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Datasheet for the decision of 21 January 2021

Case Number: T 0179/19 - 3.2.04

Application Number: 10168003.1

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IPC: A63B21/005, A61B5/11, G01L1/00, G06F19/00, H02P21/00, A63B71/00

Language of the proceedings: EN

Title of invention:
Training apparatus, arrangement and method

Patent Proprietor:
eGym GmbH

Headword:

Relevant legal provisions:
EPC Art. 100(b), 100(a), 56

Keyword:
Grounds for opposition - insufficiency of disclosure (no)
Inventive step - (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

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Case Number: T 0179/19 - 3.2.04

D E C I S I O N
of Technical Board of Appeal 3.2.04
of 21 January 2021

Appellant: (Patent Proprietor)	eGym GmbH Nymphenburger Straße 12 80335 München (DE)
Representative:	Vossius & Partner Patentanwälte Rechtsanwälte mbB Siebertstrasse 3 81675 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 25 July 2018 revoking European patent No. 2402061 pursuant to Article 101(2) EPC**

Composition of the Board:

Chairman	A. de Vries
Members:	J. Wright
	W. Van der Eijk

Summary of Facts and Submissions

I. The appeal was filed by the appellant (patent proprietor) against the decision of the opposition division to revoke the patent in suit (hereinafter "the patent").

During the opposition proceedings, the opponent had raised the grounds for opposition under Article 100(a) EPC (lack of inventive step) and 100(b) EPC. The opponent withdrew its opposition with a letter of 16 March 2017. The opposition division continued the proceedings of its own motion.

II. The opposition division decided that the patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

III. The appellant-proprietor requests that the decision under appeal be set aside and that the patent be maintained as granted.

IV. The independent claims of the main request read as follows:

"1. A training apparatus comprising
a training element (1) for an exercising person, an AC motor (3) and a frequency converter (5) being arranged to control the AC motor (3), wherein the frequency converter (5) comprises measuring means being arranged to measure a voltage and a current of the AC motor (3) and calculation means being arranged to calculate a magnetic state of the AC motor (3) using the measured voltage, the measured current, a reference torque and a

reference flux in order to generate a torque of the AC motor (3),
characterised in that the training apparatus comprises a control unit (6) having a machine control module (27) being arranged to calculate the reference flux and the reference torque using an intended overall torque, wherein the machine control module (27) is connected to the frequency converter (5) and arranged to transmit the reference flux and the reference torque to the frequency converter (5), and
wherein the machine control module (27) splits the intended overall torque into a torque component and a flux component within the control unit (6), and calculates the reference flux and the reference torque based on the torque component and the flux component using a characteristic diagram."

"9. A training arrangement comprising the training apparatus according to any one of claims 6 to 8 and a database (9) and a web interface (12), wherein the database (9) is connected to the web interface (12) and to the communication module of the control unit (6) of the training apparatus, and wherein the web interface (12) and the database (9) are arranged to store and/or manipulate training data via the web interface (12)."

"11. A method for operating the training arrangement according to claim 9 or 10 comprising the steps of: transmitting training data comprising the predefined training resistance to the database (9), manipulating the transmitted training data via the web interface (12), and transmitting the manipulated training data to the control unit (6) of the training apparatus of the training arrangement".

V. In this decision, reference is made to the following documents:

D1: DE19653862 A1
D8: Mauri Peltola and others "ACS 600-Antriebe mit direkter Drehmomentregelung" ABB Technik, Edition 6/1997, June 1997, 31-39

VI. The appellant-proprietor's arguments can be summarised as follows:

The invention as claimed can be carried out by the skilled person from the disclosure of the patent and their general knowledge.

The subject matter of the independent claims involves an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. Background

The invention relates (see published patent specification, paragraph [0001]) to a muscle training apparatus comprising a training element and an AC motor. The motor provides the training resistance (just as weights do in a conventional apparatus). The motor is operated in a direct torque control loop (DTC).

The patent (see published patent specification, paragraph [0006]) aims to improve a training apparatus by providing, amongst other things, a more accurate training resistance.

3. Main request (as granted), claim 1, sufficiency of disclosure

3.1 The subject matter of claim 1 is a training apparatus having an AC motor and a frequency converter arranged to control the motor on the basis of reference torque and reference flux input signals.

The training apparatus also comprises a control unit 6 with a machine control module 27 (see figures 1 and 2). The machine control module 27 calculates the reference flux and reference torque using an intended overall torque, which it then transmits to the frequency converter (5).

3.2 The last two features of claim 1 defines how the reference torque and reference flux are derived. In particular, the machine control module 27 *splits* [emphasis added by the Board] the intended overall torque into a torque component and a flux component within the control unit (6); and calculates the reference flux and the reference torque based on the torque component and the flux component using a characteristic diagram.

3.3 The impugned decision (see grounds, points 12.2 to 12.6) found that the skilled person would be unable to carry out these two features. In particular they would not know how to split an intended overall torque into a torque component and a reference component. Moreover, with no information given in the patent about the "characteristic diagram" necessary for converting these components into reference values, the skilled person would not be able to carry out the invention.

3.4 The Board acknowledges that the final claim features may not be ideally formulated. Indeed, the idea of splitting what already defines a torque into a torque component and something else (flux component) appears contradictory.

3.5 However, this is an issue of clarity. Sufficiency of disclosure requires that the patent *as a whole*, including description, drawings and claim, discloses the invention sufficiently clearly and completely for the skilled person to carry it out, CLBA 9th edition 2019, II.C.3.1. Thus, as long as issues of clarity are resolved in the description or drawings, the requirements of Art 100(b) and 83 EPC should be met. Therefore the Board must consider whether the above lack of clarity is resolved when considering the whole disclosure.

3.6 It appears indisputable that the claimed invention, with its AC motor having a frequency converter control with reference flux and reference torque inputs, relates to a DTC control scheme.

Indeed, the description opens by stating this to be the technical field of the invention (see published patent specification, paragraph [0001]) and goes on to explain a prior art DTC arrangement for a training apparatus (see paragraph [0005]).

3.7 The term "intended overall torque" is introduced in paragraph [0008]. There, as in claim 1, it is said that the invention has a control module that calculates the DTC reference flux and reference torque *using* the intended overall torque. In other words, both reference parameters are calculated from the intended overall torque. The description continues (see paragraph

[0009], column 3, lines 54 to 57) by explaining that the "reference flux is adjusted *as a function* of the absolute amount of torque needed at an output shaft of the AC motor" [emphasis added by the Board].

3.8 Although the term *absolute amount of torque needed* is slightly differently formulated from the expression *intended overall torque* used elsewhere and in claim 1, the Board holds that the skilled person will recognise these as being one and the same. Thus, the Board considers that this last cited passage reiterates that the reference flux and reference torque are calculated from the intended overall torque.

3.9 It is with this in mind that the skilled person reads paragraph [0010], which mirrors the claim wording in explaining that the machine control module *splits the intended overall torque into a torque component and a flux component within the control unit, and calculates the reference flux and the reference torque based on the torque component and the flux component* [...].

In the Board's view, the skilled person will understand this paragraph (and the corresponding part of claim 1) to build on the previous paragraphs, in that it explains how the machine control module calculates the reference torque and flux from the intended overall torque. It repeats the idea, albeit expressed in terms of *splitting*, that the intended overall torque is the common base from which both the reference torque and the reference flux are calculated. Thus, the skilled person understands that in order to calculate both reference values from the intended torque it first splits the torque into components (which it terms "torque" and "flux"), which are then used to determine reference torque and flux using a "characteristic

diagram". They thus understand the splitting to be nothing more than an initial step in which the intended overall torque is processed to provide separate inputs for calculating the corresponding two DTC outputs in the form of the reference torque and the reference flux. Thus interpreted, the Board has no doubt that this aspect of the invention can be carried out by the skilled person using their routine skills.

3.10 Armed with this interpretation of the above (*splitting*) feature, the question remains as to whether the skilled person, from the patent's teaching and their general knowledge, would be able to provide a suitable *characteristic diagram* for deriving the reference torque and a reference flux from the intended overall torque. In the Board's view, they would.

3.11 The description (see paragraph [0010] again) mirrors claim 1's *characteristic diagram* feature without further explanation or example. If the skilled person is to carry out the invention, they must therefore provide this diagram from their general knowledge.

3.12 In the Board's view, it goes without saying that the reference torque is closely related to the intended overall torque, since the latter is the torque needed to provide a training resistance to the user.

3.13 As to deriving the reference flux, the skilled person would be well aware of the ideal characteristics of the training apparatus in particular the machine force (torque) needed to counter a particular user's muscle force performing a particular exercise, having a specific degree of movement, reversal points, speed etc. (cf. published patent specification, column 3, lines 22 to 42 and column 11, line 56 to column 12,

line 10). They would also know, or could measure, the electrical and magnetic characteristics of the AC motor that should produce this force.

3.14 The Board agrees with the appellant-proprietor that, knowing these parameters, the skilled person would be able to provide a suitable characteristic flux-torque diagram from which to calculate the reference flux according to the intended overall torque.

3.15 Therefore, the Board considers that the skilled person would be able to carry out the invention of claim 1 from the information given in the patent and their general knowledge.

4. Inventive step

4.1 The Board notes that the opposition division decided only on the issue of sufficiency of disclosure. It did not decide on the opposition ground of inventive step raised by the opponent (who is no longer party to the proceedings).

4.2 However, in its summons to oral proceedings, the opposition division considered the issue of inventive step and gave a preliminary opinion (see communication of 22 November 2017, point 2.1.1, last paragraph and 2.2.2). According to that opinion, if the invention was sufficiently disclosed then it would be trivial with respect to combinations of D1 with the skilled person's general knowledge or D1 with D8. The appellant-proprietor has also commented on this issue in its grounds of appeal.

4.3 In accordance with Article 111(1) EPC, second sentence, the Board of Appeal may either exercise any power

within the competence of the department which was responsible for the decision appealed or remit the case to that department for further prosecution.

In the present case, given that the division did consider (though not decide) inventive step there is little point in remitting the case in view of the expected outcome of further examination. Thus, in the interest of overall procedural efficiency, the Board considers it appropriate to deal with the issue of inventive step itself.

4.4 D1 in combination with the skilled person's general knowledge

4.4.1 D1 (see abstract and figure) discloses an exercise machine with a three phase motor 2. The motor is driven by a frequency converter 5. The training apparatus also has a control unit 6.

4.4.2 However (see column 3, lines 27-36), D1's control unit 6 does not control the frequency converter 5 on the basis of a reference flux and a reference torque in a closed torque control loop (direct torque control) as claimed. Nor, therefore, does it disclose the further differing feature of calculating, not only the reference torque, but also the reference flux from the intended overall torque, as the Board interprets the last claim feature to require.

4.4.3 Rather, in D1, the torque is controlled in an open loop (see and figure 1, control lines 7 and 8) by controlling the motor current and by setting the frequency to achieve speed control in a closed loop.

4.4.4 The effect of these differing features appears to be more precise torque control (see for example published patent specification, paragraph [0010]). In the context of a training apparatus, and in agreement with the stated aim of the patent (see paragraph [0006]), the Board considers that the objective technical problem can be stated as: how to modify the training apparatus of D1 to more accurately provide a training resistance.

4.4.5 In the Board's view, the skilled person would know about direct torque control (DTC) from their general knowledge. Therefore, faced with the objective technical problem the skilled person might, as a matter of obviousness, use such a control scheme to control the motor of D1's training apparatus. This would lead to setting a reference torque and a reference flux as control inputs. Moreover, it stands to reason that the reference torque would be calculated based on the intended overall torque. However, the combination would not lead to calculating the reference flux from the intended overall torque, as the Board interprets claim 1 to require.

In the Board's view, it would not be obvious for the skilled person to arrive at this further step, without prior knowledge of the invention.

4.5 D1 in combination with D8

4.5.1 As already explained, the objective technical problem concerns improving a training apparatus. Such an apparatus implies very light loads. The Board does not consider that the skilled person would look to D8 to solve the objective technical problem because D8's motor drive control is not concerned with light loads. Rather, it is intended to be used in large plant

installations of, for example, the metallurgical industry, pulp and paper industry (see page 1, introductory paragraph).

4.5.2 In any case, D8 appears only to disclose a conventional direct torque control scheme (see for example page 31, left hand column, first paragraph) but not one in which the reference flux is calculated from the intended overall torque. Therefore, even if the skilled person were to combine the teachings of D1 and D8 (the Board holds that they would not), the combination would not lead to the subject matter of claim 1 as a matter of obviousness, for the same reasons as apply to the combination of D1 and the skilled person's general knowledge.

4.6 In the light of the above, the Board finds that the subject matter of claim 1 involves an inventive step.

5. The training arrangement of claim 9 and the method of claim 11 imply the subject matter of claim 1 by their back references. Therefore, the positive finding on inventive step for claim 1 likewise applies to claims 9 and 11.

6. The Board concludes that the subject matter of claim 1 as granted is sufficiently disclosed. Therefore, the Board must set aside the impugned decision. Moreover, since the subject matter of the independent claims involves an inventive step the, the Board judges that the patent as granted can be maintained without amendment.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained unamended.

The Registrar: The Chairman:

G. Magouliotis A. de Vries

Decision electronically authenticated