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D E C I S I O N
of 6 June 2000

Case Number: T 0409/98 - 3.2.4

Application Number: 91116365.7

Publication Number: 0477919

IPC: F02D 41/08

Language of the proceedings: EN

Title of invention:
Engine idle control system for vehicle

Patentee:
Mazda Motor Corporation

Opponent:
Robert Bosch GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"

Decisions cited:
-

Catchword:
-



Case Number: T 0409/98 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 6 June 2000

Appellant: Robert Bosch GmbH
(Opponent) Abtlg. ZGE1
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Representative: -

Respondent: Mazda Motor Corporation
(Proprietor of the patent) No. 3-1, Shinchi
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Aki-gun
Hiroshima-ken (JP)

Representative: Klunker . Schmitt-Nilson . Hirsch
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 29 January 1998
rejecting the opposition filed against European
patent No. 0 477 919 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: C. A. J. Andries
Members: H. A. Berger
C. Holtz

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal, received on 28 March 1998, against the decision of the opposition division, dispatched on 29 January 1998, on the rejection of the opposition against the patent No. 0 477 919. The appeal fee was also paid on 28 March 1998. The statement setting out the grounds of appeal was received on 2 June 1998.

Opposition was filed against the patent as a whole and based on Article 100(a) EPC.

II. The following prior art documents were considered by the appellant to be relevant and were discussed during the oral proceedings held on 6 June 2000:

D1: DE-C-2 715 408

D2: GB-A-2 117 936

III. Claim 1 reads as follows:

"An engine idle control system for a vehicle which causes the engine speed (ne) to converge on a target idling speed (no) by a feedback control when the engine (1) idles wherein said control system is provided with an engine speed sensor (14) and a detecting means (13,19,Xidl) for detecting whether the engine (1) is revolving by itself or is being driven by the vehicle body, and controls the engine speed by a control at least a part of which is an integral feedback control when the engine (1) is revolving by itself, characterized in that

said control system (13) applies a feedback-control with a proportional but without an integral component on the basis of the difference (dne0) between an actual engine speed (ne) and the target idling speed (no) when the engine (1) is being driven by the vehicle body."

IV. The appellant (opponent) considered as a first approach when assessing inventive step that document D1 was the most pertinent prior art document and that the skilled person would derive therefrom an idle control system in which the proportional portion is activated in an operation region when the engine is driven by the vehicle body and the proportional-integral portion is activated in the idle region when the engine is running by itself. According to claim 3, the integral component is switched off during particular engine running conditions, i.e. above a predetermined engine speed and/or a particular position of the gas pedal (claim 4). By these parameters a clear distinction is made between idling and the other engine operating conditions, such as for instance deceleration of the vehicle. During the oral proceedings the appellant also pointed out that the switch 30 of the control system of document D1 could be understood as functioning as an OR-gate.

As a second approach the appellant considered document D2 as the starting point in assessing inventive step and drew the board's attention to Figure 2c and the alternatively employed control manner described on page 3, lines 56 to 65, according to which, during deceleration, the valve (6) opening period is gradually increased with a further drop in the engine rpm and is set to the predetermined opening period DXH when the engine rpm reaches the upper limit NH of the desired

idling rpm range. In the opinion of the appellant it is therefore obvious to take the upper limit NH of the desired idling rpm as the target value and the actual engine speed as the actual value and to use the feedback control on the basis of the actual engine speed and the target idling speed during deceleration in which the engine is driven by the vehicle body.

The appellant therefore came to the conclusion that the subject-matter of claim 1 did not involve an inventive step.

- V. The respondent (patentee) explained the idling control system of claim 1 and pointed out, after having been asked by the board about the scope of claim 1, that it does not concern a method for controlling engine idling but an engine idle control system with a feedback-control in which the integral component is switched off solely in dependence on the detection of the fact that the engine is being driven by the vehicle body, so that during that engine condition a proportional component remains. With regard to inventive step he was of the opinion that neither document D1 nor document D2 could lead to the system of claim 1.

VI. Requests

The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patentee) requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Remarks on claim 1*

Claim 1 involves an engine idle control system which implies a throttle valve in its idle position, independent of the fact that the engine is revolving by itself (pure idling) or that the engine is driven by the vehicle body (combination of pure idling and deceleration).

Furthermore, it should be emphasized, as accepted by the respondent, that claim 1 does not involve a method, but involves a system which is partly realised by a circuit which is able to carry out the functional features present in claim 1, and which is able to use only one parameter, namely that the engine stops or starts being driven by the vehicle body, to switch from one feedback control to another feedback control.

3. *Novelty*

None of the prior art documents discloses an engine idle control system with all the features of claim 1. The system of claim 1 therefore is new in the meaning of Article 54 EPC.

4. *Closest prior art*

Document D2 is cited in the introductory portion of the patent in suit and discloses an engine idle control system with all the features of the preamble of

claim 1. However, since the appellant took both documents D1 and D2 separately as the basis of his arguments, the board will also consider these documents separately as starting points in assessing inventive step.

5. *Problem and Solution*

5.1 Problem

With regard to both state of the art documents D1 and D2 the object of the invention is to provide a simplified engine idle control system which prevents stalling of the engine even during the transition from engine deceleration to engine idling.

5.2 Solution

Since the engine speed is controlled by a proportional feedback control without an integral component on the basis of the difference between the actual engine speed and the target engine speed when the engine is being driven by the vehicle body, which is the case when the engine decelerates and goes into idling, the engine speed and the target engine speed can be quickly converged without the danger of the engine speed falling excessively low or the engine stalling. Since the feedback-control with a proportional but without an integral component is based on the condition that the engine is being driven by the vehicle body, the change between a feedback control with or without an integral portion can in a clear and simple way be determined.

6. *Inventive step*

6.1 In the control system of document D1 the integral component (21) is switched on (switches 29 and 30), if the gas pedal is in its fully closed rest position (idle position), which is the normal position during engine deceleration and if switch 30 is in the position shown in Figure 2. Although the system of document D1 also allows the switching on of a proportional component (switches 35 and 34) and to combine the integral component with the proportional component (see column 4, lines 54 to 60), there is no disclosure of the integral component being switched off when the engine is decelerating. Document D1 does not disclose any detecting means for detecting whether the engine is revolving by itself or is being driven by the vehicle body. If the switch (30) for the integral component (21) is in the position where it is controlled by the speed difference between a preselected engine speed (n_0) and an actual engine speed (n_{ist}) without the influence of the switch (29) of the gas pedal position (OR-Gate), the switch (30) for the integral component (21) is actuated when the engine speed (n_{ist}) surpasses the predetermined engine speed (n_0). If the switch (30) for the integral component acts as an AND-Gate (claim 4 of document D1), i.e. when the switch (29) of the gas pedal is closed and the switch (30) is controlled by the engine speed difference (n_0 and n_{ist}), switching of the integral component occurs when the engine speed (n_{ist}) surpasses the predetermined engine speed (n_0). Therefore, in both cases the integral component is switched on or off in dependence on the engine speed. There is no hint given that the switch for the integral component is actuated in dependence on the detected engine deceleration mode, i.e. when the engine is being driven by the vehicle body.

Document D1 could not lead the skilled person to the control system of claim 1, since D1 discloses a circuit which does not take into account the engine being driven by the vehicle body, and he would have no reason to modify this circuit to obtain the claimed system.

6.2 Document D2 discloses an engine idle control with the features of the preamble of claim 1 and with a component to prevent stalling of the engine. This component provides supplementary air (DXH) to the engine at a particular engine speed (N_A) when the engine is in the deceleration mode with the throttle valve fully closed. This supplementary air may be added in one step (Figure 2c) or gradually. The inclined straight chain line shown in Figure 2c and described on page 3, lines 56 to 65, concerns the engine operation during which the engine is driven by the vehicle body and the opening period of the valve in the supplementary air passage is gradually increased based on the time, and according to Figure 2c not on the engine speed. This gradually increasing of the valve opening period apparently functions according to an open loop control, since there is no indication of a feedback-control, either in the drawings or in the description and the claims. There is also no indication that that control is based on the difference between an actual engine speed and the target idling speed. The gradual increase of the valve opening starts at a particular engine speed N_A and ends at an upper idling speed N_H and is therefore switched on and off in dependence on a particular speed and not in dependence on a signal indicating that the engine is driven by the vehicle body. Differently from the claimed control system of the patent in suit (see above section 2, second paragraph), the circuit of document D2 has no single parameter which controls the switching between the two kinds of control. Indeed, in the circuit of document D2, it is either the fact that the engine is stopped to be driven by the vehicle body that is used to switch between the two kinds of control present in this circuit (see Figure 2 - particularly 2(b) and

page 7, lines 35 to 44), or the engine speed N_H is used for that purpose (see page 7, lines 18 to 31 and page 3, lines 73 to 79). Such a kind of circuit which is the essential part of document D2, is completely different from, and much more complicated than, the presently claimed circuit, so that the board cannot see that a skilled person would modify it so as to arrive at the claimed circuit in an obvious manner. Therefore, document D2 also cannot lead to the subject-matter of claim 1.

6.3 The engine idle control system of claim 1 is therefore inventive in the meaning of Article 56 EPC.

7. In view of the above the patent can be maintained unamended.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Magouliotis

C. Andries