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Datasheet for the decision of 13 July 2020

Case Number: T 0533/15 - 3.4.01

Application Number: 08737988.9

Publication Number: 2147325

IPC: G01R33/34, G01R33/3415, G01R33/561

Language of the proceedings: EN

Title of invention:
METHOD AND RF TRANSMITTER ARRANGEMENT FOR GENERATING RF FIELDS

Applicant:
Koninklijke Philips N.V.
Philips Intellectual Property & Standards GmbH

Headword:
Transmitter arrangement / Philips

Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
Inventive step - (no)
Amendments - added subject-matter (yes)

Decisions cited:
T 0939/92

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Beschwerdekammern

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Case Number: T 0533/15 - 3.4.01

D E C I S I O N
of Technical Board of Appeal 3.4.01
of 13 July 2020

Appellant: (Applicant 1)	Koninklijke Philips N.V. High Tech Campus 52 5656 AG Eindhoven (NL)
Appellant: (Applicant 2)	Philips Intellectual Property & Standards GmbH Lübeckertordamm 5 20099 Hamburg (DE)
Representative:	van Velzen, Maaike Mathilde Philips Intellectual Property & Standards High Tech Campus 5 5656 AE Eindhoven (NL)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 8 October 2014 refusing European patent application No. 08737988.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	P. Scriven
Members:	P. Fontenay
	R. Winkelhofer

Summary of Facts and Submissions

I. The Examining Division refused European patent application No. EP-08 737 988.

II. In their decision, the Examining Division held that the claims of the request on file introduced subject-matter extending beyond the content of the original application, contrary to Article 123(2) EPC. It further held that the claimed invention was not disclosed in a manner sufficiently clear and complete for it to be carried out, contrary to Article 83 EPC; that the claims on file were not clear, contrary to Article 84 EPC; and that the subject-matter of (at least) claim 9 was not new in the sense of Article 54 EPC over document:

D1: Mao W. et al. Magnetic Resonance in Medicine, N° 56, pages 918-922, 2006.

III. An appeal was filed against the decision. In the statement setting out the grounds of appeal, the appellant requested that the Examining Division's decision be set aside and that a patent be granted on the basis of a newly-submitted set of claims 1-4.

The appellant submitted that claim 1 had been amended to more specifically match example B1 of Figure 2 of the original application.

Arguments in favour of inventive step were put forward with regard to the various documents cited by the

Examining Division earlier in the procedure.

As a subsidiary request, it was requested that the Board remit the case to the first instance for further examination.

IV. In a communication pursuant to Article 15 RPBA, the appellant was informed of the Board's preliminary opinion.

With regard to added subject-matter, the Board expressed doubts that the example B1 of Figure 2 constituted a sufficient basis for the combination of features recited in claim 1. In particular, the embodiment referred to did not appear to disclose the feature of a cylindrical segment, when *segment* meant an individual structure identifiable as such. Moreover, there was no apparent basis for the n cylindrical segments comprising m elements, wherein n was an integer greater or equal to three and m was an integer greater or equal to four.

It was further considered that the claimed configuration was distinguished from the prior art known from document

D6: US-B-6 900 636

only in the feature of adjacent coil elements in each segment being displaced in the z-direction. That was a feature that was considered to lack support in the original disclosure, due to the impossibility of identifying any *segment* in the embodiment of Figure 2-B1.

For the sake of completeness, the Board also observed that also a claim more precisely directed to the embodiment of Figure 2-B1 would still not define inventive subject-matter. The reason was that the arrangement of Figure 2-B1 did not appear to provide any effect that was not already provided by the arrangement known from D6. As a consequence, the objective technical problem seemed to be no more than the provision of an alternative (cf. decision T 939/92, OJ 1996, 309, point 2.5).

V. In reply, the appellant reiterated its view that the claimed subject-matter did not extend beyond the content of the application as filed, and further elaborated on the existence of an inventive step with regard to document D6.

It was stressed that D6 did not disclose any feature equivalent to adjacent coil elements in each of the n cylindrical segment having different displacements in the z direction. This feature permitted increased control of the RF field in the volume to be imaged, with a reduced number of coils. This reformulation of the technical problem appeared fully justified under the circumstances.

VI. The Board sent a further communication, drawing the attention of the appellant to the various precautionary measures applying during oral proceedings in view of the COVID pandemic.

VII. The oral proceedings were cancelled following the indication by the appellant that it would not attend.

VIII. Claim 1 of the main request reads:

A Multi-channel RF transmit system comprising an RF transmitter arrangement with coil elements (s1, s2, s3,...), wherein the Multi-channel RF transmit system further comprises a plurality of RF waveform generators and RF amplifiers for generating RF transmit signals for individually feeding the coil elements (s1, s2, s3,..) of the RF transmitter arrangement for generating an RF field for exciting nuclear magnetic resonances in an MRI system, wherein the RF transmitter arrangement forms a body coil which is segmented into n cylindrical segments in the z-direction, each of the n cylindrical segments comprises m coil elements, and wherein the m coil elements of each of the n cylindrical segments are individually fed by the plurality of RF waveform generators and RF amplifiers, wherein adjacent coil elements of each of the n cylindrical segments have different displacements in the z-direction, wherien [sic] n is an integer greater than or equal to three, wherien [sic] m is an integer greater than or equal to four.

Reasons for the Decision

Added subject-matter

1. Claim 1 of the appellant's request recites that t*he* RF transmitter arrangement forms a body coil which is segmented into n cylindrical segments in the z-direction, each of the n cylindrical segments comprising m coil elements. The claim further specifies that n and m are integers greater than, respectively, three and four.

2. An exemplary embodiment of the disclosed arrangement (page 3, lines 32-34 of the published application) suggests that the body coil consists of three cylindrical segments extending in the z-direction, each with 8 coil elements. Independently of the fact that, according to this embodiment, adjacent coil elements within the three cylindrical segments have the same displacement in the z-direction, there is no indication in the application that the number of elements per segment could be reduced to four.

3. The appellant referred specifically to example B1 of Figure 2 as basis for the claimed arrangement.

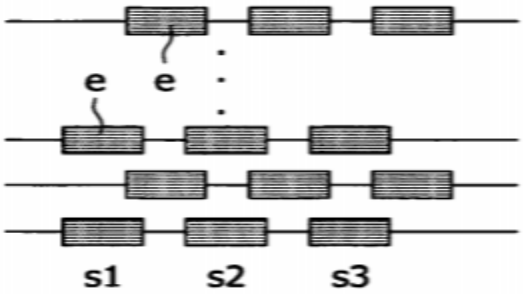

Figure 2 - B1

4. Example B1 in Figure 2 does not support the generalisation, comprised in claim 1, with at least three cylindrical segments and at least four elements per cylindrical segment. The various configurations in Figure 2 are schematic representations of the arrangements initially disclosed. No direct and unambiguous teaching regarding the number of elements present in the arrangement can be drawn from these figures.

5. Moreover, the dots between the first and second upper coil elements in all the arrangements in Figure 2, and in Figure 2-B1 in particular, suggest that the total number of elements in a segment (column) actually exceeds four.

6. The appellant's argument that the dots simply indicate that the specific pattern indicated in Figure 2-B1 is intended to be repeated around the circumference of the cylinder may be correct, but is not sufficient to support the claim's wording.

7. The interpretation of the claim's wording put forward by the appellant would imply that the complete RF arrangement would consist of a repetition around the circumference of the portion of the pattern reproduced in example B1, consisting of three segments of four coil elements each, with every second element in a segment being displaced in the z-direction. As a consequence, a segment would have a limited circumferential extension depending on the number of units according to Figure 2-B1 required to cover the whole circumference. While this interpretation would not contradict the content of the application on page 3, lines 5-8, with the reference to "segments of cylindrically arranged transmitter elements, it would

directly contradict the claim's wording, which requires "n **cylindrical** segments".

8. The statement on page 6, lines 12 and 13, cited by the appellant in support of the claim, specifies that various numbers of amplifier channels could be used, e.g., m to drive the m rings/segments or n driving n coil elements consisting of the one, two or multiple of the z-segments. Nothing in this passage, however, suggests that n may be greater than or equal to three and that m may be greater than or equal to four.

9. In conclusion, the original application does not disclose any arrangement with at least three cylindrical segments and at least four elements per segment. In particular, no disclosure can be found in the application as filed for a configuration with, specifically, three cylindrical segments and four coil elements per segment.

10. Claim 1 does thus not comply with Article 123(2) EPC.

11. This justifies the refusal of the application and the dismissal of the appeal.

Inventive step - Articles 52, 56 EPC

12. Although the failure under Article 123(2) EPC is sufficient to dispose of the appeal, the Board prefers to explain why it also considers that the application fails for lack of inventive step (Article 56 EPC).

Closest prior art

13. Document D6 discloses a multichannel RF transmitter arrangement with resonator elements in the form of planar, strip-shaped conductor elements (incidentally, called "resonator segments" in D6). The resonator elements are electromagnetically decoupled from one another. A separate transmission channel is associated with each resonator element, thus making phase and amplitude to be individually selectable for each resonator element (cf. figure 1, column 6, lines 15-25). In a preferred embodiment, the RF transmitter consists of two axially successive strip-shaped conductor elements, that is a first and second group of conductor elements displaced from one another along the z-direction of the RF arrangement (cf. Figure 8, claim 7), thus allowing for improved RF field distribution in the z-direction (cf. column 8, lines 29-32).

14. D6 shares a large number of common features with the claimed multichannel arrangement. It also shares a common purpose in terms of increased flexibility with regard to the spatial RF field pattern to be applied (cf. column 4, lines 57-64).

15. For these reasons, the Board considers that D6 constitutes a valid item of prior art when deciding on the inventive merits of the claimed invention. This was not disputed by the appellant.

16. The application does not contain any definition of the concept of "segment". The statement on page 3, lines 1-4, of the published application suggests that the invention, as originally claimed, consisted in a "segmentation" of a known single cylindrical ring, or of a planar line structure known from the prior art,

thus providing a distribution and/or segmentation of the coils in two or three spatial directions. The statement in the following paragraph (page 3, lines 5-8), according to which an example of the arrangement corresponds to "an array of different rings and/or segments of cylindrically arranged transmitter elements", suggests that the term is used in referring to various groups of coil elements by reference to the geometry of the RF arrangement, as it results from the notional segmentation envisaged by the appellant with regard to the prior art previously identified.

17. The notion of "segment" does thus not appear to be associated with any specific structural or functional limitation. In this respect, it is noted that the control of the various coil elements does not necessarily depend on the segment to which they belong (cf. page 2, lines 15-19; page 3, line 34 - page 4, line 2; page 4, lines 29-31).

18. In favour of the appellant, the term segment is to be recognised, in the context of the present application, as having a broad meaning, without making it unclear as such. The concept of "cylindrical segment", as it appears in claim 1, encompasses any arbitrary circumferential section with some extent in the z-direction.

19. Contrary to the view expressed by the Board in the provisional opinion, the notion does thus not require that the coil elements it incorporates belong to any structural or functional unit, identified as such.

20. It follows that the feature of a body coil segmented into two cylindrical segments in the z-direction, each of the two cylindrical segments comprising more than

four coil elements, is also disclosed in the arrangement of Figure 8 in D6.

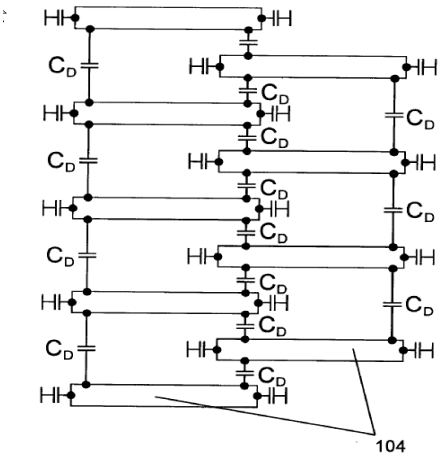

Figure 8 of D6

Distinguishing features

21. In view of the fact that the coil elements according to the claimed invention may have different sizes and shapes, and may also encompass strips (cf. description, page 5, lines 4-5; page 6, lines 23-24), the only differences between the claimed subject-matter and the multichannel RF transmit system of D6 appear to reside in the features of:
- adjacent coil elements in each segment being displaced in the z-direction and
- a number of segments n being greater than two.

Technical effects of the invention over D6 - objective problems solved

22. The displacement of adjacent coil elements in each segment in the z-direction does not provide any effect that is not inherent in the arrangement known from D6.

23. In particular, the configuration disclosed in D6 provides the same advantages in terms of flexibility with regard to the spatial RF field pattern to be applied (D6, column 4, lines 57-64).

24. In the reply to the Board's communication, the appellant stressed that the claimed arrangements further allowed increased control possibilities with fewer coil elements as a result of the coil elements being placed at a greater variety of locations along the z-direction.

25. While the feature of coil elements being distributed along both the axial and circumferential directions would undoubtedly allow increased control compared with known arrangements of the kind acknowledged in the application with a single cylindrical ring or a single line structure (cf. page 3, lines 1-4), no further such effect can be identified when compared with a two-dimensional structure of the kind illustrated in Figure 8 in D6.

26. It follows that the objective technical problem that can be derived from the first distinguishing feature identified above, is no more than the provision of an alternative (cf. decision T 939/92, *Triazoles*, OJ 1996, 309, point 2.5), for which the existence of an inventive step is to be denied in this case.

27. With regard to the second distinguishing feature of a number of segments being greater than two, its effect does not appear to extend beyond enlarging the region along the z-axis which can benefit from the flexibility and control possibilities offered by the arrangement of Figure 8 in D6. Its combination with the first distinguishing feature identified above does also not appear to serve any common purpose. This appears all the more true considering that an increase of the number of segments in the z-direction in Figure 8 of D6, according to just the second distinguishing feature, could not be distinguished from a configuration including both of them.

28. The problem to be solved by the second distinguishing feature would thus be to enlarge the volume to be imaged for which the effects identified above would apply.

29. However, the skilled person would have envisaged increasing the number of cylindrical segments in the z-direction as a simple extrapolation of the teaching provided by D6.

30. In conclusion, the claimed multichannel RF Transmit system derives in an straightforward manner from the teaching provided in D6. It is thus not inventive in the sense of Article 56 EPC.

Request for remittal to the first instance

31. In view of the above, the Board sees nothing that would justify remittal.

General observation

32. Oral proceedings were to be held on Monday 13 July 2020. Late in the afternoon of the preceding Friday, the appellant sent an Email informing the Board that "in the present circumstances this European patent application does not warrant travel to Munich and thus Philips will not attend these oral proceedings." The number of oral proceedings that can be held each day is severely limited, due to measures necessitated by the COVID-19 pandemic, and this means that many proceedings have been cancelled or postponed. By informing the Board so late, the appellant made it impossible to use the hearing room for some other case. This was unfortunate and is something the parties should try to avoid.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Hampe P. Scriven

Decision electronically authenticated