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D E C I S I O N
of 20 August 1998

Case Number: T 0833/94 - 3.5.1
Application Number: 87310683.5
Publication Number: 0271294
IPC: G06G 7/186

Language of the proceedings: EN

Title of invention:
Knock detection circuit

Patentee:
LUCAS INDUSTRIES public limited company

Opponent:
Robert Bosch GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56
EPC R. 60(1)

Keyword:
"Inventive step (yes)"
Patent lapsed in all designed states except for IT and ES:
appeal proceedings continued"

Decisions cited:
-

Catchword:
-



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Boards of Appeal

Chambres de recours

Case Number: T 0833/94 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 20 August 1998

Appellant: Robert Bosch GmbH
(Opponent) Postfach 30 02 20
D-70442 Stuttgart (DE)

Representative:

Respondent: LUCAS INDUSTRIES public limited company
(Proprietor of the patent) Well Street
GB-Birmingham, B19 2XF (GB)

Representative: Gibson, Stewart Harry
URQUHART-DYKES & LORD
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 18 August 1998
rejecting the opposition filed against European
patent No. 0 271 294 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: P. K. J. van den Berg
Members: R. R. K. Zimmermann
S. C. Perryman

Summary of Facts and Submissions

- I. The appeal lies from a decision of an opposition division concerning an opposition filed by the appellant against European patent number 0 271 294 (patent application number: 87 310 683.5, filing date: 4 December 1987, priority date claimed: 6 December 1986).

The grant of the patent took effect on the 15 July 1992 in respect of the following designated contracting states: Belgium (BE), Germany (DE), Spain (ES), France (FR), Italy (IT), Netherlands (NL), and Sweden (SE). Patent claim 1, the only independent claim, reads as follows:

"A knock detection circuit for an internal combustion engine, comprising a rectifying and integrating circuit which comprises an operational amplifier (OA) having an input for receiving a signal from a knock transducer, an integrating capacitor (C2) having one side connected to an output of the operational amplifier and its other side connected to said input of the operational amplifier, said one side of the integrating capacitor delivering an output signal from the rectifying and integrating circuit, a first rectifying device (D2) connecting the output of the operational amplifier (OA) to said one side of the capacitor (C2) and a second, oppositely-poled rectifier device (D1) connecting the output of the operational amplifier to its said input, characterised in that the input signal is rectified and integrated over successive periods of time corresponding to the time intervals (for each cylinder of the engine) during which knock is expected to occur, and between which the capacitor is reset, to give successive knock measurement signals, a switch (SWB) is connected to the output side of the integrating capacitor (C2) and is closable to reset the capacitor

by discharging it to a predetermined voltage level, and in that a switch (SWA) is connected between the output of the operational amplifier (OA) and its input and is closed during resetting of the integrating capacitor."

- II. By a notice of opposition filed on 13 April 1993, the appellant opposed the patent on the sole ground of lack of inventive step (Article 100(a) EPC). In support of this ground, the appellant cited US-A-4 351 282 and DE-A-30 10 324 as relevant prior art documents.

The opposition division rejected the opposition, thereby maintaining the patent in unamended form, essentially for the reason that neither one of the prior art documents cited by the appellant disclosed the switch configuration for resetting and clamping the rectifying and integrating circuit as claimed, and no hint leading to the presently claimed invention could be derived from the two documents either alone or in combination. The decision was posted 18 August 1994.

- III. The appellant filed a notice of appeal on 19 October 1994 and paid the fee for appeal on the same day. On 22 December 1994, the statement of grounds was filed. Having regard to the prior art, the appellant argued that in trying to improve the knock detecting circuit known from US-A-4 351 282 by adapting it to the intermittent operation disclosed in DE-A-3 010 324, a skilled person would consider it to be obvious that the integrating capacitor of the circuit shown in figure 3 of US-A-4 351 282 would have to be discharged at regular intervals. Since this known circuit comprises two oppositely-poled diodes, discharging the capacitor would make it necessary to add two switches precisely in the manner proposed by the opposed patent.

- IV. The respondent declared that it did not intend to submit any comments on the grounds of appeal. The

patent had been allowed to lapse for all the designated states. The respondent, therefore, wished that the proceedings be continued in accordance with the procedure provided for in Rule 60(1) EPC.

Furthermore, the respondent submitted documents with the intention of proving that the patent had expired in Italy and Spain. With regard to Spain, the document was a printout obtained on-line from the Spanish Patent Office database supposed to show that the patent had lapsed in Spain for the reason that the translation required in accordance with Article 65(1) EPC had not been filed. With regard to Italy, the document was a copy of a notification of the Italian Patent Office wherein the office gave notice that the renewal fees for 1992 to 1995 appeared not to have been paid. The respondent indicated that it had allowed the patent to lapse in Italy by failing to pay the national renewal fees.

The appellant replied that the respondent had not unambiguously shown that its patent had been surrendered in all contracting states and that therefore its requests in the appeal were still maintained. With regard to the documents filed by the respondent, the appellant did not file any observations.

The Board communicated its opinion to the parties that neither the Register of European Patents nor the documents produced by the respondent proved unambiguously that the patent had expired in Spain and Italy and that the appeal procedure, therefore, would have to be continued on the basis of the substantial issues.

- V. With regard to the ground of lack of inventive step, the Board informed the parties that in its preliminary

opinion the switch configuration as claimed did not seem to be derivable in any obvious manner from the cited prior art or from the normal design of prior art integrator circuits, as shown for example in figure 1 of the patent specification.

The appellant disagreed, explaining that the document DE-A-3 010 324 clearly disclosed an integrating element (integrator 27 in figure 5) for use in a knocking detection circuit as prior art and that the skilled person would consider the circuit shown in figure 3 of the document US-A-4 351 282, a knocking decision level generator comprising an integrating element, as a useful embodiment for said integrator.

The further distinguishing features of claim 1 defined a switch configuration for resetting the integrating capacitor and for holding the output voltage of the operational amplifier at a constant level. Since these features correspond to the resetting mechanism disclosed in the DE-document, the person skilled in the art would consider it obvious to design the knocking detection circuit precisely as defined in claim 1 of the contested patent.

- VI. The Board indicated to the parties that under these circumstances and in view of the fact that no in-force request for oral proceedings was on file, the appeal might be dismissed without giving further notice to the parties. Nevertheless, such a request has not been filed in the further course of the appeal proceedings.

Reasons for the decision

1. The appeal complies with Articles 106 to 108 and Rules 1(1) and 64 EPC and is admissible.

2. Before deciding on the merits of the case, the submission of the respondent that the patent has lapsed in all designated states and the provisions of Rule 66(1) EPC determining that in the absence of particular provisions the provisions governing the first instance should be applicable to the appeal procedure make it necessary to examine whether Rule 60(1) EPC applies, i.e. whether the European Patent Office has to notify the lapse of the patent to the appellant (opponent) and to make the continuation of the appeal procedure conditional on a request to that effect being made by the appellant within two months from the notification.

The appellant has expressed doubts whether the patent had indeed lapsed or had been surrendered as submitted by the respondent. These circumstances distinguish the present case from the existing case law where the submissions of the patentee regarding the lapse of the patent were not questioned by the adversary parties and could thus be fully accepted by the boards.

In the present case, lapse of the patent has to be registered with the EPO or has to be properly proved. When, as with the present documents, the evidence offered does not directly indicate the truth or falsity of the fact in issue, but requires knowledge of the national law and patent practice, such law and practice has to be proved as does any other fact on which a party bases its arguments.

The present documents adduced by the respondent for Italy and Spain do not exclude the possibility to a sufficient degree of probability that the patent is still alive in Italy or Spain, for example by way of having resorted to a legal remedy as provided by the national system of law. Therefore, lapse of the patent in Italy and Spain has not been conclusively proved,

and so the preconditions for applying the Rule 60(1) EPC are not fulfilled.

3. With regard to the grounds for lack of inventive step, the appellant cited US-A-4 351 282 and DE-A-3 010 324 as the relevant prior art documents. According to the contested decision, the US-document represents the closest prior art. Neither the appellant nor the respondent expressed any doubts or objections about the pertinence of this document. The Board does not see any relevant reason to take a different view.

Both documents disclose a knock detection circuit as part of an ignition timing control system for an internal combustion engine. The knock measurement signal produced by a knock transducer is transmitted to a comparator (knocking decision circuit) via a filter selectively passing the characteristic frequency components of the knock measurement signal. The circuit shown in figure 5 of the DE-document additionally includes separate elements for rectifying and integrating the output signal of the filter so that the input to the knocking decision circuit is an averaged half-wave knock measurement signal.

In addition to this knock measurement signal, a reference signal, its level corresponding to the half-wave average of the noise components in the measurement signal, is produced and input to the respective knocking decision circuit. A circuit for producing this reference signal and combining the functions of rectifying and low-pass filtering the input signal is shown in figure 3 of the US-document.

Figure 5 of the DE-document shows another circuit for this purpose, but with separate elements for rectifying and low-pass filtering the input signal. The rectifying element, however, is part of the measurement signal

path. This feature amounts to a structural difference from the circuit as presently claimed and justifies choosing the US-document as starting point in the assessment of the inventive step in preference to the DE-document.

The knock detection circuit as defined in present claim 1 differs from the prior art circuit disclosed by the US-document essentially in that the knock measurement signal is rectified and integrated at the input side of the knocking decision circuit over successive periods of time corresponding to the time intervals during which knock is expected to occur.

Rectifying and integrating the input signal is the answer to the problem that the knock measurement signal is normally distorted by strong but short noise components, a problem explained for example in the DE-document. The specification of the contested patent itself indicates, by referring to its own figure 1, that this type of signal processing was already known in the prior art as a solution to said problem. So does also the DE-document with regard to its figure 5.

Claim 1 of the contested patent specifically requires that the rectifying and integrating elements be combined in a circuit comprising an operational amplifier, an integrating capacitor and a pair of rectifying devices which are placed in the negative feedback path of the operational amplifier.

None of the prior art documents cited by the appellant discloses such a circuit explicitly. Figure 3 of the US-document, as pointed out by the appellant, shows a low pass filter having a similar circuit structure. This filter, however, has a cutoff frequency lower than the characteristic frequencies of the measurement signal and is used to provide an average value only of

the noise components, not of the knock measurement signal itself.

It might be arguable, as put forward by the appellant, whether the skilled person would consider it obvious to use this circuit as a rectifying and integrating element in the measurement signal path, for example in pursuit of the aim of combining the teachings of the two documents.

However, this question can be left undecided as present claim 1 includes further features directed to a particular configuration of a pair of switches, SWA and SWB, for resetting or discharging the integrating capacitor between the integration intervals. In this configuration, switch SWB is connected to the output side of the integrating capacitor and, if closed, resets the capacitor by discharging it to a predetermined voltage level. Switch SWA is connected between the output of the operational amplifier and its input and is closed during the resetting period. The appellant has not convincingly showed that such a switch configuration is obvious, having regard to the prior art.

The prior art according to circuit I in figure 1 of the specification of the contested patent shows a standard design of an integrator circuit. Although a pair of switches are present for resetting the integrator, the switches are differently connected as compared with the claimed configuration.

The circuit shown in figure 3 of the US-document is, except for the pair of rectifying diodes, a standard low pass filter which does not require any separate switching circuit for that purpose at all.

The DE-document finally describes the rectifying and integrating elements only in functional terms without giving any details about their internal structure. The skilled person, trying to develop the circuit further on the basis of the information disclosed in this document, would rather be inclined to resort to a standard integrator design, for example to the design shown in figure 1 of the present patent specification, than to design a new solution such as the one now claimed. The standard design has also the advantage that its entrance switch SWA would readily comply with the function performed by the gate circuit controlling the input of the integrating element (see figure 5 of the DE-document).

The appellant also argued that the switch configuration as claimed would be necessary to reset the integrator during each measurement interval as expressly required by the DE-document. However, this argument is not convincing since the low pass filter shown in the US-document can easily be combined with the standard switch configuration, for example with the configuration shown in figure 1 of the patent specification. To this end, resistor R2 has only to be replaced by switch SWA and resistor R1 by switch SWB. The resulting integrating circuit, although different from the claimed circuit, could be controlled as required by the DE-document. The invention is thus not a simple consequence of the combination of documents US-A-4 351 282 and DE-A-3 010 324. Other reasons or arguments regarding lack of inventive step have not been submitted by the appellant.

It follows from the foregoing that the appellant did not show that the subject-matter of claim 1 lacks an inventive step (Article 56 EPC) and thus that this ground for opposition does not prejudice the maintenance of the patent unamended.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

P. K. J. van den Berg