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Datasheet for the decision of 18 November 2022

Case Number: T 0584/21 - 3.2.01

Application Number: 08705226.2

Publication Number: 2244920

IPC: B60W10/18, B60T10/00, B60T13/58, B60W30/18

Language of the proceedings: EN

Title of invention:
A METHOD AND SYSTEM FOR BRAKING A VEHICLE

Patent Proprietor:
Volvo Construction Equipment AB

Opponent:
Voith Patent GmbH

Headword:

Relevant legal provisions:
EPC Art. 54, 56
RPBA 2020 Art. 13(2)

Keyword:

Novelty (main request: no)
Inventive step (auxiliary request 1: yes)
Amendment after summons - cogent reasons (no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 0584/21 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 18 November 2022

Appellant: (Opponent)	Voith Patent GmbH Sankt Pöltener Straße 43 89522 Heidenheim (DE)
Representative:	Dr. Weitzel & Partner Patent- und Rechtsanwälte mbB Friedenstrasse 10 89522 Heidenheim (DE)
Respondent: (Patent Proprietor)	Volvo Construction Equipment AB 631 85 Eskilstuna (SE)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Johannes-Brahms-Platz 1 20355 Hamburg (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 9 March 2021 rejecting the opposition filed against European patent No. 2244920 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	H. Geuss
Members:	C. Narcisi
	P. Guntz

Summary of Facts and Submissions

I. The opposition was rejected and European patent No. 2 244 920 was maintained as granted by the decision of the Opposition Division posted on 9 March 2021. Against this decision an appeal was lodged by the Opponent in due form and in due time pursuant to Article 108 EPC.

II. The following documents are cited in this decision:

WO-A (designating the published patent application of the contested patent);
EP-B (designating the publication of the contested patent);
D6 (KR 2002-0040340);
D6T (computer-generated translation of D6);
D6T2 (further computer-generated translation);
D6T3 (certified translation of D3);
D7 (Voith Einbaurichtlinien-Voith Retarder R133-2 Auszug Nr. 53.8205.10 (6. September 1996));
D3 (DE 198 22 859 A1)
D5 (WO 2004/048172 A1).

III. Oral proceedings were held on 18 November 2022. The Respondent (Patent Proprietor) requested that the appeal be dismissed and the patent be maintained as granted or, in the alternative, that the patent be maintained based on the following documents: Claims 1-17 filed with the reply to the statement of grounds of appeal as "auxiliary request 4"; Description pages 2-5 as filed during the oral proceedings; Figures 1-3 of the patent as granted. The Appellant (Opponent) requested that the decision under appeal be set aside and that the European patent be revoked.

IV. Granted claim 1 (main request) reads as follows:

"A method for braking a vehicle (1), wherein the vehicle comprises a circuit (37) adapted for transmitting a brake signal from an operator controlled braking element (42) to brake devices (39, 41, 43, 45, 47, 49) arranged at a plurality of the vehicle's ground engaging elements via a brake fluid,
characterized by the steps of detecting a fluid pressure in the circuit (37), using the detected fluid pressure level as an input for determining a brake power for at least one auxiliary brake (61, 63)in the vehicle, and controlling the auxiliary brake responsively in such a way that the brake power of the auxiliary brake is apportioned variably in a certain way as a function of the detected pressure in the brake devices circuit (37)."

Claim 1 of auxiliary request 4 (the sole remaining auxiliary request) differs from claim 1 of the main request in that the wording "as a function of the detected pressure in the brake devices circuit (37)" is replaced by "as a function of the detected pressure in the brake devices circuit (37), comprising the step of detecting at least one vehicle operational parameter and using the operational parameter signal as a further input for determining the brake power for said at least one auxiliary brake,
wherein the detected operational parameter is indicative of
- the vehicle speed, or
- a current gear, or
- a slip of one of the ground engaging elements."

V. The Appellant's (Opponent) arguments may be summarized as follows:

The subject-matter of granted claim 1 of the main request is not new over D6 in conjunction with D6T since the disputed features 1.4 (i.e. "using the detected fluid pressure level as an input for determining a brake power for at least one auxiliary brake (61, 63)in the vehicle") and 1.5 (i.e. "controlling the auxiliary brake responsively in such a way that the brake power of the auxiliary brake is apportioned variably in a certain way as a function of the detected pressure in the brake devices circuit (37)") are derivable from said documents.

In particular, D6 discloses a braking method comprising a pressure sensor 6 sensing the pressure in the hydraulic or pneumatic brake line 3 and converting it into an electric voltage value then transmitted to the electronic control unit 9 (see D6, figure 1; D6T, page 6, first paragraph). Then, if it is determined that lever switch 8 does not work (i.e. is not activated; see step 22 in flow chart of figure 2), the electronic control unit 9 drives the brake actuator 5 of the main brake 4, while at the same time generating a braking force, proportional to the detected pressure of the sensor 6, for driving the auxiliary actuator 12 of the auxiliary brake 11 (see D6T, page 7, second paragraph).

D6 also discloses that if it is determined that the rotational speed of the engine is less than 1000 rpm the electronic control unit 9 drives only the brake actuator 5 such that only the braking force by the main service brake 4 is generated (D6T, page 6, third

paragraph), this being illustrated in step 21 of the flow chart for said braking method in figure 2.

This same flow chart in figure 2 also shows that if in step 22 the electronic control unit (ECU) 9 determines that the lever switch 8 is activated (and in step 21 the rotational speed of the engine is also larger than 1000 rpm), then a braking force is generated by the auxiliary brake actuator 12 (driven by the ECU 9) and the auxiliary brake 11, proportional to the selected operating position of the lever switch 8 according to the given stages 1, 2, 3 or 4 (D6T, page 6, fourth paragraph-page 7, first paragraph).

Consequently features 1.4 and 1.5 are known from D6, given that the wording of claim 1 does not exclude that the setting of the lever switch and the rotation speed of the engine likewise being taken into account as additional parameters by the ECU during the braking process. It ensues that the claimed subject-matter lacks novelty.

The subject-matter of claim 1 of auxiliary request 4 is not inventive in view of D6 (and D6T) in conjunction with common general knowledge as demonstrated by documents D3, D5 and D7, for the added feature (i) (i.e. “comprising the step of detecting at least one vehicle operational parameter and using the operational parameter signal as a further input for determining the brake power for said at least one auxiliary brake, wherein the detected operational parameter is indicative of the vehicle speed, or a current gear, or a slip of one of the ground engaging elements”) does not contribute to inventive step.

In effect, it would be obvious for the skilled person to use the vehicle speed, the current gear or the slip as a further operational parameter in order to determine the brake power of the auxiliary brake. Several documents indicate that this is part of common general knowledge. D3 discloses for instance that vehicle speed and slip are detected and used in order to determine an optimal braking force of the auxiliary brakes avoiding blocking or locking of the wheels (see D3, e.g. claims 1 and 2). D5 similarly discloses that the braking force of the auxiliary brake is usually (for the most common types of auxiliary brakes) already inherently dependent on vehicle speed (or engine speed and gear) and D7 discloses that operation of the auxiliary brakes likewise depends on slip, since operation of the auxiliary brakes is switched off when the ABS anti-lock braking system is operating. Therefore the skilled person would readily apply this common general knowledge to the method of D6 to improve functioning of the auxiliary brake and thereby arrive in an obvious manner at the claimed subject-matter.

Similarly, the combination of D6 and D3 would be obvious for the skilled person, as it would lead to an improved auxiliary brake performance, thus arriving at the subject-matter of claim 1 of auxiliary request 4 (see above).

The combination of D7 and common general knowledge would obviously lead the skilled person to the subject-matter of auxiliary request 4. In effect, D7 already discloses all the features of granted claim 1 and further suggests to introduce slip as an additional operational parameter to determine the braking force of the auxiliary brake.

VI. The Respondent's (Patentee) arguments may be summarized as follows:

The subject-matter of granted claim 1 is new over D6 in conjunction with D6T since features 1.4 and 1.5 are not derivable therefrom. In particular, document D6 (being published in Korean language) and its machine-generated translation D6T do not allow to deduce that features 1.4 and 1.5 are clearly and unambiguously disclosed in D6. D6 (and D6T) discloses a method wherein the auxiliary brake may only be activated if the engine rotational speed is above 1000 rpm and if a hand lever (lever switch) having stages (or settings) 1 to 4 is activated. No activation of the auxiliary brake is disclosed in D6 if only the main brake is actuated and a pressure is detected in the brake line. Specifically, there is no clear and unambiguous disclosure in D6 (and D6T) that a braking force proportional to the detected pressure in the brake line is generated to actuate the auxiliary brake, if the hand lever is not activated. Moreover, the method disclosed in D6 anyway does not anticipate the subject-matter of claim 1, given that it comprises detecting the engine rotational speed and determining the hand lever position, which steps are both not included or contemplated in present claim 1.

The subject-matter of claim 1 of auxiliary request 4 is inventive over D6 or D7 in view of the skilled person's common general knowledge and/or the further cited prior art documents. In particular, documents D3, D5 and D7 do not constitute part of the skilled person's common general knowledge.

Reasons for the Decision

1. The appeal is admissible.

2. The subject-matter of granted claim 1 (main request) is not new over D6 in conjunction with D6T (Article 54 EPC).
In the Board's view disputed features 1.4 (i.e. "using the detected fluid pressure level as an input for determining a brake power for at least one auxiliary brake (61,63) in the vehicle") and 1.5 (i.e. "controlling the auxiliary brake responsively in such a way that the brake power of the auxiliary brake is apportioned variably in a certain way as a function of the detected pressure in the brake devices circuit (37)") are clearly and unambiguously derivable from D6 as can be derived even from the machine-generated translation D6T.

The Board notes that, although this translation has evident shortcomings and deficiencies, D6T provides, given the particular nature of the present case (implying only a very limited number of specific questions to be answered), sufficient proof that D6 directly and unambiguously discloses the aforementioned features to the skilled person.

First, the braking circuit depicted in figure 1 undisputedly shows that pressure sensor 6 detects the braking fluid pressure in the braking fluid conduit 3, which is converted into a voltage value, as is confirmed by D6T (page 6, first paragraph). Further, the detected fluid pressure or voltage is used as an input to the electronic control unit 9 (ECU) (see

braking circuit in figure 1; D6T, page 6, first paragraph).

Next, if the engine rpm sensor 7 measures an engine rotational speed less than 1000 rpm, the ECU 9 drives the brake actuator 5 to generate only the braking force of the main service brake 4 (see D6T, page 6, paragraph 3; figure 2 (flow chart), step 21).

Otherwise (if rpm greater than 1000; see step 21 in figure 2 (flow chart)) the ECU determines next in step 22 whether lever switch 8 is activated, and if yes then the ECU 9 drives (in addition to the service brake 4) the auxiliary actuator 12 to generate a braking force, proportional to the setting of the lever switch 8, acting on the auxiliary brake 11 (see also D6T, page 6, fourth paragraph). This auxiliary braking force is determined according to settings (or stages) 1 to 4 of the lever switch 8 (see steps 31, 32, 33, 34 in figure 2 (flow chart); D6T, page 6; fourth, fifth and sixth paragraph).

The disclosure in D6, conveyed by D6T, of the method steps as detailed hereinabove is not disputed by the Respondent. The only disputed features concern the method steps 41, 42, 43, 44 performed after step 22 (in figure 2(flow chart)) in case the lever switch 8 is not activated.

If the answer in step 22 is “no” (lever switch 8 not activated), then figure 2 (flow chart) in D6 shows that in steps 41, 42, 43, 44 the ECU determines whether the sensed voltage is less than 1V (step 41), or whether it lies between 1V and 2V (step 42), between 2V and 3V (step 43) or between 3V and 4V (step 44). This is confirmed by the translated disclosure in the

description (D6T, see page 7, second paragraph, third and fourth paragraph), which also specifies that the pressure is sensed by pressure sensor 6 (see D6T, page 7, second, third and fourth paragraph) and converted into voltage (pressure/voltage).

Accordingly, as a consequence of the sensed pressure/ voltage, the ECU 9 determines which of aforesaid four voltage stages (or levels/settings) has to be selected according to the detected pressure/voltage (steps 41 to 44) (see above) and thereafter it applies a braking force "proportional" to the selected voltage stage to the actuator 12 of the auxiliary brake 11 (see D6T, page 7, second, third and fourth paragraph). Of course (as hereinbefore), this braking force acts in addition to the braking force of the main service brake 4, which directly depends on pressure detected by sensor 6.

Hence it ensues from the above that features 1.4 and 1.5 are known from D6 in conjunction with D6T.

The arguments of the Respondent could not convince the Board.
First, it is not plausible or reasonable that (according to the method of D6) a braking force proportional e.g. to the engine rotational speed is generated in steps 41 to 44, since in the flow chart of figure 2 the engine rotational speed RPM is indicated only in preceding step 21 (see above), not in steps 41 to 44, and said RPM is also not mentioned in said corresponding second, third and fourth paragraphs on page 7 of D6T.

Further in the description (see D6T, page 7, second paragraph) it is disclosed "while generating the braking force by the pressure detecting sensor 6 is

proportional to the voltage", and it is also disclosed (page 7, third paragraph) "the voltage is determined to be less than 1V (step 41) the auxiliary brake 11 under the control of the electronic control unit is proportional to the voltage of less than one volt first stage and thereby generating a braking force". This clearly confirms the above interpretation of the disclosure of D6, as evidenced by D6T, in that the auxiliary braking force is proportional to the detected pressure/voltage (i.e. to the pressure detected by sensor 6 converted into voltage).

Still further, in said fourth paragraphs on page 7 in D6T it is indicated that if the voltage lies between 1V and 2V, 2V and 3V, or 3V and 4V (according to steps 42, 43, 44) then an auxiliary braking force is generated proportional to the voltage stage between 1V and 2V, 2V and 3V, or 3V and 4V respectively. Thus, the braking force is "proportional to the four-stage" voltage, the appropriate voltage stage (or level) being selected by the ECU as described hereinbefore (i.e. according to the detected pressure/voltage level).

Moreover, in steps 41 to 44 (see figure 2) said four "voltage" stages are clearly illustrated, and there can also be no doubt that the pressure/voltage sensed by sensor 6 is related to said four "voltage" stages in the way described above (i.e. the actual voltage stage being selected or determined by the sensed pressure/ voltage) since said voltage stages are described in D6T only in connection with the voltage corresponding to the pressure detected by sensor 6 (converted into voltage).

Finally, it is undoubted and unambiguous that after determining the appropriate voltage stage in steps 41

to 44 the ECU 9 applies a corresponding braking force to the auxiliary brake, and not to the main service brake, which would not make sense (since the main service brake 4 is anyway normally actuated by the braking pressure in pressure line 3 (see above)).

In particular it is evident in the flow chart of figure 2 that steps 31, 32, 33, 34 on the one side and steps 41, 42, 43, 44 on the other side are entirely symmetrical, as are the ensuing commands issued if the answer is "yes" in any one of these steps. The commands are represented by the corresponding boxes including the indication "on" and including in the box's top line the Korean term corresponding to the term "auxiliary brake" 11 (as may be verified by checking the list of reference signs and corresponding constructional elements (see reference sign 11) on page 3 of the original Korean document D6). That is, in both cases (i.e. if lever switch is actuated (right side of flow chart in figure 2) or not actuated but sufficiently high pressure is detected (left side of flow chart in figure 2)) the auxiliary brake 11 is operated.

In conclusion, for the above stated reasons, the subject-matter of claim 1 is not new over D6 in conjunction with D6T.

3. The subject-matter of claim 1 of auxiliary request 4 is not rendered obvious in view of D6 (and D6T) in conjunction with common general knowledge as derivable from documents D3, D5 and D7 (Article 56 EPC).

First it is noted that the Appellant did not provide evidence that D3, D5 and D7 should be considered as representing common general knowledge of the skilled person. Indeed, both D3, D5 and D7 constitute specific

documents addressing particular topics in the technical field and the Board does not consider that these documents form part of common general knowledge.

In addition, even on the assumption (quod non) that D3, D5 and D7 form part of common general knowledge, this would not lead the skilled person in an obvious manner to the claimed subject-matter, particularly to aforesaid feature (i).

In effect, D3 discloses a specific method intended to obtain optimal braking while avoiding wear of the main service brake, thus necessitating sensor data detecting vehicle velocity, acceleration, wheel rotational speed, slip and yaw speed in order to decide whether a wear-free braking is possible using only the engine brake and the auxiliary brake (retarder) (see D3, column 3, lines 13-20; flow chart in figure 2, step S4), i.e. without using the main service brake. Therefore, this is a clearly different braking method as compared to the method of D6, wherein the auxiliary brake is used only as an additional or optional braking means depending on braking fluid pressure (in the braking fluid circuit) or on manual activation of a lever switch, while the service brake is used primarily and constantly. Consequently, there would be no incentive or motivation for the skilled person to implement the teaching of D3 in the known method of D6.

Similarly, D7 merely teaches to disable the auxiliary brake or retarder when the ABS system is operating (see D7, page 5.2.6/2), i.e. when the wheels' rotation and slip indicate impending wheel locking or blocking. However, this does not amount to "detecting at least one vehicle operational parameter and using the operational parameter signal as a further input for

determining the brake power for said at least one auxiliary brake" (according to feature (i)), since according to D7 the auxiliary brake power is not determined as a function (also) of said detected slip values and there is no suggestion in this respect. Indeed D7 only teaches to disable and shut down the auxiliary brake function when the ABS is operating, i.e. under impending wheel locking or blocking conditions. Hence the skilled person would not be incentivized in view of D7 to adopt the slip as a "further operational parameter" and "further input" to determine auxiliary brake power according to feature (i) (in conjunction with the remaining features of the characterizing portion of claim 1), specifically as a function of both braking fluid pressure and slip.

As to D5, this document discloses that the braking effect of the auxiliary brakes (e.g. retarders) is generally dependent on vehicle speed or engine speed (or gear) (D5, pages 1 to 4) and also discloses a braking method wherein the braking torque (or force) is distributed between the main service brake and the auxiliary brake such that vehicle speed is maximized (see D5, claim 2) or the braking effect of the auxiliary brake is optimized (maximized) before the main service brake starts to deliver brake torque (see D5, claim 3). By contrast, according to the braking method of D6, the main service brake is primarily and constantly used and (depending on braking fluid pressure or on lever switch setting) the auxiliary brake is subsequently gradually used (in addition to the main service brake). Thus the strategies and technical concepts underlying the braking methods of D6 and D5 are completely different and the skilled person would not implement the teaching of D5 in the method of D6.

4. The subject-matter of claim 1 (auxiliary request 4) is not rendered obvious (Article 56 EPC) in view of D7 and common general knowledge of the skilled person. This follows already from the above discussion (see point 3), D7 including no indication suggesting to use slip as a further operational parameter (in addition to braking fluid pressure) in order to determine the braking force of the auxiliary brake as a function of both these parameters. Such a suggestion is likewise not derivable from any of documents D3 or D5 when considered as being allegedly part of common general knowledge (see above discussion), given that D7 (similarly to D6) does not disclose a braking method implementing the same strategy and technical concept as according to D3 or D5.

5. The Appellant’s line of arguments concerning lack of inventive step starting from D6 and in view of D3 was not admitted into the appeal proceedings since it was submitted at a very late stage, only during the oral proceedings before the Board and since there were no exceptional circumstances which were justified by the Appellant with cogent reasons (Article 13 (2) RPBA 2020 (Rules of Procedure of the Boards of Appeal). This was also not claimed by the Appellant.

In addition, in view of the above reasons (see point 3), similar conclusions would apply as for the case where (according to the Appellant's line of argument (see point 3)) D3 is supposed to be part of common general knowledge.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Opposition Division with the order to maintain the patent on the basis of the following documents:
   - Claims 1-17 as filed with the reply to the statement of grounds of appeal as "auxiliary request 4";
   - Description pages 2-5 as filed during the oral proceedings;
   - Figures 1-3 of the patent as granted.

The Registrar: The Chairman:

A. Vottner H. Geuss

Decision electronically authenticated