it was agreed that the circuit of the German document had a substantial number of features in common with the circuit according to Claim 1 a claim delineated against that prior art would give an unfair picture of the inventive step of the present invention. The proper starting point was the nearest piece of prior art which was concerned with the same problem as the present invention, which prior art is believed to be the well-known full-wave bridge rectifier. The Appellant contends that in a two-part claim the preamble should recite the relevant features of such nearest piece of prior art. The characterising clause then should add those further features which give effect to the inventive step, and thereby enable the invention to solve the problem to which it is directed. If the starting point were a piece of prior art which was not concerned with the same problem, but happened to have a substantial number of features in common with the invented device, the characterising clause would set out a number of features which were not directed to any particular inventive step, but were merely fortuitous, in the sense that they happened to be differences between two proposals for solving two different problems. If, on the other hand, the starting point of the invention were taken to

be the nearest attempt to solve the same problem as the invention, the characterising portion of the claim would quite fairly set out the inventive step, so that the true nature of the invention would be apparent to all. The nearest prior art to the present invention appeared to be a conventional diode-bridge rectifier followed by a capacitor filter, and rated so as to be able to accommodate a substantial drop in the input supply voltage.

The Appellant drew attention to the Decision of the Technical Board of Appeal T 39/82 (OJ 1982/11) which he considered as supporting his views.

VII The Appellant requested that the application should be allowed in its present form or should be remitted to the Examining Division for further prosecution in the light of such guidance as might be offered by the reasoning of the Board's Decision.

Reasons for the decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is therefore admissible.

2. The present application relates to a bridge rectifier circuit for direct rectification of an a.c. line voltage. Such circuits are generally known. In many cases such a rectifier circuit is followed by a regulated d.c.-d.c. inverter for obtaining a constant low voltage d.c., as is also well known.

3. The application purports to solve the problem of obtaining a substantially constant d.c. output voltage of the rectifier circuit ("d.c. bulk voltage") in spite of a relatively large drop in the a.c. line voltage. To this end, the rectifier circuit is provided with two series-connected capacitors, the

common point of which is connected to one of the bridge input terminals via a switching means consisting of a bi-directional current device which is controlled by a control circuit so that in case of a drop in the line voltage the rectifier circuit functions at least partially in each cycle as a voltage doubler circuit. When the nominal line voltage is present, the circuit functions as a conventional full wave rectifier without any voltage multiplication effect.

4. The European Search Report revealed as prior art DE-A-2 746 504, which discloses a bridge rectifier circuit for direct rectification of an a.c. line voltage. This document, although primarily related to improvements in the d.c.-d.c. inverter following the rectifier circuit, provides additionally a solution to a second problem, namely how to obtain a substantially constant "d.c. bulk voltage" for two widely differing line voltages (120 V and 220 V). For this purpose the rectifier circuit comprises two series-connected capacitors, their common point being connected to an input terminal of the rectifier bridge via a switching means consisting of a manually actuated switch so that in the low line voltage case the rectifier circuit acts as a voltage doubler circuit.

5. The Examining Division was of the opinion that the rectifier circuit according to the present application is novel and involves inventive step both over the generally known prior art (see paragraph 2) and over the cited DE document. The Board sees no reason to disagree with this view.

6. The point at issue in the present appeal is the choice of the prior art to be used as a basis for the preamble of Claim 1.

7. The Appellant and the Examining Division were agreed that a claim in two-part form would be appropriate (although the Examining Division indicated its willingness to accept a

claim in one-part form). The Board shares this view. Generally speaking a claim in two-part form must be regarded as appropriate if there exists a clearly defined state of the art from which the claimed subject-matter distinguishes itself by further technical features. Such is the case in the present application.

8. In the judgement of the Board the relation between the prior art known from DE-A-2 746 504 and the present invention should be formulated as follows.

The invention concerns a rectifier circuit comprising a fullwave diode bridge rectifier with an output capacitor filter. From DE-A-2 746 504, such a circuit is known in which the output filter comprises two capacitors in series and the common point between the capacitors is connected to at least one input terminal of the bridge through a switching means. In the rectifier circuit according to this document the switching means consist of a manually operated switch in order to obtain a d.c. output voltage ("bulk voltage") which remains essentially constant when two different line voltages (e.g. 120 V and 220 V) are applied to the rectifier circuit. There is a need, however, (e.g. in power supplies for computers) for a rectifier circuit which will regulate the bulk voltage to a constant nominal voltage for all line-load conditions e.g. in case of a power brown-out. This problem is solved in that the switching means consists of a controllable bi-directional current device and that a control circuit switches on the bi-directional device for at least part of each cycle in response to a drop in output voltage, whereby the circuit is caused to function at least partially in each cycle as a voltage doubler rectifier.

9. From a technical point of view, the invention can properly be regarded as using a basic idea which was already known, namely the transition from full wave bridge operation to

voltage doubler operation in case of differing line voltages. The inventive contribution to the art then lies in the concept of providing a controlled gradual transition between the two types of operation so that a constant d.c. output voltage is not merely obtained for two predetermined line voltages but within a range of line voltages. The Board is therefore of the opinion that the prior art disclosed by DE-A-2 746 504 is nearer to the invention than the generally known full wave bridge rectifier circuit having a conventional output capacitor filter.

10. The Board is of course aware that when the problem to be solved and its solution are formulated in relation to the prior art as indicated in paragraph 8, the invention will appear in a perspective which is somewhat different from that presented in the application as filed. Such a situation is, however, inherent to a patent granting procedure in which a search made after filing may reveal prior art which is nearer to the invention.

11. It has consequently been constant jurisprudence of the Boards of Appeal that the nature of the problem has to be determined on the basis of objective facts, in particular as appearing in the prior art revealed in the course of the proceedings, which may be different from the prior art of which the Applicant was actually aware at the time the application was filed. A reformulation of the problem which then may become necessary is not precluded by Article 123(2) EPC if the problem could be deduced by the person skilled in the art from the application as filed when considered in the light of the prior art which is nearest to the invention.

12. In his letter of 27.05.83 the Appellant introduced in the preamble of the originally filed Claim 1 a passage reading: "capable of maintaining a constant output voltage, notwithstanding a substantial temporary drop in output

voltage, and". The Appellant contends that the prior art thus defined would be nearer to the invention while addressing the same problem. The Examining Division in paragraph 23 of its Decision formulated objections against this amendment. The Board agrees with the views of the Examining Division on this matter. Consequently Claim 1 in its present form is unallowable.

13. Additionally the Board observes that, so far as can be gathered from the description (page 1, second paragraph), the added passage pertains to power supplies which include the d.c.-d.c. inverter, as it is this latter part which is rated so as to cope with deviations from the nominal line voltage. Such power supplies, however, do not form the subject-matter of Claim 1, but this claim clearly seeks protection for a rectifier circuit (20, 21) itself which may or may not be followed by a d.c.-d.c. inverter (cf. Fig. 3 and the corresponding part of the description). Conventional rectifier circuits as defined in the preamble of Claim 1 as originally filed are not concerned with the problem of delivering a constant output voltage in case of varying line voltages. They cannot be said therefore to represent a state of the art nearer to the present invention than the prior art reflected by DE-A-2 746 504.

14. The Appellant's contention that the piece of prior art used for the preamble of the claim should be concerned with the same (or at least a similar) problem as the invention cannot be accepted as a general rule, if only for the reason that it is quite usual that the invention solves a problem which has not been recognised earlier. Generally, the apparatus or process constituting the prior art which is nearest to the invention will in compliance with Rule 29(1)(a) EPC have to figure in the preamble of the claim, stating such features of

it as are necessary for the definition of the claimed subject-matter and which are in combination already part of this prior art.

15. It has to be remembered that the purpose of the claims is to define the matter (e.g. an apparatus, a process) for which protection is sought (Article 84 EPC). The claims have to be formulated as prescribed by Rule 29 EPC. Neither the Article nor the Rule makes any reference to the necessity or desirability that "the characterising portion of the claim should fairly set out the inventive step". This contention by the Appellant seems to be based on the false conception that the inventive step resides in the characterising portion of the claims. It is, however, the subject-matter of the claim as a whole which embodies the invention and the inventive step involved.

16. The Appellant contends in his letter of 27.05.83, to which reference is made in the Statement of Grounds, that with the Claim 1 as amended on that date the situation appeared to be entirely parallel to that with which the decision T 39/82 was concerned. As, however, the claim in that form is not allowable, this argument need not be discussed.

17. Nevertheless, the Board wishes to observe that the decision in question deals with judgement of inventive step under Article 56 EPC and is not directly concerned with the correct application of Rule 29(1) EPC. It would seem, however, that the claim which was held allowable was correctly directed to a device for the reduction of light reflection on traffic lights, in compliance with Rule 29(1)(a) EPC which provides, inter alia, that the preamble has to indicate the designation of the subject-matter of the invention.

18. In all the circumstances the Board must uphold the decision of the Examining Division insofar as it held that the European patent application did not comply with Rule 29(1) EPC.

19. However, the Appellant was entitled to challenge the views of the Examining Division on a point of law which had not previously been considered in its entirety by any Board of Appeal, and it is just that the present case should be referred back to the Examining Division in order for the Appellant to have the opportunity, if he so desires, of submitting amendments to the application to meet the requirements of this decision. To that extent, therefore, the decision under appeal will be amended.

20. It may be added that the Board has noted that the introductory part of the description (page 1 and the first paragraph on page 2) will have to be amended in order to bring it into a form complying with Article 84 EPC (support for the claim in the description) and Rule 27(1) EPC, in particular (c) and (d) thereof. The Board understands these provisions as requiring that the introductory part of the description comprises a statement of the subject-matter for which protection is sought which corresponds, at least in substance, with the terms of the independent claim or claims and a reference to at least the prior art on which the preamble(s) of this (these) claim(s) is (are) based. Such a presentation is considered necessary in the public interest, having regard to the provision of Article 69(1) EPC, second sentence, that the description shall be used to interpret the claims of a European patent application or a European patent. This matter ought to be considered during the further prosecution of the application. Reference is made in this context to paragraph 8 above.

Order

For these reasons it is decided that:

1. The decision of the Examining Division dated 25.08.83 is hereby amended as follows:

   The European patent application shall not be refused according to Article 97(1) EPC on the grounds set out in the said decision provided that within time limits set by the Examining Division the Applicant offers amendments to the application which in the opinion of the Examining Division meet the objections set out in Part II of the said decision and are also otherwise in agreement with the Board's reasoning.

2. The case is remitted to the Examining Division for further prosecution.

The Registrar — The Chairman

B.A. Norman — G. Korsakoff