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**Datasheet for the decision
of 13 June 2017**

Case Number: T 0754/15 - 3.2.01

Application Number: 09159498.6

Publication Number: 2128077

IPC: B66F17/00, B66F9/22

Language of the proceedings: EN

Title of invention:

A load weight measuring device for a multi-stage mast forklift truck

Patent Proprietor:

Kabushiki Kaisha Toyota Jidoshokki

Opponent:

Linde Material Handling GmbH

Headword:

Relevant legal provisions:

EPC Art. 56

Keyword:

Inventive step (yes)

Decisions cited:

Catchword:



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Case Number: T 0754/15 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 13 June 2017

Appellant: Linde Material Handling GmbH
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Respondent: Kabushiki Kaisha Toyota Jidoshokki
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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
13 February 2015 concerning maintenance of the
European Patent No. 2128077 in amended form.**

Composition of the Board:

Chairman G. Pricolo
Members: C. Narcisi
S. Fernández de Córdoba

Summary of Facts and Submissions

I. European patent No. 2 128 077 was maintained in amended form by the decision of the Opposition Division posted on 13 February 2015. An appeal was lodged by the Opponent on 13 April 2015 and the appeal fee was paid. The statement of grounds of appeal was filed on 23 June 2015.

II. Oral proceedings took place on 13 June 2017. The Appellant (Opponent) requested that the impugned decision be set aside and the patent be revoked. The Respondent (Patentee) requested that the appeal be dismissed and that the patent be maintained according to the impugned decision (main request).

III. Claim 1 reads as follows:

"A load weight measuring device for a multi-stage mast forklift truck (1) comprising:
a mast assembly (3, 50) having:
a lift bracket (6, 51) for receiving a load weight;
a multi-stage mast unit having masts (3A, 3B, 50A, 50B, 50C); and
a lift-cylinder unit raising the lift brackets (6, 51) along the masts (3A, 3B, 50A, 50B, 50C), the lift-cylinder unit having lift cylinders (4A, 4B, 7, 53, 54, 58) each having an oil chamber (42A, 42B, 53B, 54B, 58B);
an oil passage (16, 22, 24, 63, 68, 70, 26, 72) in which hydraulic oil flows;
a flow regulator valve (18, 65) regulating the maximum flow rate of hydraulic oil, the flow regulator valve (18, 65) connected to the oil chamber (42A, 42B, 53B, 54B, 58B) of the lift cylinder (4A, 4B, 7, 53, 54, 58)

through the oil passage (16, 22, 24, 63, 68, 70, 26, 72);

a pressure sensor (25, 71) detecting a pressure of hydraulic oil and outputting a pressure signal;

a memory (33) storing predetermined parameters; and

a calculator (S15) calculating the load weight based on the selected parameter and the pressure signal, wherein the lift cylinder unit is a multi stage lift cylinder unit, wherein a detecting device (28, 61) detects a state which stage of the lift cylinder (4A, 4B, 7, 53, 54, 58) raises the lift bracket (6, 51) and outputs a detection signal, wherein

the memory (33) stores the predetermined parameters corresponding to the states, wherein a selector (S12, S13, S14) selects one or more parameters from the predetermined parameters based on the detection signal, characterized in that the oil chambers (42A, 42B, 7B, 53B, 54B, 58B) of the lift cylinders of each stage are connected in series from the flow regulator valve (18, 65) toward he downstream with respect to the flowing direction of hydraulic oil, wherein the lift cylinder (4A, e4B, 7, 53, 54, 58) further has a piston rod (43 A, 43B, 7C, 53C, 54C, 58C), and the lift cylinder (4A, 4B, 53, 54) of a stage at the most downstream firstly extends the piston rod (43A, 43B, 53C, 54C) thereof during a lifting operation, wherein after the lift cylinder (4A, 4B, 53, 54) of the stage at the downstream fully extends the piston rod (43A, 43B, 53C, 54C) thereof, the lift cylinder (7, 58) of the other stage extends the piston rod (7C, 58C) thereof due to further supplied hydraulic oil, wherein

the parameters include a inner or rod diameter of the lift cylinder (4A, 4B, 7, 53, 54, 58) represented by Φ , a zero point voltage of the pressure sensor (25, 71) represented by V_0 , a pressure sensing area factor represented by N_{cyl} , a correction value represented by

Np which indicates how many times of the load weight is applied, and a sensitivity of the pressure sensor (25, 71) represented by S, wherein the calculator (S15) calculates the load weight represented by Wp with equations (1), (2), wherein the Vp represents an output voltage outputted from the pressure sensor (25, 71), the Wcyl represents a load weight per one lift cylinder (4A, 4B, 7, 53, 54, 58), the Wp represents a calculated load weight

$$W_{cyl} = S \times \pi \times (\Phi/2)^2 \times (V_p - V_0) \quad \dots (1)$$

$$W_p = W_{cyl} \times N_{cyl} : N_p \quad \dots (2)."$$

IV. The Appellant's arguments may be summarized as follows:

The subject-matter of claim 1 is not inventive over E1 (DE-T2-689 07 523) and the skilled person's common general knowledge (as exemplified e.g. by documents E11 (excerpts from "Hydraulik in Theorie und Praxis", Firma Bosch, Lehrbuch 1983), E12 (excerpts from "Ölhydraulik", "Handbuch", Springer-Verlag 1994), E13 (excerpts from "Einführung in die Ölhydraulik", Teubner Studienbücher 1984). In particular, the feature reading "the parameters include a inner or rod diameter of the lift cylinder (4A, 4B, 7, 53, 54, 58) represented by Φ , a zero point voltage of the pressure sensor (25, 71) represented by V0, a pressure sensing area factor represented by Ncyl, a correction value represented by Np which indicates how many times of the load weight is applied, and a sensitivity of the pressure sensor (25, 71) represented by S, wherein the calculator (S15) calculates the load weight represented by Wp with equations (1), (2), wherein the Vp represents an output voltage outputted from the pressure sensor (25, 71), the Wcyl represents a load weight per one lift cylinder

(4A, 4B, 7, 53, 54, 58), the W_p represents a calculated load weight

$$W_{cyl} = S \times \pi \times (\Phi/2)^2 \times (V_p - V_0) \quad \dots (1)$$

$W_p = W_{cyl} \times N_{cyl} : N_p \quad \dots (2)$ " (hereinafter designated as (i)) would be obvious for the skilled person, given that formulae (1) and (2) included in feature (i) are known to the skilled person and are implicitly derivable from E1 (see pages 9, 10, 12, 27, 32).

Indeed, according to E1 parameters corresponding and equivalent to N_p , N_{cyl} , Φ , V_0 , V_p and S are disclosed in E1 and their actual value (according to the specific forklift truck of E1) is used by the control unit to determine the load weight acting on the forklift truck. Thus, the specific case as disclosed in E1 would allow the skilled person to deduce in an obvious manner the aforementioned feature (i) (including formulae (1) and (2)), thus arriving at the subject-matter of claim 1 (the remaining features of the claim being known from E1, or anyway obvious in view the skilled person's common general knowledge (see above cited documents)).

V. The Respondent's arguments may be summarized as follows:

The subject-matter of claim 1 involves an inventive step over E1 and the skilled person's common general knowledge. E1 does not disclose or suggest a load weight measuring device according to claim 1, which by virtue of feature (i) (in combination with the remaining features of the claim) is apt for use in conjunction with different kinds of forklift trucks, as clearly and unambiguously disclosed in the patent specification (hereinafter designated as EP-B, see paragraphs [0009], [0010] and [0011]). Thus a versatile

load weight measuring device is obtained, capable of being used on various kinds of forklift trucks (see e.g. tables 1 to 3 in EP-B). By contrast, E1 merely discloses that a load weight acting on a specific kind of forklift truck is determined in a known way by a known load measuring device. The mentioned differences, particularly as implied by feature (i), are not suggested or made obvious by the cited prior art.

Reasons for the Decision

1. The appeal is admissible.
2. The subject-matter of claim 1 would not be obvious for the skilled person in view of E1 and the common general knowledge (Article 56 EPC). The forklift truck of E1 does not include a load weight measuring device including said feature (i), which entails a method of determining the load weight (i.e. total load and the load on a distinct hydraulic cylinder) at a given detected state (comprising the stage and the operated cylinder(s); low lift state and high lift state) and depending on said further predetermined parameters (relating to said states and said various specific forklift trucks), which are stored in a memory (see further features in claim 1) and whose actual values as selected (based on said detected state and detection signal) and read from the memory are "fed" into formulae (1) and (2).

Thus, the device of claim 1 is a versatile and flexible device, taking into account a number of different varying parameters (corresponding to different forklift trucks, and different states and stages) in a general load weight determining method (as set out by equations (1) and (2)) performed by said calculator (S15). In E1 there is no disclosure or suggestion to implement such

a device, as E1 discloses a single, specific forklift truck working with fixed parameter values (corresponding to each state and stage). The further documents cited as proving common general knowledge (see above) likewise do not suggest or hint at feature (i).

The further documents E9 (DE-U1-77 09 840), E10 (DE-A1-10 2004 042 774), E3 (EP-A2-1 728 759) and E8 (US-A1-2007/0239312), cited by the Appellant, similarly do not give any hint pointing to feature (i), as conceded by the Appellant itself during oral proceedings. Therefore, the Appellant's further lines of arguments based on these documents do not need to be discussed any further.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



A. Vottner

G. Pricolo

Decision electronically authenticated