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D E C I S I O N
of 14 May 2002

Case Number: T 0716/00 - 3.2.1

Application Number: 95308786.3

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Language of the proceedings: EN

Title of invention:
Cruise control system

Patentee:
Lucas Industries Limited

Opponent:
Mannesmann VDO AG

Headword:
-

Relevant legal provisions:
EPC Art. 56, 84

Keyword:
"Claims - interpretation"
"Inventive step - yes"

Decisions cited:
-

Catchword:
-



Case Number: T 0716/00 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 14 May 2002

Appellant: Lucas Industries Limited
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Respondent: Mannesmann VDO AG
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 6 June 2000
revoking European patent No. 0 720 928 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: F. A. Gumbel
Members: J. Osborne
G. E. Weiss

Summary of Facts and Submissions

- I. The patent proprietor's appeal is against the decision of the Opposition Division to revoke the European patent No. 0 720 928.
- II. The patent had been opposed on the ground that the subject-matter of the claims lacked an inventive step (Article 100(a) EPC).
- III. The decision of the Opposition Division was posted on 6 June 2000. Notice of appeal together with payment of the appeal fee were received on 12 July 2000. The grounds of appeal were received on 6 October 2000.
- IV. In oral proceedings held on 14 May 2002 the appellant requested that the decision be set aside and that the patent be maintained as granted, according to a main request, or, in the alternative, in amended form according to first and second auxiliary requests. The respondent requested that the appeal be dismissed.
- V. The following evidence was mentioned during appeal:

D1 EP-A-0 612 641
D2 EP-B-0 433 351.

The Opposition Division was of the opinion that the subject-matter of Claim 1 as granted lacked inventive step in the light of a combination of D1 and D2.

- VI. The claims according to the appellant's main request contain a single independent claim, Claim 1, and dependent Claims 2 to 7 which define preferred embodiments of the subject-matter of Claim 1. Claim 1

reads:

"A cruise control system of the type which operates in accordance with a driver's headway request given in terms of a desired time interval between the controlled vehicle and the preceding, target vehicle, characterised in that, upon slowing of the target vehicle towards zero velocity, the calculated station of the controlled vehicle behind the target is arranged to be changed from being a pure time-based interval into a time interval which is calculated to include a proportion of a desired residual range at standstill, the proportion being dependent upon the velocity of the controlled vehicle."

VII. The arguments of the appellant (patent proprietor) in respect of the main request can be summarised as follows:

The closest prior art is known from D1 which discloses a cruise control system which is adapted to regulate the speed of the controlled vehicle to follow at a desired distance behind a target vehicle. The spacing may be set as a variable time interval and the system calculates the corresponding distance using the formula $s = v \times t$ where v represents the speed of the controlled vehicle. This calculation cannot reliably determine a distance between the vehicles as the speed term approaches zero. The solution suggested in D1 is to add a fixed distance of 7m to the calculated value so that the controlled vehicle will come to rest spaced from the target vehicle by this distance. However, it is desirable that the spacing at rest be related to the time interval chosen for separation of the vehicles. Claim 1 according to the main request specifies this in

that it defines a cruise control system which operates in accordance with a driver's headway request given in terms of a desired time interval between the controlled and target vehicles and in that the calculated station upon slowing towards zero speed is defined as a time interval which also includes a proportion of desired residual range, the proportion being dependent upon the speed of the controlled vehicle. D2 does not relate to a cruise control system which regulates the speed of a vehicle at the driver's request but to a collision avoidance system as part of the control system of an automatically guided vehicle. The skilled person therefore would not consider D2 when wishing to modify the cruise control system according to D1. Moreover, D2 discloses that the minimum distance to follow a preceding vehicle is neither based on a time interval nor related to speed.

VIII. The respondent (opponent) countered essentially as follows:

D1 discloses a system according to the preamble of Claim 1. The problem of calculation of the spacing at standstill is already recognised in D1 in as far as the fixed 7m spacing has been suggested. Moreover, the addition of the fixed 7m spacing suggests the idea of changing from one method of determining the spacing to another. D2 does relate to a cruise control system because it requires the driver to input a desired speed and then determines the set values accordingly. The collision avoidance system modifies the set values in the event that a potential collision is recognised. In the special case in which a change of course is not possible the system causes the controlled vehicle to follow at a distance behind the preceding vehicle, the

distance between the vehicles being dependent on the speed of the controlled vehicle. The system would operate in the same way if the preceding vehicle were to come to a standstill. Claim 1 according to the appellant's main request does not require that the spacing at standstill be dependent on the time interval set by the driver for following a target vehicle. The subject-matter of Claim 1 in suit therefore is rendered obvious by a combination of D1 and D2.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Interpretation of Claim 1*
 - 2.1 In the appellant's submissions during the appeal procedure it relied on an interpretation of Claim 1 according to which the desired residual range at standstill is determined as a function of the headway set by the driver. The Board cannot agree with this interpretation for the reasons set out below.
 - 2.2 In the characterising portion of the claim it is specified that, upon the speed of the target vehicle decreasing, the calculated desired range between the controlled and target vehicles is "changed from being a pure time-based interval into a time interval ... to include a proportion of a desired residual range at standstill ...". The "time interval" from which the desired range is calculated at lower speeds is a combination of time and distance terms, namely the

driver's headway request and the desired residual range (RDR) respectively. This is consistent with the statement in the claim that the system changes from a "pure" time-based interval. It is also consistent with the preamble of the claim which defines the system as being of the type which "operates in accordance with a driver's headway request" because the proportion of the "time interval" which is not formed by the RDR is based on the driver's headway request. The definition in the preamble that the system operates in accordance with the driver's headway request therefore does not necessarily imply that the RDR is also dependent on the driver's headway request. Indeed, a link between the driver's desired headway and the value of RDR is explicitly introduced in dependent Claim 5.

- 2.3 Consideration of the subject-matter of Claim 1 in the light of the description of the patent in suit also does not lead the Board to concur with the appellant's interpretation of Claim 1. The description discusses the prior art known from D1 and describes the problem to be solved as relating to the calculation of the spacing using the formula $s = v \times t$ as the value of v approaches zero (page 2, lines 48 to 54). The solution to this problem is given as the subject-matter of Claim 1 in which the proportion of the spacing based on RDR prevents the calculated desired range from tending to zero. In the opinion of the Board it is clear to the person skilled in the art that a dependency of RDR on the driver's headway request is not essential to the solution of the stated problem. Indeed, it is stated in the description of the patent specification at page 4, lines 42 to 44 that adding a fixed distance, in that case 7m, to the value calculated from the formula $s = v \times t$ ensures that the controlled vehicle stops

without causing a collision. Page 5, lines 34 to 37 of the description merely states that RDR should (emphasis added) relate to the driver's headway request. Figure 2 discloses at 52 an "RD Range Factor" which links the value of RDR to the driver's headway request but this concerns only a preferred embodiment which is the subject of dependent Claim 5 (see also page 3, lines 25, 26). The only part of the description which could support the appellant's interpretation of the claim is the wording at page 3, lines 4 to 7 which discusses the effect of the subject-matter of Claim 1 at standstill as being dependent on the driver's headway request. However, in the light of the disclosure of the patent specification taken as a whole the Board comes to the conclusion that Claim 1 in suit is not to be interpreted as specifying that RDR is necessarily dependent on the driver's headway request.

3. *Inventive step*

3.1 The parties are in agreement that D1 discloses the closest prior art. In the preferred embodiment according to Figure 1 the desired range is determined by circuit 4 as a function of the speed of the controlled vehicle. D1 suggests three relationships between the desired range and the speed. The first relationship includes a fixed time interval together with a fixed distance (column 5, lines 54 to 58), the second relationship is a pure, fixed time interval (column 6, lines 1 to 3) and the third is a pure, variable time interval which is selectable by the driver (column 6, lines 3 to 8). The third relationship relates to a cruise control system of the type which operates in accordance with a driver's headway request given in terms of a desired time interval between the

controlled vehicle and the preceding, target vehicle, the calculated station of the controlled vehicle behind the target being a pure time-based interval. This third relationship represents the starting point for consideration of inventive step of Claim 1 in suit. The desired range is calculated using the formula $s = v \times t$ and so the system has difficulty in determining the desired position behind the target vehicle as the speed approaches zero.

- 3.2 The subject-matter of Claim 1 in suit differs from that of D1 by the features of the characterising portion. These differentiating features have the effect of providing a phased change over from a pure time-based interval at higher speeds to a distance at which the controlled vehicle is required to be positioned behind the target vehicle at standstill. The subject-matter of the claim solves the problem of allowing the desired range at higher speeds to be determined purely on the basis of a driver's desired headway whilst nevertheless ensuring that the system can determine the desired range as the speed approaches zero. In the opinion of the Board D1 gives no hint of the idea of changing from one method of calculation of the desired range to another as speed reduces. Although the problem of calculating a desired range based on a pure time-interval was recognised in D1, the solution which was proposed, to add a fixed distance of 7m to the value calculated on the basis of the driver's headway request, continues to use a single basis for calculating the desired range at all speeds.

4. D2 relates to an automatic guidance system for a road vehicle, which can determine potential collision situations and react to avoid them. The system

determines the desired course and speed based on data input by the driver (page 5, lines 51 to 54). In the event that a potential collision is recognised the system determines the alterations in course and speed which are necessary in order to avoid the collision (page 5, line 56 to page 6, line 4). A special case exists when the collision would be with a vehicle moving in the same direction and a course alteration would be impossible. In this case the system operates to brake the controlled vehicle to follow behind the preceding vehicle at a minimum distance r_{mind} (page 15, lines 50 to 54; page 16, lines 29 to 31). According to page 14, lines 20 to 24 the distance r_{mind} may have a value which is either variable as a function of speed or fixed.

4.1 The problem which the subject-matter of Claim 1 in suit solves exists only in the case that the desired range is calculated in such a way that the value tends to zero as the speed approaches zero. Although D2 suggests that the value of r_{mind} may vary as a function of speed, no detail is give of the relationship. The problem which arises if the calculation of the value of r_{mind} is based solely on vehicle speed and in the special case in which the speed of the preceding vehicle approaches zero is not addressed in D2.

4.2 The teaching of D2 that the value of r_{mind} may vary with speed is not a disclosure of the differentiating features of Claim 1 in suit. D1 already discloses that the desired range may vary with speed by virtue of the formula $s = v \times t$. According to Claim 1 in suit the variation of the desired range is not a general one but is of a particular form in which a stationary distance element (RDR) is introduced into the calculation upon

the speed reducing towards zero and the proportion of the desired range which is due to the value of RDR is dependent on the momentary speed. D2 contains no teaching either to change from one method of calculation to another upon slowing towards rest or to introduce a stationary distance element in dependence upon the speed.

- 4.3 It follows that a combination of D1 and D2 discloses neither the idea of changing from one calculation of the desired range to another as the controlled vehicle slows towards standstill nor the idea of adding to the desired range based only on the vehicle speed a proportion of the residual desired range at standstill, the proportion being dependent on the speed of the controlled vehicle.
5. The Board therefore comes to the conclusion that the subject-matter of Claim 1 in suit is not rendered obvious by the combination of D1 and D2. Since the dependent Claims 2 to 7 contain all features of Claim 1 the same conclusion applies to those claims. Accordingly, the subject-matter of the claims is found to involve an inventive step (Article 56 EPC). In the light of this conclusion consideration of the auxiliary requests is unnecessary.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

The Registrar:

The Chairman:

S. Fabiani

F. Gumbel