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Datasheet for the decision of 30 April 2009

Case Number: T 1762/07 - 3.2.01

Application Number: 00103805.8

Publication Number: 1031487

IPC: B60T 13/68

Language of the proceedings: EN

Title of invention:
Parking brake apparatus for industrial vehicle

Patentee:
KABUSHIKI KAISHA TOYOTA JIDOSHOKKI

Opponent:
Linde Aktiengesellschaft, Wiesbaden

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step - yes (eight auxiliary request)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1762/07 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 30 April 2009

Appellant: (Opponent)	Linde Aktiengesellschaft, Wiesbaden Zentrale Patentabteilung Dr.-Carl-von-Linde-Str. 6-14 D-82049 Höllriegelskreuth (DE)
Representative:	Geirhos, Johann Geirrhos & Waller Partnerschaft Landshuter Allee 14 D-80637 München (DE)
Respondent: (Patent Proprietor)	KABUSHIKI KAISHA TOYOTA JIDOSHOKKI 2-1, Toyoda-cho Kariya-shi Aichi-ken (JP)
Representative:	TBK-Patent Bavariaring 4-6 D-80336 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted 16 August 2007 concerning maintenance of European patent No. 1031487 in amended form.**

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
S. Hoffmann

Summary of Facts and Submissions

I. The opponent's appeal is directed against the interlocutory decision posted 16 August 2007 according to which it was found that, account being taken of the amendments made by the patent proprietor during the opposition proceedings, the patent and the invention to which it relates were found to meet the requirements of the EPC 1973.

II. The following state of the art filed during the opposition proceedings played a role during the appeal:

D1: DE-A-39 41 400;

D2: DE-A-32 38 196;

D5: Patent Abstracts of Japan vol. 018, no. 637 (M-1716), 5 December 1994 (& JP-A-06 247190).

The following additional state of the art was admitted into the appeal proceedings:

D11: DE-C-32 11 366.

III. During oral proceedings held 30 April 2009 the appellant requested that the decision under appeal be set aside and the patent revoked.

The respondent requested that the appeal be dismissed (main request) or in the alternative that the patent be maintained on the basis of the first or third auxiliary requests filed with a letter dated 4 February 2009 or in the further alternative on the basis of the single

claim of the eighth auxiliary request filed together with an amended description during the oral proceedings and figures as granted. Auxiliary requests 2 and 4 to 7 were withdrawn.

IV. Claims 1 according to the respondent's final requests read as follows:

Main request:

"A transmission output shaft (3b) for an industrial vehicle, the output shaft being provided with a parking brake apparatus (12) comprising:
a braking member (12b) for maintaining the industrial vehicle in a stationary position;
holding means (12d) for holding the braking member (12b) in an engaged state;
releasing means (13) for releasing the braking member (12b) from the engaged state;
first detection means (17) for detecting the speed of the vehicle and for generating a speed indication signal; and
determination means (31) for determining whether the vehicle speed is equal or less than a predetermined value based on the speed indication signal from the first detection means (17), and for generating a first determination signal;
characterized in that
said holding means (12d) permanently provides a force to hold said braking member (12b) in an engaged state independently on the operational state of the industrial vehicle also when the engine is stopped;
said releasing means (13) is capable to provide a

force against said force of said holding means (12d); and
a control means (32) is provided for controlling the releasing means to engage the braking member, based on the first determination signal."

First auxiliary request:

"A transmission output shaft (3b) for a transmission (3) of an industrial vehicle, wherein the output shaft (3b) of the transmission (3) is coupled to drive shafts (5) through a differential gear (4), the transmission output shaft being provided with a parking brake apparatus (12) comprising:
a braking member (12b) for maintaining the industrial vehicle in a stationary position;
holding means (12d) for holding the braking member (12b) in an engaged state;
releasing means (12c) for releasing the braking member (12b) from the engaged state;
first detection means (17) for detecting the speed of the vehicle and for generating a speed indication signal; and
determination means (31) for determining whether the vehicle speed is equal or less than a predetermined value based on the speed indication signal from the first detection means (17), and for generating a first determination signal;
characterized in that
said holding means (12d) permanently provides a force to hold said braking member (12b) in an engaged state independently on the operational state of the industrial vehicle also when the engine is stopped;
said releasing means (12c) is capable to provide a

force against said force of said holding means (12d); and
a control means (32) is provided for controlling the releasing means to engage the braking member, based on the first determination signal."

Third auxiliary request:

"A transmission (3) for an industrial vehicle, comprising an input shaft (3a), an output shaft (3b) and a hydraulic pump for hydraulically operating a forward clutch (8) and a reverse clutch (9) which are located on the input shaft (3a), wherein the output shaft (3b) of the transmission (3) is coupled to drive shafts (5) through a differential gear (4) and is provided with a parking brake apparatus (12) comprising:
a braking member (12b) for maintaining the industrial vehicle in a stationary position;
holding means (12d) for holding the braking member (12b) in an engaged state;
releasing means (12c) for releasing the braking member (12b) from the engaged state, the releasing means (12c) being provided with hydraulic pressure from the hydraulic pump;
first detection means (17) for detecting the speed of the vehicle and for generating a speed indication signal; and
determination means (31) for determining whether the vehicle speed is equal or less than a predetermined value based on the speed indication signal from the first detection means (17), and for generating a first determination signal;
characterized in that
said holding means (12d) permanently provides a force

to hold said braking member (12b) in an engaged state independently on the operational state of the industrial vehicle also when the engine is stopped; said releasing means (12c) is capable to provide a force against said force of said holding means (12d); and
a control means (32) is provided for controlling the releasing means to engage the braking member, based on the first determination signal."

Eighth auxiliary request:

"An industrial vehicle having a transmission output shaft (3b) being provided with a parking brake apparatus (12) comprising:
a braking member (12b) for maintaining the industrial vehicle in a stationary position;
holding means (12d) for holding the braking member (12b) in an engaged state;
releasing means (12c) for releasing the braking member (12b) from the engaged state;
first detection means (17) for detecting the speed of the vehicle and for generating a speed indication signal; and
determination means (31) for determining whether the vehicle speed is equal or less than a predetermined value based on the speed indication signal from the first detection means (17), and for generating a first determination signal; wherein
said holding means (12d) permanently provides a force to hold said braking member (12b) in an engaged state independently on the operational state of the industrial vehicle also when the engine is stopped; said releasing means (12c) is capable to provide a

force against said force of said holding means (12d); and

a control means (32) is provided for controlling the releasing means to engage the braking member, based on the first determination signal,

characterized by that

the industrial vehicle includes an accelerator, and that the parking brake apparatus further comprises:

acceleration means (23) for manipulating the accelerator;

second detection means (26) for detecting when the acceleration means (23) is manipulated and generating a manipulation signal; and

wherein, upon receipt of the manipulation signal, the control means (32) controls the releasing means (12c) to disengage the braking member (12b), wherein

the industrial vehicle further includes switching means (29) for switching the moving direction of the vehicle between forward and reverse, and that the parking brake apparatus (12) further comprises:

third detection means (30) for detecting the moving direction of the vehicle as specified by the switching means (29), and generation a direction signal; and

wherein, depending upon the direction signal, the control means (32) controls the releasing means (12c) to disengage the braking member (12b), wherein

fourth detection means detects a slope of a surface upon which the vehicle is traveling, wherein, upon receipt of a slope signal from the fourth detection means indicating that the surface is sloped, the control means controls the releasing means to disengage the braking member when the engine speed exceeds a predetermined value which corresponds to the inclination of the slope, wherein

the fourth detection means detects the slope of the surface based on the relationship between the vehicle speed and the engine speed, and that the fourth

detection means stores the detected slope data in a memory (33) and uses the stored data when the vehicle starts moving again."

V. In as far as relevant to this decision, the appellant essentially submitted that:

The subject-matter of claim 1 according to the main request involves no inventive step in the light of the disclosure of D5 as closest state of the art in combination with the teaching of D1 or in the light of D1 alone. In particular, the subject-matter of the claim is not limited to a parking brake located upstream of a differential.

Claim 1 according to the first auxiliary request fails to add any inventive feature and so remains obvious in the light of the closest state of the art which is known from D5 together with the teaching of D1. Similar arguments apply in respect of claim 1 according to the third auxiliary request. The additional features are merely aggregated and are already known from both D5 and D11.

As regards the eighth auxiliary request the subject-matter of claim 1 is rendered obvious by a combination of the teachings of D5, D1 and D2. In particular, the final feature of claim 1 is not clearly distinguished from D1 column 6, beginning at line 40.

VI. The respondent's rebuttal was essentially:

The term "transmission output shaft" is to be interpreted in the light of the description as

understood by the skilled person. In all embodiments this shaft is upstream of the differential. The skilled person therefore would understand it as being distinguished from a drive shaft. The description acknowledges the difficulties encountered by an operator in controlling creep arising from the use of a torque converter whilst needing also to operate the parking brake. The problem solved is to improve the vehicle according to D5 so that the operator does not need to operate the parking brake in addition to controls for regulating speed. The skilled person would receive no motivation from D1 to solve the problem and, moreover, since the parking brake according to D1 is implicitly placed at the wheels, if he were to follow the teaching he would not arrive at the vehicle of claim 1.

If the location of the parking brake were considered as not clearly defined in accordance with the main request, claim 1 according to the first auxiliary request rectifies the situation. D1 provides no motivation to position the parking brake upstream of the differential. It is inherent when beginning from the closest state of the art according to D5 that the problem of operating the parking brake arises in an industrial truck in connection with the need to control the creep caused by a torque converter. D11, on the other hand, is applicable to small, slow, lightly loaded vehicles and there is no mention of either torque converters or creep. The skilled person therefore would not consider D11, let alone be motivated to combine its teaching with that of D5.

In claim 1 according to the third auxiliary request the feature of the clutches has been added to underline the synergy arising from positioning the parking brake on the shaft upstream of the differential and the sharing of the hydraulic pump permitting a more cost-efficient arrangement.

As regards claim 1 according to the eighth auxiliary request the most important feature is the final one relating to the determination of the inclination. This avoids the need for an inclination sensor. D1, on the other hand, always requires a signal from an inclination sensor.

Reasons for the Decision

1. The patent relates in general to the provision of an automatically applied parking brake in which means such as a spring apply the braking force and the brake is released by the application of a counter force. The parking brake is applied in response to the vehicle speed falling below a pre-determined value. In some embodiments the parking brake may also act as the service brake and so replace the conventional wheel brakes. The closest state of the art for consideration of inventive step is that disclosed in D5 which relates to a fork-lift truck having a transmission including a torque converter and forward and rearward hydraulic clutches which drive a transmission output shaft coupling the transmission to a differential from where the drive shafts drive the wheels. An auxiliary brake upstream of the differential may be used to afford fine control of the vehicle speed during manoeuvring whilst

the service brakes are provided at the drive wheels. The desired vehicle speed is determined from the accelerator pedal setting and achieved by operation of the clutches and the auxiliary brake independently of the engine speed which is set in accordance with the desired speed of load manipulation.

Main request

2. Claim 1 according to this request is identical to that found allowable by the opposition division and defines a transmission output shaft being provided with a parking brake apparatus. The respondent takes the view that when the claim is interpreted in the light of the description it implicitly requires that the parking brake be located in the transmission upstream of the differential.

2.1 In the embodiments in the patent specification the clutches in the transmission and the parking brake all are hydraulically operated and located upstream of the differential. By virtue of this combination of features the hydraulic power supply for the clutches is conveniently available also for the release of the parking brake. However, present claim 1 is silent as regards any such hydraulic operation. Moreover, aside from the matter of hydraulic operation the patent specification is silent as regards any advantage which would obtain from locating the parking brake upstream of the differential.

2.2 The board therefore considers that the skilled person would not understand the parking brake of present claim 1 as being restricted to a location upstream of a

differential. Indeed, as asserted by the appellant and not challenged by the respondent, industrial vehicles conventionally are provided with a differential integrated into the transmission, in which a drive shaft therefore would constitute a transmission output shaft.

3. The subject-matter of present claim 1 solves the problem of eliminating the necessity for the vehicle operator to actuate a control for applying the parking brake.

3.1 D1 relates to a spring operated parking brake for a vehicle. It explains that conventional parking brakes which require action by the driver are wearisome to apply and therefore relatively seldom used. It proposes an automatically operable brake which is applied by a spring and releasable by a counter-force created by hydraulic pressure. The brake has a control system which monitors the vehicle speed, the angle and direction of inclination of the surface on which the vehicle is situated and the torque created by the engine. Automatic engagement of the brake when the vehicle stops is achieved by reducing the hydraulic pressure. The teaching of D1 neither is directed to any particular category of vehicle nor is applicable to a parking brake in only a particular location within the vehicle. The skilled person therefore would see no obstacle to its applicability to the parking brake of the industrial vehicle of D5 and would seek to employ it to solve the set problem.

3.2 In respect of this request the respondent's arguments mainly rely on interpreting the claim as requiring that

the parking brake is located upstream of the differential. However, since the board disagrees with that interpretation, the arguments are without effect. The respondent also argues that the problem is particularly related to the existence of creep in a vehicle equipped with a torque converter and that this is not addressed by D1. However, the problem addressed by D1 does arise from the need to manually apply the parking brake and this would be motivate the skilled person to apply the teaching to the vehicle of D5 in which the problem arises from the same need for manual application.

3.3 On the basis of the forgoing the board considers that the subject-matter of claim 1 according to this request does not involve an inventive step.

First auxiliary request

4. Claim 1 according to this request has been amended in order to specify that the parking brake apparatus is provided on a transmission output shaft which is coupled to drive shafts through a differential gear, i.e. the parking brake is located upstream of the differential. This feature was not included in the claims as granted but was introduced in response to matters raised for the first time by the board when it summoned the parties to oral proceedings. The introduction of this additional feature into claim 1 justified an additional search by the appellant and the consequent citation of D11, cf. T 101/87 (not published in OJ EPO), which the board therefore admitted into the proceedings.

5. The presently claimed position of the transmission output shaft, and therefore also the parking brake, is in accordance with the embodiments described in the patent specification. However, as already mentioned above no advantage is disclosed as deriving from that location and, contrary to the view of the respondent, no synergistic effect can be accorded because the brake is not specified in the claim as being hydraulically operated. Indeed, no problem solved by this additional feature is explicitly disclosed in the patent specification. The additional feature therefore is considered to be merely aggregated with the subject-matter of claim 1 according to the main request.

6. D11 relates to a spring operated parking brake which is of compact design for use in small vehicles and is mounted between the gearbox and the differential. It is explained that the higher speed of rotation of the transmission shaft upstream of the differential results in improved modulation in comparison with brakes located at wheels, whereby it may replace the conventional wheel brakes at least on vehicles having a relatively low maximum speed such as of the order of 20 Kmh. This teaching is clearly applicable to the vehicle according to D5 and it would be an obvious measure for the skilled person wishing to improve that vehicle to put it into effect. The respondent argues that D11 has no mention of the use of a torque converter and the associated creep so that the skilled person would not see cause to consider its teaching. However, the explicit teaching of improved modulation achievable by locating the brake upstream of the differential would be understood by the skilled person as rendering it suitable for use in controlling creep.

7. On the basis of the foregoing the board concludes that the subject-matter of claim 1 also of this request does not involve an inventive step.

Third auxiliary request

8. Claim 1 according to this request has been amended to specify the entire transmission including hydraulically operated forward and rearward clutches, with the parking brake being located on the transmission output shaft upstream of the differential and being fed by the same hydraulic supply pump as the clutches. The respondent argued that the inclusion of these features underlines the synergy resulting from the location of the parking brake.

9. The additional hydraulically operated clutches and associated pump are already known from D5, as acknowledged by the respondent. D11 proposes that the brake housing be integrated with the transmission and that the friction plates be cooled using oil from the sump of the transmission. The synergistic effect relied on the respondent is therefore already suggested by D11. D11 is silent as regards the means of pressurising the oil but it would be a trivial matter for the skilled person when integrating the brake and transmission units in accordance with the teaching of D11, which integration extends to sharing oil, to employ a common pump.

10. The subject-matter of claim 1 according to this request therefore also does not involve an inventive step.

Eighth auxiliary request

11. The subject-matter of claim 1 according to this request is the entire vehicle and results essentially from the combination of claims 1 to 3, 6 and 9 as granted. It is directed in particular towards the control system for releasing the parking brake when the vehicle starts from rest on an incline whereby the feature of the fourth detection means enables the inclination to be determined without the use of an inclination sensor.

11.1 The features contained in the preamble essentially define a vehicle according to D5 and having additionally an automatically operable parking brake mounted on the transmission output shaft. The features contained in the characterising portion may be summarised as follows:

- second detection means associated with an accelerator for providing a signal to release the parking brake;

- third detection means for providing a signal indicative of the direction in which the vehicle will move away from rest; and

- fourth detection means for determining the inclination of a surface on which the vehicle is positioned, whereby the brake is released only when the engine speed is sufficient, the inclination being determined on the basis of the relationship between the vehicle and engine speeds before the vehicle stops and the value being stored for use when the vehicle moves away again.

11.2 As for the higher order requests the closest state of the art is that known from D5 and the features relating to the automatically operable parking brake itself are rendered obvious by the combination with D1. The teaching of D1 extends beyond the features of the parking brake itself to a control system for release of the brake when the vehicle moves away on an inclined surface. Whilst the brake is applied the control system monitors parameters to assess whether the conditions are right for it to be released. One such parameter is the degree and direction of any inclination on which the vehicle is standing. Beginning at D1 column 6, line 11 it is explained that in the case that the vehicle is on an incline the system calculates the force tending to move the vehicle down the incline and compares that force with the force available to propel the vehicle. However, D1 is silent as to how the inclination is measured. D2 relates to the automatic operation of a parking brake but is silent as regards taking account of any inclination of the surface on which the vehicle stands. D11 contains no disclosure relating to the control of the parking brake.

11.3 It follows from the foregoing that the feature in present claim 1 relating to the determination of the inclination is not known from the state of the art. Since it also falls outside of the general knowledge of the skilled person it is not considered as being obvious. The board therefore concludes that the subject-matter of present claim 1 does involve an inventive step.

12. The description in accordance with this request was correctly modified for consistency with the single claim and the appellant raised no objection in this respect.

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 on the basis of:

   – the single claim of the 8th auxiliary request filed during the oral proceedings;

   – columns 1 to 15 of the description filed during the oral proceedings;

   – figures 1 to 4 as granted.

The Registrar: The Chairman:

A. Vottner S. Crane