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Datasheet for the decision of 18 August 2011

Case Number: T 0815/08 - 3.4.01

Application Number: 04000846.8

Publication Number: 1445622

IPC: G01R 33/28

Language of the proceedings: EN

Title of invention:
Hyperpolarized gas transport device

Applicant:
Medi-Physics, Inc.

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC R. 103(1)(a)
RPBA Art. 11

Relevant legal provisions (EPC 1973):
EPC Art. 76(1), 84, 56, 113(1)

Keyword:
-

Decisions cited:
T 0734/91, T 0268/00

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0815/08 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 18 August 2011

Appellant: Medi-Physics, Inc.
101 Carnegie Center
Princeton, NJ 08540 (US)

Representative: Canning, Lewis R.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 14 December 2007 refusing European patent application No. 04000846.8 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: B. Schachenmann
Members: G. Assi
H. Wolfrum

Summary of Facts and Submissions

I. The European patent application No. 04000846.8 (publication number 1 445 622) was refused by the examining division which, in the decision dispatched on 14 December 2007, held that the application did not meet the requirements of Articles 76(1), 84 and 56 EPC 1973.

In the decision the examining division considered the following prior art documents:

(D1) US-A-4,157,495;

(D2) H.-U. Kauczor et al., "*Normal and Abnormal Pulmonary Ventilation: Visualization at Hyperpolarized He-3 MR Imaging*", Radiology, Volume 201, Number 2, 1996, pages 564-568;

(D3) US-A-4,644,281.

II. The applicant (appellant) lodged an appeal, received on 30 January 2008, against the decision of the examining division. The appeal fee was paid on the same day. The statement setting out the grounds of appeal was received on 14 April 2008.

With the grounds of appeal the appellant submitted that a substantial procedural violation occurred in the first instance procedure. The appellant thus requested that the case be remitted to the examining division for further prosecution and the appeal fee be reimbursed in accordance with Rule 103(2) EPC.

The appellant also requested that the decision under appeal be set aside and a patent be granted on the basis of the following documents:

Main request:
Claims 1-50 of the main request filed with the grounds of appeal,
Description pages 1-45, 45A-45J as originally filed,
Drawing sheets 1/18-18/18 as originally filed;

First auxiliary request:
Claims 1-48 filed with the grounds of appeal,
Description pages 1-45 as originally filed,
Drawing sheets 1/18-18/18 as originally filed;

Second auxiliary request:
Claims 1-48 filed with the grounds of appeal,
Description pages and Drawing sheets of the main request;

Third auxiliary request:
Claims 1-44 filed with the grounds of appeal,
Description pages and Drawing sheets of the main request;

Fourth auxiliary request:
Claims 1-15 filed with the grounds of appeal,
Description pages and Drawing sheets of the main request;

Fifth auxiliary request:
Claims 1-40 filed with the grounds of appeal,
Description pages and Drawing sheets of the main request.

III. With a communication of 8 April 2011 the appellant was summoned to oral proceedings scheduled to take place on

18 August 2011. With a further communication of 6 May 2011 the Board gave a provisional view on the appellant's requests.

With a letter of 18 July 2011 the appellant notified the Board of the fact that it did not intend to submit any further written submissions or to be represented at the oral proceedings.

With a communication of 12 August 2011 the scheduled oral proceedings were cancelled.

IV. The wording of claim 1 of the main request reads as follows:

"*A solenoid (20) for providing a magnetic field to shield hyperpolarized gases within a transport unit, said solenoid comprising:*
a cylindrical body (20A) having at least one coil segment (21, 22 23 [sic]) thereon, said cylindrical body sized and configured to receive a container (30) holding a quantity of hyperpolarized gas therein; and
a power source (40) operably associated with said at least one coil segment (21, 22 23 [sic]);
wherein, in operation, current from said power source (40) is directed into said solenoid (20) at said at least one coil segment (21, 22 23 [sic]) to generate a magnetic holding field having a low field strength to shield a quantity of hyperpolarized gas;
wherein said at least one coil segment (21, 22, 23) comprises:
a first coil segment (21) having a first coil length and a first number of windings disposed on said cylindrical body (20A);

a second coil segment (22) having a second coil length and a second number of windings disposed on said cylindrical body (20A) adjacent said first coil segment; and
a third coil segment (23) having a third coil length and a third number of windings disposed on said cylindrical body (20A) adjacent said second coil segment (22) opposing said first coil segment (21);
characterised in that:
(i) said first and third coil segments (21, 23) are configured with an increased number of wire layers relative to the second coil segment (22);
(ii) said solenoid (20) is configured to generate a substantially homogeneous magnetic holding field in which the spherical or major portion (33) of the gas chamber (30) is positioned; and; [sic]
(iii) said solenoid (20) defines a magnetic holding field having a magnetic field strength of between 0.2-4.0 mT (2-40 Gauss)."

The wording of claim 1 of the first auxiliary request reads as follows:
"*A solenoid (20) for providing a magnetic field to shield hyperpolarized gases within a transport unit, said solenoid comprising:*
a cylindrical body (20A) having first, second and third coil segments (21, 22 23 [sic]) thereon, said cylindrical body sized and configured to receive a gas chamber (30) holding a quantity of hyperpolarized gas therein; and
a power source (40) operably associated with said first, second and third coil segments (21, 22 23 [sic]);
wherein, in operation, current from said power source (40) is directed into said solenoid (20) at said first,

second and third coil segments (21, 22 23 [sic]) such that said solenoid generates a magnetic holding field having a low field strength to shield a quantity of hyperpolarized gas;
wherein:
said first coil segment (21) has a first coil length and a first number of windings disposed on said cylindrical body (20A);
said second coil segment (22) has a second coil length and a second number of windings disposed on said cylindrical body (20A) adjacent said first coil segment; and
said third coil segment (23) has a third coil length and a third number of windings disposed on said cylindrical body (20A) adjacent said second coil segment (22) opposing said first coil segment (21);
characterised in that:
(i) said first and third coil segments (21, 23) are configured with an increased number of wire layers relative to the second coil segment (22);
(ii) said solenoid (20) generates a substantially homogeneous magnetic holding field in which the spherical or major portion (33) of the gas chamber (30) is positioned; and; [sic]
(iii) said low field strength being between 0.2-4.0 mT (2-40 Gauss)."

The wording of claim 1 of the second auxiliary request reads as follows:
"*A solenoid (20) for providing a magnetic field to shield hyperpolarized gases during transport, said solenoid comprising:*
a cylindrical body (20A) having first, second and third coil segments (21, 22 23 [sic]) thereon, said

cylindrical body sized and configured to receive a gas chamber (30) holding a quantity of hyperpolarized gas therein; and
a power source (40) operably associated with said first, second and third coil segments (21, 22 23 [sic]);
wherein, in operation, current from said power source (40) is directed into said solenoid (20) at said first, second and third coil segments (21, 22 23 [sic]) such that said solenoid generates a magnetic holding field having a low field strength to shield a quantity of hyperpolarized gas;
wherein:
said first coil segment (21) has a first coil length and a first number of windings disposed on said cylindrical body (20A);
said second coil segment (22) has a second coil length and a second number of windings disposed on said cylindrical body (20A) adjacent said first coil segment; and
said third coil segment (23) has a third coil length and a third number of windings disposed on said cylindrical body (20A) adjacent said second coil segment (22) opposing said first coil segment (21);
characterised in that:
(i) said first and third coil segments (21, 23) are configured with an increased number of wire layers relative to the second coil segment (22);
(ii) said solenoid (20) generates a substantially homogeneous magnetic holding field in which the spherical or major portion (33) of the gas chamber (30) is positioned; and; [sic]
(iii) said low field strength being between 0.2-4.0 mT (2-40 Gauss)."

The wording of claim 1 of the third auxiliary request reads as follows:

"*A solenoid (20) for providing a magnetic field to shield hyperpolarized gases within a transport unit, said solenoid comprising:*

a cylindrical body (20A) having first, second and third coil segments (21, 22 23 [sic]) thereon, said cylindrical body sized and configured to receive a gas chamber (30) holding a quantity of hyperpolarized gas therein; and

a power source (40) operably associated with said first, second and third coil segments (21, 22 23 [sic]);

wherein, in operation, current from said power source (40) is directed into said solenoid (20) at said first, second and third coil segments (21, 22 23 [sic]) such that said solenoid generates a magnetic holding field having a low field strength to shield a quantity of hyperpolarized gas;

wherein:

said first coil segment (21) has a first coil length and a first number of windings disposed on said cylindrical body (20A);

said second coil segment (22) has a second coil length and a second number of windings disposed on said cylindrical body (20A) adjacent said first coil segment; and

said third coil segment (23) has a third coil length and a third number of windings disposed on said cylindrical body (20A) adjacent said second coil segment (22) opposing said first coil segment (21);

characterised in that:

(i) said first and third coil segments (21, 23) are configured with an increased number of wire layers relative to the second coil segment (22);

(ii) said solenoid (20) generates a substantially homogeneous magnetic holding field in which the spherical or major portion (33) of the gas chamber (30) is positioned; and; [sic]

(iii)where said hyperpolarized gas is either ^{3}He or ^{129}Xe , and said low field strength is either at least 0.7 mT (7 Gauss) or at least 2.0 mT (20 Gauss), respectively."

Claim 1 of the fourth auxiliary request corresponds to claim 24 of the main request (see grounds of appeal, page 9, first paragraph). It relates to a transport unit for transporting hyperpolarized gas products therein, said transport unit including a solenoid "*(20) for providing a magnetic field to shield hyperpolarized gases within a transport unit, said solenoid comprising:*
a cylindrical body (20A) having at least one coil segment (21, 22 23 [sic]) thereon, said cylindrical body sized and configured to receive a container (30) holding a quantity of hyperpolarized gas therein;
at least one container (30) adapted to hold a quantity of hyperpolarized gas product therein disposed within said solenoid (20);
a power source (40) operably associated with said at least one coil segment (21, 22, 23) wherein, in operation, current from said power source (40) is directed into said solenoid (20) at said at least one coil segment (21, 22, 23) to generate a magnetic holding field having a low field strength to shield a quantity of hyperpolarized gas;
wherein said at least one coil segment (21, 22, 23) comprises:

a first coil segment (21) having a first coil length and a first number of windings disposed on said cylindrical body (20A);
a second coil segment (22) having a second coil length and a second number of windings disposed on said cylindrical body (20A) adjacent said first coil segment; and
a third coil segment (23) having a third coil length and a third number of windings disposed on said cylindrical body (20A) adjacent said second coil segment (22) opposing said first coil segment (21);
characterised in that:
(ii) [sic] said first and third coil segments (21, 23) are configured with an increased number of wire layers relative to the second coil segment (22);
(ii) said solenoid (20) is configured to generate a substantially homogeneous magnetic holding field in which the spherical or major portion (33) of the gas chamber (30) is positioned; and; [sic]
(iii)said solenoid (20) defines a magnetic holding field having a magnetic field strength of between 0.2-4.0 mT (2-40 Gauss);
and wherein said solenoid (20) and said container (30) are positioned in the transport unit (10) so that the major portion (33) of the at least one container (30) resides in the magnetic field provided by the solenoid (20)."

The wording of claim 1 of the fifth auxiliary request reads as follows:
"*A solenoid (20) for providing a magnetic field to shield hyperpolarized gases within a transport unit, said solenoid comprising:*

a cylindrical body (20A) having first, second and third coil segments (21, 22 23 [sic]) thereon, said cylindrical body sized and configured to receive a gas chamber (30) holding a single patient dose of hyperpolarized gas therein; and
a power source (40) operably associated with said first, second and third coil segments (21, 22 23 [sic]);
wherein, in operation, current from said power source (40) is directed into said solenoid (20) at said first, second and third coil segments (21, 22 23 [sic]) such that said solenoid generates a magnetic holding field having a low field strength to shield a single patient dose of hyperpolarized gas;
wherein:
said first coil segment (21) has a first coil length and a first number of windings disposed on said cylindrical body (20A);
said second coil segment (22) has a second coil length and a second number of windings disposed on said cylindrical body (20A) adjacent said first coil segment; and
said third coil segment (23) has a third coil length and a third number of windings disposed on said cylindrical body (20A) adjacent said second coil segment (22) opposing said first coil segment (21);
characterised in that:
(i) said first and third coil segments (21, 23) are configured with an increased number of wire layers relative to the second coil segment (22);
(ii) said solenoid (20) generates a substantially homogeneous magnetic holding field in which the spherical or major portion (33) of the gas chamber (30) is positioned; and; [sic]

(iii)said low field strength being between 0.2-4.0 mT (2-40 Gauss)."

The main request as well as the first, second, third and fifth auxiliary requests also include independent claims concerning a "*transport unit (10) for transporting hyperpolarized gas products therein*", including a solenoid as claimed in preceding claims, and a "*method of inhibiting relaxation of hyperpolarized noble gases due to external electromagnetic interference or stray magnetic fields*", referring back to a transport unit and a solenoid as claimed in respective preceding claims.

V. The revised version of the European Patent Convention or EPC 2000 entered into force on 13 December 2007. In the present decision, reference is made to "*EPC 1973*" or "*EPC*" for EPC 2000 (EPC, Citation practice, pages 4-6) depending on the version to be applied according to Article 7(1) of the Revision Act dated 29 November 2000 (Special Edition No. 1 OJ EPO 2007, 196) and the decisions of the Administrative Council dated 28 June 2001 (Special Edition No. 1 OJ EPO 2007, 197) and 7 December 2006 (Special Edition No. 1 OJ EPO 2007, 89).

Reasons for the Decision

1. The appeal is admissible.

2. Alleged procedural violation

2.1 The appellant submitted that the examining division committed a substantial procedural violation. In its

view, the refusal of the present application after one substantive response and a cancelled summons to oral proceedings was both premature and unwarranted. In accordance with decision T 0734/91 (unpublished), a further opportunity to comment pursuant to Article 113(1) 1973 and Article 94(3) EPC would have been both necessary and appropriate in the present case.

2.2 In case T 0734/91, in a first and only communication, the examining division informed the applicant of the grounds against the grant of a patent. The applicant replied with a letter and filed an amended set of claims. The examining division then refused the application.

The circumstances of the present case are different.
In a communication dated 09 January 2007, the examining division informed the applicant of the grounds against the grant of a patent.
The applicant replied with a letter of 04 July 2007, filed an amended set of claims and requested that a further communication pursuant to Article 96(2) EPC 1973 be issued or that a telephone interview be conducted or, as an auxiliary request, that oral proceedings be arranged.
In a further communication accompanying the summons to attend oral proceedings of 17 August 2007, the examining division raised objections against the claims filed with the letter of 04 July 2007. A final date (07 November 2007) was fixed for making written submissions and/or amendments.
With a letter of 07 November 2007, the applicant commented on the objections raised, filed a main request and an auxiliary request and, moreover,

submitted that oral proceedings after a substantive response to a first communication were both premature and unwarranted. Considering that a further written communication would be more appropriate, the applicant requested that oral proceedings be cancelled and that a communication pursuant to Article 96(2) EPC 1973 be issued. Moreover, the applicant announced that it would not be represented at the oral proceedings, should these take place on the envisaged date.
The summons was cancelled with a brief communication dated 06 December 2007 and the proceedings were continued in writing.
The application was then refused with the decision of 14 December 2007.

In summary, the examining division issued two communications, the first one dated 09 January 2007 and the second one dated 17 August 2007. The applicant replied in writing with the letters of 04 July 2007 and 07 November 2007. Oral proceedings were scheduled to take place on 07 December 2007, after the mentioned exchange of letters.

Under these circumstances, the Board does not see any substantial procedural violation in view of the fact that the examining division has a discretionary power as to the number of communications issued, laid down in Article 96(2) EPC 1973 ("*as often as necessary*"). For the same reason, the fact that, in the decision under appeal, the examining division has not mentioned the reasons why the applicant's request for a further communication was not followed, would not amount to a substantial procedural violation either.

2.3 The decision under appeal is based on the main request and the auxiliary request filed with the reply of 07 November 2007. The question has to be considered as to whether the decision is based on grounds or evidence on which the applicant has had an opportunity to present its comments (Article 113(1) EPC 1973). In particular, attention is drawn to the ground of lack of inventive step.

In the communication of 09 January 2007 (point 3), claim 1 as originally filed was considered to lack novelty over D1. Moreover, independent claims 19 (read "*29*"), 44 and 56 as originally filed were regarded as lacking inventive step in view of the combination of D2 and D1.
In the communication of 17 August 2007 (point 1), the amended claim 1 then on file was considered to lack inventive step in view of D1 or D3. Moreover, independent claim 41 then on file was regarded as lacking inventive step in view of the combination of D2 and D3.
In the decision under appeal (Reasons, points 1.3(a) and 2.3(a)), the further amended claims 1 according to the main request and the auxiliary request then on file were considered to lack inventive step having regard to the combination of D2, considered to be the closest prior art, and D1 or to the combination of D2 and the knowledge of the skilled person as shown by D3.

Thus, in the decision under appeal the line of argumentation concerning the issue of inventive step of claim 1 differs from that in the directly preceding communication of 17 August 2007 in that the closest prior art relied upon was not the same. Moreover,

claim 1 underlying the decision under appeal was amended by addition of features taken from the dependent claims and the description, whereby the dependent claims in the communications of 09 January 2007 and 17 August 2007 had been dealt with only summarily.

Nevertheless, as results from the foregoing, the decision under appeal is based on the ground of lack of inventive step, inter alia, and on evidence provided by documents D1, D2 and D3, on which the appellant had presented its submissions. The requirement of Article 113(1) EPC 1973, which only refers to "*grounds or evidence*", is thus met. Fresh arguments in a decision still based on grounds and evidence communicated beforehand are not precluded (T 0268/00 (unpublished); Reasons, point 8).

2.4 In conclusion, the Board does not agree with the appellant's view that the examining division committed a substantial procedural violation. Hence, there is no reason to remit the case to the examining division for further prosecution (Article 11 RPBA).

2.5 Pursuant to Rule 103(1)(a) EPC the appeal fee shall be reimbursed "*where the Board of Appeal deems an appeal to be allowable, if such reimbursement is equitable by reason of a substantial procedural violation*".

In the present case, the reimbursement requested by the appellant would not be equitable because the examining division has not committed a substantial procedural violation.

Therefore, the request for reimbursement of the appeal fee is refused.

3. Present application

The present application as filed is a divisional application of the earlier application EP-A-1 090 250 (WO-A-99/66254). The description pages 1-45 and the drawing sheets 1/18-18/18 of both applications are identical.

4. Main request

4.1 Amendments (Article 123(2) EPC and Article 76(1) EPC 1973)

4.1.1 The solenoid according to claim 1 of the main request comprises a cylindrical body having "*at least one coil segment thereon*", wherein said at least one coil segment comprises a first coil segment, a second coil segment and a third coil segment.

4.1.2 These features are disclosed in claim 1 together with claim 3 of the present application as filed (Article 123(2) EPC).

4.1.3 However, they are not disclosed in the earlier application as filed (Article 76(1) EPC 1973). According to claim 22 of the earlier application as filed, the solenoid comprises a cylindrical body, a first coil segment, a second coil segment and a third coil segment. According to page 24, the solenoid comprises a plurality of electrical coil segments (lines 10-13) and, preferably, at least three coil

segments (lines 17-19; Figure 2). The disclosure of a solenoid comprising at least a first coil segment, a second coil segment and a third coil segment differs from that of a solenoid comprising "*at least one coil segment*" which comprises a first coil segment, a second coil segment and a third coil segment.

4.1.4 The effect of these considerations also extends to independent claims 24 and 39 of the main request.

4.1.5 It follows that the present divisional application according to the main request contains subject-matter which extends beyond the content of the earlier application as filed.

4.2 Clarity of the claims (Article 84 EPC 1973)

4.2.1 The claimed solenoid generates a "*substantially homogeneous*" magnetic holding field to shield a "*quantity*" of hyperpolarized gas.
The term "*quantity*" is undefined, although it is related to the volume in which the magnetic holding field has to be "*substantially homogeneous*". The level of the required magnetic field homogeneity is an important aspect of the present invention but it is not specified by claim 1.

4.2.2 Claims 17 and 18 concern a solenoid comprising at least a container for the hyperpolarized gas. It is unclear how a solenoid could "*comprise*" a gas container. Moreover, it is not clear why the container in claim 17 is "*adapted to hold*" a quantity of gas whereas the container of claim 18 is "*holding*" a quantity of gas.

4.3 Novelty and inventive step (Articles 54 and 56 EPC 1973)

4.3.1 Technical field

The present invention relates to the transport of hyperpolarized gases from one site to another, the hyperpolarized gases being suitable for magnetic resonance (MR) applications.

4.3.2 Closest prior art

Document D2 (page 564) represents the closest prior art document among those cited in the decision under appeal.

D2 refers to the use of hyperpolarized noble gases, such as ^{129}Xe or ^{3}He, for MR imaging. With regard to ^{3}He in particular, it discloses that a long longitudinal relaxation time T_1 is essential for facilitating storage, transport and handling of this gas. For the transport from a filling site to a MR imaging unit, hyperpolarized gas cells are placed in the centre of a dedicated magnetic holding field of 0.3 mT.

4.3.3 Knowledge of the skilled person

The skilled person for MR applications using hyperpolarized gases is aware of the fact that the hyperpolarized state is subject to various T_1 relaxation mechanisms like oxygen-induced relaxation (present application, page 14, line 20 to page 15, line 18), container wall surface relaxation (present application, page 15, line 20 to page 16, line 5) and electromagnetic interference as well as gradient induced relaxation (present application, page 16,

line 7 to page 18, line 3). Evidence for this knowledge is provided by D2 (page 564, "*Materials and Methods*", right-hand column, lines 18-22 and 32-44) and the documents cited in the present application on pages 13-15.

The skilled person is also aware of the fact that a magnetic holding field as mentioned in D2 can be generated by various types of basic geometries like, for example, permanent magnets or a solenoid comprising a cylindrical body having a coil thereon. D3 (column 1, lines 10-16) also mentions Helmholtz coils, an endwise compensated solenoid whose ends are thicker than the midpoint, or separate solenoids.

4.3.4 Novelty

Considering the particular case of a solenoid comprising a cylindrical body having a single coil thereon (see above), the subject-matter of claim 1 would essentially differ from the disclosure of D2 pertaining to the transport of hyperpolarized gas within glass cells placed in the centre of a dedicated magnetic holding field of 0.3 mT (see above) in that the claimed solenoid comprises a cylindrical body having a coil thereon, the coil comprising a first coil segment, a second coil segment and a third coil segment, wherein the first and third coil segments have an increased number of wire layers with respect to the second coil segment.

The technical effect related to these differences would consist in that the claimed solenoid permits to achieve an increased region of the homogeneous holding field in

the solenoid with respect to a solenoid of the same length with a single winding and uniform current density (present application, page 26, lines 5-11; Figure 10).

Starting from D2, the object to be achieved would then consist in further reducing the effect of gradient induced relaxation (present application, page 4, lines 10-18). As already noted above, the independent claims of the main request do not mention to which extent the field homogeneity should be achieved.

4.3.5 Inventive step

D2 does not disclose a specific structure for generating the magnetic holding field of 0.3 mT. A solenoid comprising a cylindrical body having a coil thereon would, however, represent a basic solution considered by the skilled person for generating a homogeneous magnetic field with said strength (see above). The issue which thus arises is whether the claimed configuration of three coil segments with different number of wire layers may be considered obvious in view of the object of improving the field homogeneity within the solenoid.

It is known that the magnetic field generated by a solenoid is not perfectly homogeneous (D3, column 1, lines 31-34). Different solutions are known for improving the spatial homogeneity of the magnetic field.

A solution is shown in Figure 2A of D1 (column 9, line 65 to column 10, line 6), according to which additional coil windings 52 are employed at both ends

of a main solenoidal coil windings 50 "*to improve the spatial uniformity of the magnetic field*". The coil windings 52 are commingled with the main coil windings 50. A reduced spacing of the wire loops is provided at both ends of the coil structure, as it appears from Figure 2A.

Another solution already mentioned above is disclosed by D3 (column 1, lines 15 and 16) that mentions an endwise compensated solenoid whose ends are "*thicker*" than the midpoint. This geometry indicates an increased number of wire layers at both ends of the coil structure, as claimed, assuming that the same wire is used for the ends and the midpoint.
It is noted that both a reduced spacing of wire loops and an increased number of wire layers at both ends of a coil lead to a higher magnetic field which improves spatial uniformity of the field within the coil.

Yet another solution is disclosed in Figure 1 of D3 which shows a coil arrangement including three solenoids having a common axis and different geometries.

In summary, D2 concerns the use of hyperpolarized gases for MR imaging. It addresses the problem of gradient induced T_1 relaxation and underlines the need for long T_1 times to facilitate storage, transport and handling. During transport, glass cells containing the hyperpolarized gas are placed in the centre of a magnetic holding field of 0.3 mT. D2 does not disclose any particular configuration for generating the mentioned magnetic holding field. Thus, it is left to the skilled person to accomplish a configuration suitable with regard to field strength and homogeneity.

The skilled person knows about various basic configurations for producing a homogeneous magnetic field, some of which are resumed in D3 (column 1, "*BACKGROUND OF THE INVENTION*"). One of these is an endwise compensated solenoid whose ends are thicker than midpoint (column 1, lines 15-16). Such a solenoid, which is suitable for use in portable transport units, gives a clear hint at the coil of the claimed solenoid.

Therefore, the subject-matter of claim 1 of the main request does not involve an inventive step. The same would apply for the subject-matter of independent claims 24 and 39 which refer back to claim 1, because the recited features other than those of claim 1 are considered as trivial.

4.4 In conclusion, the main request is not allowable.

5. Auxiliary requests

5.1 The reasoning concerning inventive step mentioned above for claim 1 of the main request also applies to claim 1 of the auxiliary requests on file.

5.1.1 The amendments to claim 1 of the first auxiliary request simply make clear that the claimed solenoid comprises a cylindrical body having a coil thereon having first, second and third coil segments. This structure has already been considered above.

5.1.2 Claim 1 of the second auxiliary request corresponds to claim 1 of the first auxiliary request with the amendment that the shielding magnetic field is provided during transport. This is also the case according to D2.

5.1.3 Claim 1 of the third auxiliary request corresponds to claim 1 of the first auxiliary request with the amendment that the hyperpolarized gas is either ^{3}He with field strength of at least 0.7 mT or ^{129}Xe with field strength of at least 2 mT.

D2 discloses a field strength of 0.3 mT for both gases ^{3}He and ^{129}Xe. Higher field strengths like 0.7 mT and 2 mT would obviously further reduce gradient induced relaxation while remaining suitable for a portable application. Besides, the difference in field strengths does not concern the structure of the solenoid but only an operating parameter.

Moreover, the claimed open ranges of "*at least 0.7 mT*" and "*at least 2 mT*" extend to values of the magnetic field which are suitable for applications in MR imaging. Attention is drawn to the values (500 mT, 200 mT and 64 mT) mentioned by the appellant with the letter of 7 November 2007 (page 3, paragraphs 2-6). However, such values may not be suitable for use within a transport unit.

5.1.4 Claim 1 of the fourth auxiliary relates to a transport unit comprising a solenoid according to claim 1 of the main request. As stated above the solenoid does not appear to involve an inventive step. The remaining features pertaining to the transport unit as such are common in the art.

5.1.5 Claim 1 of the fifth auxiliary request corresponds to claim 1 of the first auxiliary request with the

amendment that the gas chamber holds a single patient dose of hyperpolarized gas therein.
The provision of single patient doses is common in the art.

5.2 In conclusion, the subject-matter of claim 1 of each of the auxiliary requests on file does not involve an inventive step.

Therefore, the first to fifth auxiliary requests are not allowable.

6. Appellant's arguments

With the letter of 18 July 2011 the appellant did not make any submissions on the Board's objections raised in the communication of 6 May 2011. The Board has no reason to change its view. The present decision takes up the same objections left undisputed by the appellant.

Order

For these reasons, it is decided that:

1. The appeal is dismissed.

2. The request for reimbursement of the appeal fee is refused.

The Registrar | The Chairman

R. Schumacher | B. Schachenmann