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

Case Number: T 0936/95 - 3.2.4

Application Number: 89908357.0

Publication Number: 0416039

IPC: F02D 11/10

Language of the proceedings: EN

Title of invention:
Accelerator pedal position sensor

Patentee:
Caterpillar Inc.

Opponent:
Mannesmann VDO AG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - (yes) after amendment"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0936/95 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 20 January 1998

Appellant: (Opponent)
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Representative:
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Respondent: (Proprietor of the patent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 13 November 1995 concerning maintenance of European patent No. 0 416 039 in amended form.**

Composition of the Board:

Chairman: C. A. J. Andries
Members: H. A. Berger
J. P. B. Seitz

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal, received on 23 November 1995, against the interlocutory decision of the opposition division, dispatched on 13 November 1995, on the amended form of the patent No. 416 039. The appeal fee was also paid on 23 November 1995. The statement setting out the grounds of appeal was received on 12 March 1996.

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

In the decision of the opposition division document EP-A-0 054 908 (D1) was considered as representing the most relevant prior art.

II. Oral proceedings before the board were held on 20 January 1998, during which the respondent (proprietor of the patent) filed a new claim 1.

Claim 1 reads as follows:

"A signal generating apparatus (10) for mounting directly on a vehicle pedal and for delivering a pulse-width-modulated signal responsive to the position of a movable mechanical member, the apparatus comprising a circuit board (46) having first and second sides (48,50); a potentiometer (52) having a movable wiper (54) and a stationary portion (56), the movable wiper (54) being in movable contact with the stationary portion (56), the movable wiper (54) and the stationary

portion (56) being positioned on the circuit board first side (48) and the movable wiper (54) being connected to and movable with the movable mechanical member; and a conditioning circuit (66) being positioned on the circuit board second side (50), electrically connected through the circuit board to the potentiometer stationary portion (56) and arranged to deliver the pulse-width-modulated signal responsive to the position of the movable wiper (54) on the potentiometer stationary portion (56)."

III. The appellant (opponent) is of the opinion that most of the features of the impugned claim 1 are known from document D1 and that according to the description (last paragraph of page 7) the foot pedal operated motor control of document D1 is not limited to sewing machines and would therefore also be suitable to be mounted directly on a vehicle pedal. The appellant argued that the pedal housing shown in Figure 3 is part of the pedal and therefore the potentiometer and the control circuit are mounted directly on the pedal. Although an apparatus for generating pulse width modulated signals is not explicitly mentioned in document D1 it would be clear from the description, page 6, last sentence of the second paragraph, in which a full wave circuit is indicated, and from Figure 7 in which a triac 72 and diac 74 are shown, that the apparatus described therein functions as a pulse width modulator. The disclosure in the paragraph bridging pages 6 and 7, according to which the speed of the motor 70 is controlled by the current applied from the AC line, does not give any other information, since the control by the current is not limited to an analogue

signal but also must be understood as a control with a pulse-width-modulated signal.

According to the appellant, the only difference between the device of Claim 1 and that of document D1 is the positioning of the potentiometer and of the conditioning circuit (motor control circuit 25) on the circuit board. Since it is already known from document D1 that the potentiometer and the conditioning circuit are closely fitted together and since it would be obvious therefrom that the advantages of a short wiring are attained therewith, no inventive step could be seen in providing one element at the one side of the circuit board and the other element at the other side in order to arrive at an even closer positioning of both elements with regard to one another. It would also be obvious that in this position the wiring must extend through the circuit board. Figure 6 of document D1 already discloses such a wiring which extends therethrough. The appellant drew attention in this respect to the connector terminals (50) which are mounted on a board extension (52). For positioning the two elements on the different sides of the circuit board the helical member (62), which extends through this circuit board, would be no hindrance, as the conditioning circuit could be mounted laterally of this helical member. It would be only a normal design variation for the skilled person to position the known apparatus directly on the moving part of the pedal, in which case he would adapt the helical member to the available space in the housing.

The appellant also drew attention to the state of the

art described in column 2, lines 15 to 33 of the granted patent and came to the conclusion that, starting therefrom and having regard to the prior art of document D1, the skilled person would also come to the subject-matter of claim 1 without an inventive step. The appellant however could not cite a document in which this described state of the art is clearly disclosed.

The appellant is of the opinion that the apparatus of the impugned claim 1 does not involve an inventive step.

IV. The respondent (patentee) argued that the arrangement in the apparatus of Claim 1 has been found to be so effective in reducing electromagnetic interference that no electromagnetic screening is required. In addition, the circuit board acts as a physical barrier to protect the components of the conditioning circuit.

According to the respondent, the appellant's assertion that the invention is merely the selection of one of only two possible alternatives is based on hindsight. He is of the opinion that even if the problem of electromagnetic interference is recognized, the person skilled in the art still has any number of alternatives for positioning the circuit provided that the circuit elements are suitably screened. Even if he decided to have the potentiometer and the circuit close together, this could be done by having the circuit on a separate board above or to one side of the potentiometer.

With regard to the state of the art described in the

granted patent (column 2, lines 15 to 33) the respondent argued that it might be an internal state of the art. Furthermore, since no prior art document in this respect is cited, it is not sure if these described systems were available to the public before the priority date of the impugned patent.

The respondent is of the opinion that the subject-matter of claim 1 is patentable.

V. Requests

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

The respondent (patentee) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the new claim 1 filed during the oral proceedings before the board.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

In the amended version of claim 1 the feature "for mounting directly on a vehicle pedal" is added after the term "A signal generating apparatus (10)" in line 1 of the granted claim 1, and the feature "through the circuit board" is added to the granted claim 1 after

the term "electrically connected" (page 12, line 15; patent specification column 7, line 37).

The first feature is disclosed in the originally filed claim 4 (granted claim 5) and in the paragraph bridging originally filed pages 3 and 4 (column 2, lines 40 to 46 of the granted patent). The second feature is disclosed on originally filed page 7, second paragraph (column 4, lines 37 to 43 of the granted patent) in conjunction with Figures 2 and 3.

The amended claim 1 is restricted with regard to the granted claim 1 by the additional features. In particular the second feature excludes that the connecting wires (68) would go around the board circuit.

The description is adapted to the amended claim 1.

These amendments do not contravene Article 123 EPC.

3. *Novelty*

None of the cited prior art documents discloses a signal generating apparatus with all the features of claim 1. The subject-matter of claim 1 therefore is new in the meaning of Article 54 EPC. Novelty was not disputed by the appellant.

4. *Closest prior art*

The appellant regards document D1 as representing the closest prior art.

Since it is neither proven by the appellant, nor accepted by the respondent, that the systems described in column 2, lines 15 to 33 were available to the public before the relevant priority date, they cannot be considered as state of the art according to Article 54(2) EPC. The reasoning of the appellant based on this alleged prior art cannot therefore be followed by the board.

5. *Problem and solution*

5.1 Problem:

The problem underlying the invention is to provide a compact apparatus which is able to be mounted on a vehicle pedal and which prevents inaccuracies in the engine control signal by electromagnetic interference on the analogue signal of the potentiometer and by degradation of the wiring harness.

5.2 Solution:

By positioning the conditioning circuit on the second side of the circuit board and by electrically connecting the conditioning circuit with the potentiometer stationary portion through the circuit board, a compact construction is achieved and a simplified pedal mounting is possible. Inaccuracies induced by electromagnetic interference are minimised and a possible wiring harness degradation is avoided.

6. *Inventive step*

6.1 Document D1 discloses a signal generating apparatus for mounting in a pedal housing of a sewing machine, motor tools and other small appliances (see page 1, first sentence of second paragraph and page 2, lines 5 and 6) and for delivering a signal responsive to the position of a movable mechanical member (foot pedal 10, helical member 62). The apparatus comprising a circuit board (24) having first and second sides; a potentiometer (40) having a movable wiper (rotary element 42) and a stationary portion (44), the movable wiper (42) being in movable contact with the stationary portion (44), the movable wiper (42) and the stationary portion (44) being positioned on the circuit board's first side and the movable wiper (42) being connected to and movable with the movable mechanical member (10, 62); and a conditioning circuit (control circuit 25) being also positioned on the circuit board's first side, electrically connected to the potentiometer stationary portion (44) and arranged to deliver the signal responsive to the position of the movable wiper (42) on the potentiometer stationary portion (44).

The appellant maintained that the apparatus of document D1 delivers a pulse-width-modulated signal, whereas the respondent was of the opinion that it only delivers a current signal to the electro motor, i.e. an analogue signal.

The subject-matter of claim 1 clearly differs from the apparatus of document D1 at least by the following features:

(a) the signal generating apparatus is suitable for

being mounted **directly** on a **vehicle** pedal; and

(b) the conditioning circuit being positioned on the circuit board's **second** side, electrically connected **through the circuit board** to the potentiometer stationary portion.

6.2 The appellant stated that the apparatus of document D1 also is suitable for mounting directly on a vehicle gas pedal and drew attention to page 7, last paragraph of document D1.

Although in this paragraph it is stated that the invention is not considered limited to the examples chosen for purposes of illustration, no hint is given to mount the apparatus in a vehicle, let alone directly on a vehicle pedal. Prima facie, it is clear for a person skilled in the art that there is a difference between the environment where such an apparatus, which is suitable for small appliances, is used and the harsh environment where vehicle pedals are used. It might be obvious to modify or improve the apparatus according to document D1, however the result would remain an apparatus which is suitable to be used with foot pedals for these disclosed small appliances, and it is doubtful that such a modified apparatus would be immediately suitable to be used in a pedal for a vehicle, particularly since there is no hint in document D1 in this respect. The statement that such an apparatus is suitable for vehicles, must therefore be considered as the result of an ex-post facto analysis, but not as a logical development of the device of document D1. Starting from this document D1, cannot

therefore lead in an obvious way to the claimed apparatus.

6.3 Furthermore, document D1 discloses a signal generating apparatus which is mounted not on the movable pedal but on a stationary part in the housing of the pedal. For mounting the apparatus directly on the pedal it would be necessary to mount the light helical element on the stationary part in the housing and the relatively heavy circuit board with the potentiometer (40), the control circuit (25), and the base plate (26) on the movable pedal. The skilled person would not take into consideration such a complicated modification, particularly since the circuit board must be mounted in a distance of the movable pedal because of the length of the helical element. Even an adaptation of the length of the helical member to the available space in the pedal housing would still lead a considerable mounting distance of the circuit board from the pedal, because of the necessary movement of the pedal.

The argument of the appellant that the apparatus could be mounted on the pivot part (12) of the pedal is not convincing since the space in this region is too small for this apparatus.

6.4 The appellant further argued that it would be only a simple choice of two obvious possibilities to position the potentiometer on the first side of the circuit board and the conditioning circuit on its second side.

In the apparatus of document D1 the conditioning circuit (control circuit 25) is positioned on the same side of the circuit board (24) as is the potentiometer (40). No hint is given in this document D1 of mounting the conditioning circuit (25) on the other side of the circuit board.

The appellant furthermore maintained that the electrical connector terminals (50) according to Figure 6 already extend through the circuit board so that it would be obvious to mount the conditioning circuit on the second side of the circuit board. However, according to the construction of the circuit board (24) in connection with the base plate (26) disclosed in document D1 (see Figure 3 and the positioning of the potentiometer in Figure 4), it would not be obvious to eliminate the base plate. This base plate (26) however would prevent the skilled person from providing the conditioning circuit on the second side of the circuit board.

6.5 Therefore, even if the apparatus of document D1 generated pulse-width-modulated signals, the skilled person would, on the basis of this document D1, not arrive in an obvious way at the subject-matter of claim 1.

6.6 The apparatus according to claim 1 therefore is inventive in the meaning of Article 56 EPC with respect to the sole prior art document put forward by the appellant.

7. Claim 1, as well as claims 2 to 8, the adapted

description and the drawings therefore can form the basis for the maintenance of the patent as amended (Articles 52 and 102(3) EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent in the following version:

Claims: 1 as filed during the oral proceedings on 20 January 1998,
2 to 8 as granted.

Description: Columns 1, 2 as filed during the oral proceedings on 20 January 1998,
columns 3 and 4 as filed on 24 October 1995,
columns 5, 6 and 7 as granted.

Drawings: Figures 1 to 5 as granted.

The Registrar: The Chairman:

N. Maslin C. Andries