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D E C I S I O N
of 28 November 1994

Case Number: T0393/92 - 3.2.4

Application Number: 84201876.4

Publication Number: 0151323

IPC: A01B 63/111

Language of the proceedings: EN

Title of invention:
Working depth control system for vehicle with ground working implement

Patentee:
DEERE & COMPANY

Opponent:
Robert Bosch GmbH

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - (yes) after amendment"
"Problem and solution"

Decisions cited:
T 0099/85, T 0229/85, T 0289/91

Catchword:

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0393/92 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 28 November 1994

Appellant: (Proprietor of the patent)
DEERE & COMPANY
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Representative:
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Respondent: (Opponent)
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Representative:

Decision under appeal: **Decision of the Opposition Division of the European Patent Office dispatched on 21 February 1992 revoking European patent No. 0 151 323 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: C. A. J. Andries
Members: H. A. Berger
B. J. Schachenmann

Summary of Facts and Submissions

I. The Appellant (Proprietor of the patent) lodged an appeal, received on 22 April 1992, against the decision of the Opposition Division, dispatched on 21 February 1992, and paid the appeal fee on 22 April 1992. The statement setting out the grounds of appeal was received on 3 June 1992.

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

The Opposition Division held that the grounds for opposition mentioned in Article 100(a) EPC prejudiced the maintenance of the patent, having regard to the following prior art documents

(D5) GB-A-1 132 475
(D6) DE-A-2 508 620
(D7) US-A-4 077 475
(D8) GB-A-1 503 592 (which is a family member of D6)
(D9) GB-A-1 430 819

II. In response to a communication of the Board the Appellant filed, with the letter dated 7 November 1994, new claims for a main and an auxiliary request, as well as new pages 1 and 2 and new columns 7 to 14 and 17 to 20 of the description and new pages 2, 4 and 5 of the drawings.

Oral proceedings were held on 28 November 1994 during which the Appellant presented a new set of Claims 1 to 4 for the main request.

III. The wording of Claim 1 of the main request reads as follows:

"A working depth control system for a vehicle having connecting means (26) for attaching a ground-penetrating implement thereto and actuator means (34) for raising and lowering the implement to vary the ground penetration thereof in response to a control signal (HVCO) derived from a combined error signal (LERR) formed from a plurality of error signals representing differences between actual parameter signals such as draft force, driven wheel slippage and tractor engine speed derived from the machine system comprising the vehicle, the attaching means and the implement, and corresponding set-point signals; the combined error signal (LERR) including a linear combination of a draft force error signal (DRAFT-LCOM) and an engine speed error signal (RERR), the system further comprising a draft sensor (38) for generating a draft force signal (DRAFT) representing a sensed draft force produced by implement-ground interaction, operator-adjustable load (58) command means for generating a load command signal (LCOM) representing a desired draft force, engine speed sensing means (66, 68, 150, 160) for generating an engine speed error signal (RERR) representing a difference between a sensed and a set-point engine speed; and signal combining means (226, 228) for generating the combined signal (LERR) derived by linearly combining the draft force signal, the load command signal and the engine speed error signal; characterised by means (156, 194-204) for momentarily reducing the engine speed error signal in response to a predetermined operator-induced change in the load command signal."

IV. The Appellant (Proprietor) argued as follows:

The pre-characterising portion of Claim 1 of the main request is based on the prior art document D8 or D6, although it is doubtful that this known control system comprises signal combining means for generating the combined signal by linearly combining the draft force signal, the load command signal and the engine speed error signal because of a non-linear circuit being provided between the error-signal differentiator (D) and the adder (A) for the combined signal (CS). However, such a difference would not be of importance since none of the cited documents discloses the feature of the characterising portion of Claim 1 or acknowledges the problem of the invention.

Although a switch (K2) is provided in the system of documents D8 and D6 to switch on and off engine related signals the skilled man has no information to open this switch in response to a predetermined operator-induced change in the load command signal. It would be difficult for the operator of the vehicle to actuate simultaneously the lever of the load command signal and the switch, which would be necessary with regard to the invention. According to document D6 the switches k1 and k2 are actuated by choice if wheel slip dependent signals and/or engine overload dependent signals should be taken into account for correcting the control system, as is described on page 8, second paragraph. The skilled person therefore would not arrive at the idea to momentarily reduce or switch off the engine related signal in response to a predetermined operator-induced change in the load command signal.

In the opinion of the Appellant documents D5, D7 and D9 are less relevant than documents D6 and D8 and would not lead to the control system of Claim 1 of the main request.

With regard to the new Claim 2 the Appellant drew attention to the content of the granted claims.

V. The Respondent (Opponent) argued as follows:

In the new Claim 2 of the main request a plurality of features of the granted Claim 4, which is the basis for new Claim 2, are deleted, since the granted Claim 4 did not refer to the granted Claim 3. Therefore this new Claim 2 cannot be dependent on the new Claim 1, which derives from granted Claims 1 and 3. This is unallowable because the protection would be shifted to a new aspect which was not present in the wording of the granted claims.

The Respondent considers documents D6 and D8, which are of the same patent family, as the most relevant prior art documents. He is of the opinion that all the features of the pre-characterising portion of Claim 1 of the main request are known therefrom. The provision of a non-linear circuit in the system of documents D6 and D8 cannot be considered as a real difference since according to the content of the impugned patent the combined signals are not purely derived by linear combination. The generation of these signals is much more complicated as can be seen from the drawings and the description of the patent.

The Respondent further argued that the problem stated in the granted description has not been changed and adapted to the new Claim 1. On the basis of the correctly formulated problem taking into account the dominant

control aspect, it would be obvious to arrive at the subject-matter of the new Claim 1.

With regard to inventive step the Respondent drew attention to document D6 in which it is described, for instance on page 2 (typed number), at the end of the first paragraph, that the pressure command signal of the power lift cylinder and therefore the draft force command signal is one of the dominant factors. In a system with a dominant factor it would be implicit that the influence of the other parameter signals is diminished when the dominant factor is changed because of the interrelation of the circuits. In particular, the Respondent not only drew attention to the remark on page 2 (end of first paragraph and second paragraph) concerning a smooth and flexible working condition, but also to the description on page 3, first paragraph, that the dominating factor is only influenced to a certain limit by the subsidiary control circuit when the overload is diminished. The overload however is dependent on a set point engine speed and the actual engine speed and therefore on a speed error signal, as is disclosed by the reference to document D9 given in document D8. It is obvious that the switches k1 and k2 of the system of documents D6 and D8 would automatically be operated if modern digital control systems were used. The Respondent is of the opinion that it is therefore obvious from the disclosure of documents D6 and D8 to diminish the engine speed error signal in response to a predetermined operator-induced change in the load command signal.

VI. Requests

The Appellant requested that the decision under appeal be set aside and that the patent be maintained according to the main request on the basis of the following documents

Claims: 1 to 4 filed during the oral proceedings on 28 November 1994;

Description: Pages 1 and 2 filed with the letter dated 7 November 1994;
column 2, line 8 to column 6, last line and columns 15, 16 and 21 according to the patent specification EP-B-0 151 323;
columns 7 to 14 and 17 to 20 filed with the letter dated 7 November 1994;

Drawings: Pages 1, 3 and 6 to 9 according to the patent specification EP-B-0 151 323;
pages 2, 4 and 5 as filed with the letter dated 7 November 1994.

The Appellant also filed an auxiliary request based on two claims.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments according to the main request*

2.1 The present Claim 1 is based on the granted Claims 1 and 3 wherein the "modifying" activity is limited to a "reducing" activity. Claim 2 is based on the granted Claims 1, 4 and 5; Claim 3 is based on the granted Claims 1, 4, 5 and 6; and Claim 4 is based on the granted Claim 7.

The Board accepts the new Claims 2 and 3 (i.e. the respective combination of Claims 1 and 2 and 1, 2 and 3) having regard to the content of the corresponding granted Claims 5 and 6 respectively which include the features of the granted Claims 1 and 4, and 1, 4 and 5 respectively, by their references to previous claims. Indeed, although the granted Claims 5 and 6 did not refer to the granted Claim 3, which now forms part of the new Claim 1, the technical content of these Claims 5 and 6, i.e. the combination of features present in the granted Claims 5, 4 and 1, and 6, 5, 4 and 1 respectively is the same as the combination of the features in the present Claims 2 and 1 (Claim 2) and 3, 2 and 1 (Claim 3). Since the present dependent Claims 2 and 3 therefore do not bring new claimed subject-matter into the patent, these newly-formulated claims are accepted.

2.2 The further amendments made in the description and to the drawings also do not give rise to an objection according to Article 123(2) EPC.

2.3 Since the new Claim 1 comprises the features of the granted Claims 1 and 3, wherein furthermore the "modifying" activity is restricted to a "reducing" activity, the protection conferred is restricted vis-a-vis the granted Claim 1. The amended version of the patent therefore does not contravene Article 123(3) EPC.

2.4 The Appellant had the opportunity to correct the description and the drawings after the communication of the Board.

3. *Novelty (main request)*

The Board ascertained during the examination of the cited prior art documents that none of these discloses a working depth control system with all the features of Claim 1. Novelty of the subject-matter of the new Claim 1 was not disputed by the Respondent during the appeal.

The control system of Claim 1 is thus novel within the meaning of Article 54 EPC.

4. *Closest State of the Art (main request)*

The Appellant and the Respondent took as the starting point in assessing inventive step a control system according to document D6 or document D8, which are of the same patent family. According to the Appellant the pre-characterising portion of Claim 1 is based on document D8 or document D6. The Respondent related his arguments mainly on the disclosure of document D6. The Board will therefore consider document D6 as the starting point for examining inventive step.

5. *Problem and Solution (main request)*

5.1 Problem

As the combined signal (LERR) is a linear combination of draft load command and engine speed errors there is a danger that the recalculation of the draft control operating point required when there is a change in the load command control would be influenced by the engine speed error signal. This is undesirable in a system in which the draft force responsive aspect of the control system is the primary or dominant aspect (see the granted patent column 13, lines 55 to 65).

With regard to the most relevant state of the art disclosed in document D6 or document D8 the objective problem of the invention is to provide an improved system which takes better account of the interactive relationship between the draft force as the dominant factor and engine speed and vehicle speed.

Although a similar problem is already described in the granted patent (see column 1, lines 58 to 61) with regard to the granted Claim 1, a more restricted problem would already contain pointers to the solution which is based on knowledge not supported by the state of the art and acquired only after the priority date. This would therefore not be in accordance with the general jurisdiction of the EPO. The objective problem must be defined in such a way that it does not partially anticipate the solution (T 99/85, OJ EPO 1987, 413; T 229/85, OJ EPO 1987, 237; T 289/91, paragraph 3.2.3).

5.2 Solution

By momentarily reducing the engine speed error signal in response to a predetermined operator-induced change in the load command signal, interference from the engine speed error inputs is prevented when the draft control operating point is set. This ensures that the draft force responsive aspect of the control system is normally the dominant control aspect.

6. *Inventive Step (main request)*

6.1 The Appellant and the Respondent consider the feature of the characterising portion of Claim 1 as the essential difference with regard to the state of the art of documents D6 and D8.

6.2 It is true that, according to document D6, the pressure command signal of the power lift cylinder described therein is a dominant factor in this known control system. However, there is no hint given in the prior art, either explicitly or implicitly, to provide additional means to momentarily reduce the engine speed error signal in response to a predetermined operator-induced change in the load command signal.

6.3 On the contrary, on page 2 (typed number), at the end of the first paragraph of document D6, it is described that the dominating factor must yield slightly for achieving a smooth working condition, which would not lead to the idea of reducing the influence of the speed error signal but would entail a certain change of the dominating factor by the tractor and engine related signals. Also the statement on page 3 (typed number), first paragraph, that a parameter of the tractor and/or the engine can only influence the dominating factor up to a certain limit (Grenze) so that wheel slip and/or overload of the

engine are diminished, indicating therewith the influence of the tractor and engine parameters on the dominating factor, gives no encouragement to the skilled person to provide additional means to momentarily reduce the engine speed error signal upon a change in the load command signal. If a reduction of the engine overload in response to a change in the load command signal is attained in the system of document D6 then this is due to the whole circuit of the system comprising the working implement (plough) and the tractor engine. This whole circuit cannot be compared with the additional means for momentarily reducing the engine speed error signal according to Claim 1 and its interpretation by the content of the patent where this additional means interferes directly with the engine speed error signal.

With regard to the switch (k2), with which the engine related unit can be switched off and on, it is disclosed in document D6, page 8 (typed number), second paragraph, that the control system (dominating factor) can be corrected by the engine over-load command signal via the corresponding switch (k2) or by the wheel slip signal via the corresponding other switch (k1) or by both signals together. It is therefore not obvious for the skilled person or for the skilled operator of the tractor to momentarily switch off the engine related signal when the load command is changed. This paragraph only indicates a switching from one influencing parameter to another.

Documents D5, D7 and D9 are less relevant than documents D6 and D8 and do not give any hint towards the feature of the characterizing portion of Claim 1. Apart from the relevant documents D6 and D8, only document D9 was mentioned during the oral proceedings by the Respondent

due to the fact that it was referred to in document D8 and since according to the parties it mentioned an engine speed error signal.

6.4 As the available prior art does not provide even a suggestion of the feature which distinguishes the control system according to Claim 1 of the main request from the content of document D6 or D8, the subject-matter of Claim 1 is considered to involve an inventive step.

7. In view of the above, the patent in suit can be maintained on the basis of the documents of the main request.

8. Therefore, there is no need to examine the Appellant's auxiliary request.

9. At the oral proceedings, both parties had an opportunity to present their comments on the amended text of the patent submitted by the Appellant. It is therefore not necessary to issue a communication pursuant to Rule 58(4) 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 to 4 filed during the oral proceedings on 28 November 1994;

Description: Pages 1 and 2 filed with the letter dated 7 November 1994;
column 2, line 8 to column 6, last line and columns 15, 16 and 21 according to the patent specification EP-B-0 151 323;
columns 7 to 14 and 17 to 20 filed with the letter dated 7 November 1994;

Drawings: Pages 1, 3 and 6 to 9 according to the patent specification EP-B-0 151 323;
pages 2, 4 and 5 as filed with the letter dated 7 November 1994.

The Registrar: The Chairman:

N. Maslin C. Andries