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**Datasheet for the decision
of 29 September 2011**

Case Number: T 2267/09 - 3.2.01

Application Number: 05252437.8

Publication Number: 1588885

IPC: B60K 6/04

Language of the proceedings: EN

Title of invention:

Series & parallel combined dual power drive system

Applicant:

Yang, Tai-Her

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 123(2)
RPBA Art. 13(1)(3)

Relevant legal provisions (EPC 1973):

EPC Art. 54(1)

Keyword:

"Main request - added matter (yes)"
"First auxiliary request - not admitted"
"Second auxiliary request - novelty (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 2267/09 - 3.2.01

D E C I S I O N
of the Technical Board of Appeal 3.2.01
of 29 September 2011

Appellant:

Yang, Tai-Her
No. 59, Chung Hsing 8 Street
Si-Hu Town
Dzan-Hwa (TW)

Representative:

Wright, Howard Hugh Burnby
Withers & Rogers LLP
4 More London Riverside
London SE1 2AU (GB)

Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 14 July 2009
refusing European patent application
No. 05252437.8 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: G. Pricolo
Members: Y. Lemblé
T. Karamanli

Summary of Facts and Submissions

- I. The present appeal is directed against the decision of the examining division posted 14 July 2009 to refuse the European patent application No. 05 252 437.8.
- II. The Examining Division held that the subject-matter of claim 1 then on file did not involve an inventive step in view of the prior art. As prior art, *inter alia* the following document played an essential role:
- D1: US-A-2003/0217876.
- III. The Board issued an annex to the summons to oral proceedings according to Article 15(1) RPBA (Rules of Proceedings of the Boards of Appeal of the EPO) in which it indicated its provisional opinion that the claims 1 and 2 filed with the statement setting out the grounds of appeal did not comply with the requirements of Article 123(2) EPC.
- IV. During oral proceedings held on 29 September 2011 the Appellant (Applicant) requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request, filed with the statement setting out the grounds of appeal, or on the basis of the first or second auxiliary request, both filed during the oral proceedings.
- V. Claim 1 according to main request reads:
- "A hybrid drive system for driving a load (120), the system comprising:

an internal combustion engine (100) having a rotary power output end, the engine being operable in a plurality a rotation speed ranges, including a high-efficiency, low speed range and a high speed range;

drive train means for selectively coupling the engine to the load, the drive train means including:

a first electrical unit (101) having input and output rotary ends, the rotary power output end of the engine being coupled to the input rotary end of the first electrical unit;

a second electrical unit (103) having input and output rotary ends, the output rotary end of the second electrical unit being coupled to the load;

a clutch (112) having input and output rotary ends, the input rotary end of the clutch being coupled to the output rotary end of the first electrical unit and the output rotary end of the clutch being coupled to the input rotary end of the second electrical unit; and

control means (104) for selectively engaging or disengaging the clutch for selectively coupling the rotary power output end of the engine to the load or for isolating the rotary power output end of the engine from the load, and for selectively connecting electrically to the first and second electrical units, to permit the system to be operated in a plurality of operating modes, including:

a first mode in which the engine is operated in its high-efficiency, low-speed range with the clutch disengaged to drive the load and regulate the engine to operate at a constant speed, the constant speed operation being the range of operation speed in which the engine runs with a lower fuel consumption and a higher output power so as to provide the brake specific

fuel consumption, and with the second electrical unit operated as a motor and the first electrical unit operated as a generator that supplies electrical power to the second electrical unit in said first mode, and a second mode in which the clutch is engaged so that the load is driven by the engine while the engine is operating in its high speed range."

Claim 1 according to first auxiliary request reads:

"A hybrid drive system for driving a load (120), the system comprising:

an internal combustion engine (100) having a rotary power output end, the engine being operable in a plurality a rotation speed ranges, including a high-efficiency, low speed range and a high speed range;

drive train means for selectively coupling the engine to the load, the drive train means including:

a first dynamo-electric unit (101) having input and output rotary ends, the rotary power output end of the engine being coupled to the input rotary end of the first dynamo-electric unit;

a second dynamo-electric unit (103) having input and output rotary ends, the output rotary end of the second dynamo-electric unit being coupled to the load;

a clutch (112) having input and output rotary ends, the input rotary end of the clutch being coupled to the output rotary end of the first dynamo-electric unit and the output rotary end of the clutch being coupled to the input rotary end of the second dynamo-electric unit; and

drive control unit (104) for selectively engaging or disengaging the clutch for selectively

coupling the rotary power output end of the engine to the load or for isolating the rotary power output end of the engine from the load, and for selectively connecting electrically to the first and second dynamo-electric units, to permit the system to be operated in a plurality of operating modes, including:

a first mode, the system engaging in the operation as the series combined power system in case of a light load, in which the engine is operated in its high-efficiency, low-speed range with the clutch disengaged to drive the load, the engine operating at a constant speed, the constant speed operation being within the range of operation speed in which the engine runs with a lower fuel consumption, and with the second dynamo-electric unit operated as a motor and the first dynamo-electric unit operated as a generator that supplies electrical power to the second dynamo-electric unit in said first mode, and

a second mode, the load driven by the engine in case of a normal load, in which the clutch is engaged so that the load is driven by the engine while the engine is operating in its high speed range."

Claim 1 according to second auxiliary request reads:

"A hybrid drive system for driving a load (120), the system comprising:

an internal combustion engine (100) having a rotary power output end, the engine being operable in a plurality a rotation speed ranges, including a high-efficiency, low speed range and a high speed range;

drive train means for selectively coupling the engine to the load, the drive train means including:

a first dynamo-electric unit (101) having input and output rotary ends, the rotary power output end of the engine being coupled to the input rotary end of the first dynamo-electric unit;

a second dynamo-electric unit (103) having input and output rotary ends, the output rotary end of the second dynamo-electric unit being coupled to the load;

a clutch (112) having input and output rotary ends, the input rotary end of the clutch being coupled to the output rotary end of the first dynamo-electric unit and the output rotary end of the clutch being coupled to the input rotary end of the second dynamo-electric unit; and

drive control unit (104) for selectively engaging or disengaging the clutch for selectively coupling the rotary power output end of the engine to the load or for isolating the rotary power output end of the engine from the load, and for selectively connecting electrically to the first and second dynamo-electric units, to permit the system to be operated in a plurality of operating modes, including:

a first mode, in which the engine is operated in its high-efficiency, low-speed range with the clutch disengaged to drive the load, the engine operating at a constant speed, and with the second dynamo-electric unit operated as a motor and the first dynamo-electric unit operated as a generator that supplies electrical power to the second dynamo-electric unit in said first mode, and

a second mode in which the clutch is engaged so that the load is driven by the engine while the engine is operating in its high speed range."

VI. In support of his requests the Appellant argued essentially as follows:

Claim 1 of the main request did not extend beyond the content of the application as originally filed. In the passage starting page 25, line 27 to page 26, line 8 of the description as originally filed there was a clear basis for the wording of the paragraph of claim 1 referring to the first operating mode. The skilled person would recognise that the rechargeable device (battery) was optional and that only the control means 104 were involved in regulating the engine to operate at a constant speed in the first operating mode. As far as this first operating mode was concerned, the rechargeable device did not add anything in terms of functionality and operation of the claimed system.

Claim 1 of the first auxiliary request addressed the objections of added subject-matter presented by the Board in the summon to attend oral proceedings and during oral proceedings. A basis for the amendments was to be found on page 25, line 27 to page 26, line 8, in figure 6 and on page 35, lines 2 to 9 of the originally filed application documents. In view of the effort of the Appellant to address the objections of the Board, the new first auxiliary request should be admitted into the proceedings.

A basis for the hybrid drive system as claimed in claim 1 of the second auxiliary request was to be found in figure 6 and the passage of page 35, lines 2 to 9 of the originally filed application documents. This part of the application clearly disclosed an hybrid drive system which operated without the rechargeable device.

Such an hybrid system was not disclosed in Document D1. D1 made clear in paragraph [0193] that, in the first mode of operation (MODE II of figure 8(b)), the first dynamo-electric unit 21 exclusively charged the battery, so that electrical power to the motor 25 always came through the battery and there was no direct supply of power from the generator 21 to the motor 25. Therefore document D1 did not disclose a system which was capable of operating without a rechargeable device. The effect achieved by the claimed device was that the system was more efficient since there were fewer losses attendant on the conversion of energy to be stored in the battery.

Reasons for the Decision

1. The appeal is admissible.
2. Main request
 - 2.1 In support of his argumentation for the purpose of Article 123(2) EPC, the Appellant cited the passage on page 25, line 27 to page 26, line 8 of the description as originally filed. This passage indeed describes the claimed first operating mode, in which the power system operates as a series combined system, i.e. the internal combustion engine drives the first dynamo-electric unit to operate as a generator that supplies electrical power to the second dynamo-electric unit. The skilled person understands from the wording of this passage ("and may charge the rechargeable device or supply power to another load at random for regulating the engine to operate at a constant speed with higher

energy efficiency") that the range of operating speed of an engine in which it runs with a lower fuel consumption such as to optimise its brake specific fuel consumption (constant speed as defined in the claim) can only be realised with the "rechargeable device" or "another load" mentioned therein. Without such rechargeable device it is not possible for the engine to be regulated to operate at the claimed constant speed and at the same time to cope with the inevitable fluctuations of the driven load without passing by less efficient operating points (transient performance). Therefore it is the rechargeable device which evens out the load on the internal combustion engine by absorbing excess power or supplying additional power on demand. Thanks to the rechargeable device, the engine can run at constant speed and remain in its most efficient operating range, while still being able to cope with load fluctuations due to different road configurations and/or variations of the power demand from the operator.

- 2.2 This interpretation of the original wording also applies to the operating mode "series combined power system" as defined in claim 2 as originally filed.
- 2.3 Consequently, for the skilled person, there is no disclosure in the originally filed documents of a first operating mode where the internal combustion engine is regulated to operate at the claimed constant speed in the absence of a rechargeable device.
- 2.4 In other words, the "rechargeable device" mentioned in the cited passage of the original disclosure, plays an essential role in the claimed first operating mode of the system and the omission of that feature in the

penultimate paragraph of claim 1 of the main request contravenes the requirements of Article 123(2) EPC. Accordingly, the main request must fail.

3. First auxiliary request

In making amendments in claim 1 of the first auxiliary request the Appellant sought to overcome the above-mentioned objections of added subject-matter. Especially the modifications made in the penultimate paragraph of claim 1 referring to the first operating mode mainly consist in a semantic reworking of some features present in the main request, for example the replacement of the expression "and regulate the engine to operate at..." in "the engine operating at..." and in the deletion of "and at higher output power so as to provide the brake specific fuel consumption". Most importantly, claim 1 of this request still specifies that the "constant speed" is within a "range of operating speed in which the engine runs with a lower fuel consumption", the latter wording suggesting that claim 1 of this request relates to the same functioning as claim 1 of the main request. For this functioning, the feature relating to the "rechargeable device" is, as explained above, essential in the context of maintaining the engine in a constant speed range and optimising its efficiency when driving the load. This feature, however, is still absent. Therefore, the Board cannot recognise in these amendments a clear attempt to overcome the objections made in respect of Article 123(2) EPC.

For this reason, the Board exercised its discretion under Article 13(1) and (3) RPBA not to admit the first auxiliary request in the proceedings.

4. Second auxiliary request

4.1 Admissibility

The Board has no formal objection under Article 123(2) EPC to the amendments made in claim 1 of this request.

The claim no longer includes a reference to the regulation of the engine so as to provide the brake specific fuel consumption and now specifies that, in the first mode in which the clutch is disengaged and the first dynamo-electric unit operates as a generator that supplies electrical power to the second dynamo-electric unit which operates as a motor, the engine is operated in its high-efficiency, low-speed range and at a constant speed. This mode of functioning is adequately supported by figure 6 taken in combination with page 35, lines 1 to 9 of the originally filed application documents.

4.2 Novelty

4.2.1 As exposed by the examining division in its decision the basic mechanical design (see in D1: internal combustion engine 40, first dynamo-electric unit 21, second dynamo-electric unit 25, clutch 51, and drive control unit 48) of the claimed hybrid drive system and its modes of operation are known from document D1 (see D1: figures 8(a) to 8(d) in combination with paragraphs [0192] to [0195] of D1).

- 4.2.2 D1 specifically discloses the claimed "second mode" of operation as the mode IV "Highway cruising", in which clutch 51 is engaged so that the load 32 is driven by the internal combustion engine ICE 40 while the engine is operating at high speed range (see D1, figure 8(c), paragraph [0194]).
- 4.2.3 As regards the "first mode" claimed in the penultimate paragraph of claim 1, it corresponds to "Mode II Low speed operation & battery charging " of D1. In this mode, clutch 51 is disengaged so that the first dynamo-electric unit 21 operates as a generator that supplies electrical power to the battery bank 22 and the second dynamo-electric unit 25, the latter operating as a motor (see D1, figure 8(b), paragraph [0193]).
- 4.2.4 Contrary to the assertion of the Appellant, claim 1 does not require that, in the first mode when the first dynamo-electric unit operates as a generator, the latter directly and exclusively supplies electrical power to the second dynamo-electric unit. The possibility that the claimed system also includes a rechargeable device and that at least some electrical power generated by the first dynamo-electric unit is supplied via a rechargeable device (battery) is not excluded by the wording of the claims (see also dependent claim 9 in this respect). This is precisely what occurs in "MODE II" of D1. As can be seen in figure 5 of D1 the battery 84 is arranged in parallel to the semi-conductor switching elements 80 making up the inverter/charger 23,27, so that the first dynamo-electric unit 21, working as a generator, can simultaneously supply the second dynamo-electric unit

25 and the battery 84 with electrical power (see D1: paragraphs [0179] and [0181]- [0182]: independent operation of the first and second dynamo-electric units 21,25). Irrespective of the specific paths of electrical current within the device of figure 5 of D1, it is a fact that power generated by the first dynamo-electric unit is supplied to the second dynamo-electric unit when the battery does not need charging, or only needs a relatively small amount thereof.

4.2.5 As mentioned in paragraph [0193] of D1, in the first mode, the speed of the engine 40 is independent of the road speed of the vehicle and can be maintained at relatively high output torque level for fuel efficiency. Such a mode of operation is also qualified as a "stable mode" in paragraph [0224] of D1. In such a stable operating mode, the engine runs so as to remain at a stable and efficient operating point. The skilled person would understand from this that the engine speed is constant because a stable mode of operation avoids any transient performance detrimental to efficiency. It can also be noted that the engine speed in this mode is lower than the high speed range which is reserved for mode IV ("highway cruising").

4.2.6 The Board concludes from the above considerations that the hybrid drive system of claim 1 is known from the prior art disclosed in D1 (Article 54(1) EPC 1973).

Thus, the second auxiliary request must fail.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

A. Vottner

G. Pricolo