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Datasheet for the decision of 21 January 2019

Case Number: T 1269/13 - 3.5.02

Application Number: 08251645.1

Publication Number: 1993188

IPC: H02K5/14, H02K5/167

Language of the proceedings: EN

Title of invention:
Electric motor

Applicant:
Johnson Electric S.A.

Relevant legal provisions:
EPC Art. 56, 84

Keyword:
Inventive step - main request, first to fifth and seventh auxiliary requests (no)
Claims - clarity - sixth auxiliary request (no)

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Case Number: T 1269/13 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 21 January 2019

Appellant: (Applicant)	Johnson Electric S.A. Freiburgstrasse 33 3280 Murten (CH)
Representative:	Cupitt, Philip Leslie Marks & Clerk LLP Alpha Tower Suffolk Street Queensway Birmingham B1 1TT (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 22 January 2013 refusing European patent application No. 08251645.1 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	R. Lord
Members:	G. Flyng
	J. Hoppe

Summary of Facts and Submissions

I. The applicant's appeal contests the examining division's decision to refuse the European patent application 08 251 645.1, which was published as EP 1 993 188 A2. For its reasoning the decision refers to a communication dated 7 November 2012.

II. In the communication dated 7 November 2012 the examining division considered the claims of the applicant's main request and auxiliary request that were filed with a letter dated 4 October 2012.

The examining division referred to the following prior art documents:

D1: JP 2007-110795 A
D2: US 6,707,177 B1

The examining division held in essence that:

- Claim 1 of the main request and claim 1 of the auxiliary request did not meet the requirements of Article 84 EPC because they lacked essential features;
- The subject matter of claim 1 of the main request lacked novelty over document D1;
- The amendments according to claim 1 of the auxiliary request offended Article 123(2) EPC; and
- The subject matter of claim 1 of the main request and claim 1 of the auxiliary request did not involve an inventive step over document D1 in combination with document D2.

III. With the statement of grounds of appeal dated 29 May 2013 the appellant contested the appealed decision, maintained the main request and the first

auxiliary request filed with the letter dated 4 October 2012 and submitted a new second auxiliary request.

IV. Third party observations were filed in a letter dated 8 November 2016, together with two further prior art documents.

V. With a letter dated 31 May 2018 the appellant (applicant) referred to the third party observations and submitted sets of claims of a main request and first to fifth auxiliary requests to replace the requests on file. The appellant also requested that the Board exercise its discretion not to admit the third party observations or the documents filed therewith, or otherwise that the application be remitted to the examining division in order to preserve the appellant's right to argue its case before two instances.

VI. The Board summoned the appellant to attend oral proceedings on 21 January 2019, setting out their preliminary observations in a communication annexed to the summons.

VII. With a letter dated 10 December 2018 the appellant responded to the summons and filed claims of a new sixth and a new seventh auxiliary request.

VIII. Oral proceedings were held on 21 January 2019, during which the appellant filed a new machine-generated translation of document D1 (see attachment to minutes).

The appellant's final requests were that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request filed with letter dated 31 May 2018, or if that was not

possible, on the basis of the claims of one of the following requests in numerical order:

- first to fifth auxiliary requests filed with letter dated 31 May 2018; or
- sixth or seventh auxiliary request, both filed with letter dated 10 December 2018.

IX. Claim 1 of the **main request** reads as follows:

"1. An electric motor comprising:

a wound rotor (40) having a shaft (42), a rotor core (46), a commutator (44) and windings wound about the rotor core (46) and connected to the commutator (44);

a stator confronting the rotor (40);

brush gear (36) connecting the commutator (44) to motor terminals (34);

first and second bearings (30, 31) for rotatably supporting the rotor (40), and;

an oil stopper (50) fitted to the shaft (42) between the commutator (44) and the first bearing (30) for preventing oil migrating along the shaft (42) from the first bearing (30) reaching the commutator (44), the oil stopper being of metal and having a body portion (52) for fixedly mounting to the shaft (42) and an oil collecting portion (54);

characterized in that the oil stopper (50) is fixed to the shaft (42) by an oil tight press fit and the body portion (52) of the oil stopper (50) is adapted to function as a spacer, is arranged to make contact with an axial end face of the first bearing (30) as a thrust bearing and is fixed fast to the shaft (42) thereby limiting movement of the shaft (42) through the first bearing (30) in a first direction, and wherein the metal of the oil stopper is a high temperature metal."

Claim 1 of the **first auxiliary request** corresponds to claim 1 of the main request but with the feature

"thereby limiting movement of the shaft"

amended to read (emphasis added)

"thereby limiting end play movement of the shaft".

Claim 1 of the **second auxiliary request** corresponds to claim 1 of the main request but with the following changes (emphasis added):

- the feature "first and second bearings (30, 31)" is amended to read "first and second bearings (30, 31) in the form of oil impregnated sintered bushings";
- the feature "arranged to make contact" is amended to read "adapted to make contact" (as in claim 5 as filed);
- the feature "as a thrust bearing" (which was not in the claims as filed) is deleted; and
- the feature "thereby limiting" is amended to read "to limit" (as in claim 6 as filed).

Claim 1 of the **third, fourth and fifth auxiliary requests** correspond respectively to claim 1 of the main request and first and second auxiliary requests, but with the feature that the oil stopper (50) is arranged/ adapted "to make contact" with an axial end face of the first bearing (30) amended to read "to make direct contact" (emphasis added).

Claim 1 of the **sixth auxiliary request** corresponds to claim 1 of the main request but with the feature

"An electric motor comprising"

amended to read (emphasis added)

"An electric motor applied to an engine compartment of a vehicle, the electric motor comprising".

Claim 1 of the **seventh auxiliary request** corresponds to claim 1 of the main request but with the feature that

"the oil stopper is a high temperature metal"

amended to read that (emphasis added)

"the oil stopper is brass".

X. The appellant argues in essence that starting from document D1 the subject-matter of claim 1 of the main request solves the objective technical problem of reducing the size of the motor or improving the axial positioning of the rotor. Faced with the latter problem the skilled person would not look to document D2 for a solution as it says nothing about axial positioning. Furthermore, the skilled person would discard any thoughts of using the splash ring 27 of D1 as a thrust bearing as it would be evident that in so doing there would be a risk of the tip portion 28a of the boss 28 being pushed too far into the resinous portion of the commutator and damaging it. Furthermore, the skilled person would see the protrusion in the centre of the end plate 43 of D1 as providing a thrust bearing for the end of the shaft and would thus have no reason to consider using the splash ring 27 as a thrust bearing.

Reasons for the Decision

1. Main Request

1.1 Document D1 can be considered the closest prior art document. That is not disputed.

1.2 Figure 1 and the corresponding description of document D1 disclose an electric motor 1 comprising the features of the preamble of claim 1. In particular, they disclose:

- a wound rotor 20 having a shaft 21, a rotor core 22, a commutator 24 and windings 23 wound about the rotor core and connected to the commutator;
- a stator 10 confronting the rotor;
- brush gear (see paragraph [0014]) connecting the commutator to motor terminals;
- first and second bearings 31, 30 for rotatably supporting the rotor 20; and
- a splash ring (i.e. an oil stopper) 27 fitted to the shaft 21 between the commutator 24 and the first bearing 31 for preventing oil migrating along the shaft 21 from the first bearing 31 reaching the commutator 24, the oil stopper being of metal (see paragraph [0020]) and having a boss (i.e. body portion) 28 for fixedly mounting to the shaft 21 and a flange (i.e. oil collecting portion) 29.

1.3 Considering the characterising features of claim 1, the oil stopper 27 of document D1 is fixed fast to the shaft 21 by an oil tight press fit (see paragraphs [0021] and [0024]). Furthermore, given that the application does not give any indication as to what

might be considered to be a "high temperature" metal, the metal of the oil stopper can be considered to be a "high temperature metal" at least in so far as this feature can be interpreted.

1.4 The Board considers that document D1 does not disclose the features of claim 1 according to which the body portion of the oil stopper (splash ring):

(a) is adapted to function as a spacer;

(b) is arranged to make contact with an axial end face of the first bearing 31 as a thrust bearing; and

(c) thereby limits movement of the shaft 21 through the first bearing 31.

In this respect the Board does not share the examining division's view that it is unambiguously derivable from document D1 that if an extremely high axial load were to be applied to the shaft 21, the splash ring 27 would come into contact with the axial end face of the bearing 31 (cf. communication of 7 November 2012, pages 3 to 5). Document D1 does not describe what would happen in the event of the shaft moving axially. Figure 1 of D1 shows an end plate 43 that has a central projection aligned with the axial end face of the shaft 21 and it is at least plausible that if the shaft 21 were to move to the left as viewed in figure 1 the end of the shaft would contact the projection of the end plate before the splash ring 27 made contact with the axial end face of the bearing 31 (see figure 3). As to what might happen if an extremely high axial load were to be applied to the shaft, the Board sees this as a matter of speculation about an abnormal situation that D1 does not foresee. Hence, it is not directly and unambiguously derivable that when the shaft moves axially to the left there will be contact between the splash ring and the bearing, and thus it is not

derivable that the splash ring functions as a spacer, acts as a thrust bearing and limits axial movement of the shaft.

1.5 As to the technical problem solved by the features (a), (b) and (c) identified above, several possibilities have been put forward, namely:

- to find an alternative to the thrust bearing in the end plate of D1 (cf. contested decision);
- to reduce the size of the motor (cf. paragraph [0005] of the application as published); and
- to improve the axial positioning of the rotor (cf. paragraph [0006] of the application as published).

The Board has reservations as to the appropriateness of the first of these possibilities; D1 does not state that the end plate acts as a thrust bearing and does not show the shaft bearing onto the end plate, so it is questionable whether seeking an alternative thrust bearing is an appropriate problem to be solved. As to the second possibility, again the Board has doubts as to its appropriateness, as it has not been demonstrated that the features (a) to (c) would necessarily lead to a smaller motor. Considering the third possibility, however, it is evident from feature (c) that the technical effect of the features (a) and (b) is to limit axial movement, i.e. improve axial positioning, of the shaft. For these reasons the Board considers that the problem of improving the axial positioning of the rotor is the most appropriate choice when considering inventive step. This was discussed in the oral proceedings before the Board and the appellant did not challenge this choice.

1.6 Faced with the problem of improving axial positioning of the D1 rotor the Board considers that it would be

obvious for the skilled person to consult document D2 for the following reasons. Document D2 concerns electric motors of the same basic type as D1, i.e. motors with a pair of bushings supporting a rotating shaft on which a wound armature, a commutator and an oil throw washer are mounted. In the prior art acknowledged in the background of the invention of D2 the oil throw washer, a separate wear washer and a separate isolation washer are mounted between the armature and the second bushing. The oil throw washer is disposed in engagement with the commutator. The isolation washer is then interposed between the oil throw washer and the wear washer, the latter acting as a wear surface in contact with the second bearing (see column 1, lines 35 to 47). As an improvement over this arrangement D2 proposes to replace the three separate washers with a single-piece oil slinger that provides the same functions (cf. column 2, lines 39 to 50). In both the background arrangement and the inventive arrangement of D2 the contact between the wear surface and the bushing creates a thrust bearing that would position the shaft in the axial direction while allowing it to rotate. That would be evident to the skilled person with a basic knowledge of mechanical engineering. Thus the skilled person would take from document D2 the teaching that the rotor of a motor can be axially positioned using an oil slinger that is positioned between the commutator and the bushing and that forms a thrust bearing with motor bushing either directly or via the intermediary of a washer (cf. paragraph [0022], first sentence of the application as published).

1.7 Applying this knowledge to the motor of document D1 the Board considers that it would be an obvious matter for the skilled person to arrange any of the splash rings

27 disclosed in D1 such that they make contact with the axial face of the bushing 31 to form a thrust bearing (feature b). With such an arrangement the splash ring 27, which is fixed fast to the shaft, would function as a spacer (feature a) and limit movement of the shaft 21 through the bushing 31 (feature c). The Board considers that the skilled person would thus arrive at the subject-matter of claim 1 of the main request without involving an inventive step, Article 56 EPC.

1.8 The Board is not convinced by the appellant's argument that the skilled person would discard any thoughts of using the splash ring 27 of D1 as a thrust bearing due to a risk of the tip portion 28a of the boss 28 being pushed too far into the resinous portion of the commutator and causing damage to it.

Document D1 discloses in paragraph [0021] (see translation of D1 filed during the oral proceedings before the Board) that:

> "The boss portion 28 has an insertion hole 28 b for inserting the rotation shaft 21 and the inner diameter dimension of the insertion hole 28 b is set slightly smaller than the outer diameter dimension of the rotation shaft 21".

Furthermore, in paragraph [0023] D1 discloses that:

> "... the splash ring 27 is disposed such that a part of the boss portion 28 bites into the mold portion 25 of the commutator 24 when the splash ring 27 is fixed to the rotation shaft 21 by press fitting".

The Board considers that such a press-fitting operation would be able to fix the splash ring to the shaft sufficiently securely to withstand the axial force of a

thrust bearing in at least some applications. Hence, at least in such applications there is no reason for the skilled person to consider that the splash ring might slip on the shaft and cause damage to the commutator.

1.9 For these reasons the Board could not accede to the appellant's main request.

2. First to Fifth Auxiliary Requests

2.1 The amendments made according to the first to fifth auxiliary requests are not apt to establish an inventive step for the reasons that follow.

2.2 In the line of reasoning set out above for the main request the axial movement of the shaft that would be limited by arranging the splash ring 27 of D1 so that it contacts the bushing is end play movement. Hence, the introduction of this feature in claim 1 of the first and fourth auxiliary requests is not apt to establish an inventive step.

2.3 In document D1 the bearings are sintered oil impregnated bearings, i.e. bushings (see paragraph [0016]). Hence, this feature of claim 1 of the second and fifth auxiliary requests is also not apt to establish an inventive step.

2.4 In the line of reasoning set out above for the main request the contact that would be established between the splash ring 27 of D1 and the bushing would be direct contact. Hence, the limitation to "direct" contact according to claim 1 of the third, fourth and fifth auxiliary requests is not apt to establish an inventive step.

2.5 The other amendments made according to the second and fifth auxiliary requests concern the deletion of "as a thrust bearing" and the amendments to read "adapted to make contact" and "to limit". None of these amendments restrict the claimed subject-matter.

2.6 For these reasons the Board could not accede to any of the appellant's first to fifth auxiliary requests.

3. Sixth Auxiliary Request

3.1 According to the appellant, the newly-introduced feature according to which the electric motor is "applied to an engine compartment of a vehicle" is to be understood in the sense that the motor is installed in the engine compartment of a vehicle, but that the claimed subject-matter does not include the engine compartment or the vehicle.

3.2 The Board considers that with this formulation the matter for which protection is sought is not clearly defined. The claim is formulated as a device claim (i.e. a motor comprising various technical features) but the feature that the motor is "applied to" another device (i.e. the engine compartment of a vehicle) can be interpreted either in the sense that the combination of two devices is claimed, or in the sense that it is the use of the motor in a particular environment that is claimed. With this ambiguity the category of claim is unclear and the requirements of Article 84 EPC are not met. Furthermore, it is not clear in what way the characteristics of the device would be limited by use in this particular application.

3.3 For these reasons the Board could not accede to the appellant's sixth auxiliary request.

4. Seventh Auxiliary Request

4.1 According to claim 1 of the seventh auxiliary request the metal of the oil stopper is brass. The appellant argued that this choice of metal is particularly advantageous as its coefficient of expansion is similar to that of steel, which would be the material of the shaft. This would be good for ensuring an oil-tight seal and would not be obvious.

4.2 The Board does not find these arguments convincing in terms of establishing an inventive step. Firstly, due to its low-friction properties, brass is one of the most commonly-used metals for sliding-contact bearings. With the splash ring of document D1 positioned to form a thrust bearing with the bushing, brass would for this reason be an obvious choice of metal for the splash ring. Secondly, there is no indication in the application that brass would be beneficial for the reason given and the coefficient of thermal expansion of brass (about $19 \times 10^{-6}\ K^{-1}$) is not particularly close to that of steel (about $13 \times 10^{-6}\ K^{-1}$). Hence, the Board is not convinced that this choice of metal would lead to any surprising effect.

4.3 Hence, the choice of brass does not involve an inventive step. For this reason the Board could not accede to the appellant's seventh auxiliary request.

5. Conclusion

In the absence of an allowable request the appeal had to be dismissed. In view of this finding the documents and observations submitted by the third party did not need to be considered.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

U. Bultmann R. Lord

Decision electronically authenticated