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Datasheet for the decision of 20 October 2017

Case Number: T 0739/14 - 3.2.05

Application Number: 03005337.5

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Language of the proceedings: EN

Title of invention:
Transportation and storage of ultra-high purity products

Patent Proprietor:
AIR PRODUCTS AND CHEMICALS, INC.

Opponent:
Praxair, Inc.

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step (no)

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Case Number: T 0739/14 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 20 October 2017

Appellant: (Opponent)	Praxair, Inc. 39 Old Ridgebury Road Danbury, Ct. 06810-5113 (US)
Representative:	Ivo Schwan Schwan Schorer & Partner mbB Patentanwälte Bauerstrasse 22 80796 München (DE)
Respondent: (Patent Proprietor)	AIR PRODUCTS AND CHEMICALS, INC. 7201 Hamilton Boulevard Allentown, PA 18195-1501 (US)
Representative:	Schwabe - Sandmair - Marx Patentanwälte Rechtsanwalt Partnerschaft mbB Joseph-Wild-Straße 20 81829 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 11 March 2014 rejecting the opposition filed against European patent No. 1 347 231 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	M. Poock
Members:	S. Bridge
	J. Geschwind

Summary of Facts and Submissions

I. The opponent appealed against the decision of the opposition division rejecting their opposition against European patent No. 1 347 231.

II. The opposition was filed against the patent as a whole based on Article 100(a) EPC 1973 (lack of inventive step, Article 56 EPC 1973).

III. Oral proceedings were held before the board of appeal on 20 October 2017.

IV. The appellant (opponent) requested that the decision under appeal be set aside and that the patent be revoked.

V. The respondent (patent proprietor) requested as main request that the appeal be dismissed and as auxiliary request, that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of the claims filed as auxiliary request with letter of 20 September 2017.

VI. Claim 1 of the main request (patent as granted) reads as follows:

"A system (1) for the transportation and storage of a product, which system comprises:

a) a tank (3) including a cylindrical wall section and two ends, wherein said cylindrical wall section and said two ends define a cylindrical tank periphery, and wherein the tank periphery has an interior and an exterior;

b) a recessed valve box including one or more side walls (19), a bottom wall (21) and a removable,

sealable top cover (7) which can be attached to the one or more side walls to seal the valve box, wherein the valve box side walls (19) are sealably joined to the cylindrical wall section such that the valve box extends through the cylindrical wall section into the interior of the tank periphery and is partially or totally disposed in the interior of the tank periphery; and

c) one or more valves (25, 33) disposed in the valve box, wherein each valve (25, 33) has a first and second end, wherein each first end is connected to a pipe (27, 35) which passes through a wall of the valve box for introducing product into the tank (3) or withdrawing product from the tank (3); and

d) wherein the product in the tank (3) is isolated from the atmosphere surrounding the tank (3) when the valve box is sealed;

characterized by

e) a rigid framework (5) surrounding the tank (3) and valve box,

f) wherein the framework (5) is attached to and supports the tank (3), and

g) wherein the framework (5) defines a periphery which encloses the periphery of the tank (3)."

VII. Claim 1 according to the auxiliary request differs from claim 1 according to the main request in that the following feature is added at the end of the claim:

"h) and wherein the pipe (27, 35) passes through the bottom wall (21), the bottom wall (21) being attached by plurality of bolts (23) to a bracket or ring which is part of the one or more side walls (19)."

VIII. The following documents are referred to in the present decision:

D1: US 5,211,202;
D2: US 5,996,827;

IX. The arguments of the appellant in the written and oral proceedings can be summarised as follows:

Main request

Figure 2 of document D2 discloses a cylindrical tank with outwardly extending (non-recessed) fittings 13, 15 provided with a framework around it. This constitutes the closest prior art.

The claimed system differs therefrom in that it comprises a valve box which is recessed into the tank and which can be sealed.

According to paragraphs [0028] and [0030] of the opposed patent, such recessed and sealed valve box enhances safety by ensuring that any leakage from the valve(s) within the valve box during transportation and storage is contained until the system can be transported to a safe location for repair by sealing the cover of the valve box. These benefits of a recessed and sealed valve box are completely independent of whether the tank is provided with a framework or not.

The corresponding objective problem is to enhance safety with regard to egress of leakage fluid from the tank valves into the environment.

Document D1 teaches that by providing a recessed and sealed valve box the valves can be protected from

impact and vandalism and improves emergency leak control during shipment (column 6, lines 39 to 49, column 7, lines 26 to 51 , column 29, lines 4 to 13 and 49 to 68).

Consequently, the skilled person starting from the tank with a framework of document D2, and seeking to improve safety with regard to the fittings/valves with regard to leakage and structural integrity, would have considered the teaching of document D1 with regard to the sealed and recessed valve box, thereby immediately arriving at the subject-matter of claim 1.

The arguments of the respondent do not follow the problem-solution approach (letter of 28 July 2015, point 4).

The subject-matter of claim 1 thus does not involve an inventive step.

Auxiliary request

The admissibility of the auxiliary request is not contested.

The bottom wall/cover plate of claim 1 according to the auxiliary request is not necessarily suitable for use as a manhole. Similarly, claim 1 does not require the valves to be removable with the bottom wall. The patent in suit is silent on these issues. The objective problem is thus to provide an alternative connection for the bottom wall.

Document D1 only discloses that the recessed valve box (which is labeled "*well head*") is "*secured*" to a flange forming the sidewall. Figures 6, 8, 10, 20 and 21 of

document D1 show a well head 174, 228, 276, 538, respectively, through which passes a pipe connected to a valve in the valve box.

However, the skilled person is aware that a cover plate may be welded to a flange for a non-releasable connection and that it may be connected to the flange by bolts when a releasable connection is desired. In consequence, the skilled person, when seeking to provide an access to the tank interior, would have considered securing the well heads of figures 6, 8, 10, 20 and 21 of document D1 to their respective flange by means of bolts (instead of welding) in order to make such connection releasable/detachable.

Thus, claim 1 according to the auxiliary request lacks an inventive step with respect to the combination of documents D2 and D1.

X. The arguments of the respondent in the written and oral proceedings can be summarised as follows:

Main request

Document D2 discloses a tank with a supporting framework. The fill and discharge valves protrude from the periphery of the tank outwardly are protected by the framework. This requires the framework to be larger than the tank to provide clearances and space for storing accessories (column 2, lines 29 to 33 and 61 to 64). This is contrary to the problem addressed in paragraph [0003] of the patent specification, namely that it is desirable to maximize the volume of product in tanks which are mounted in a given standard-sized structural frame. This problem is therefore not solved by the system of document D2.

Document D1 does not suggest or even consider use of a surrounding framework defining a periphery which encloses a periphery of the tank. The skilled person would conclude from document D1 that instead of providing a surrounding framework, the tank itself should be strong and that the valves can be protected in a recessed valve box. Thus no rigid framework which supports and surrounds the tank would be required. Thus document D1 does not lead the skilled person to a system comprising the framework of document D2 while disposing the valves of the tank in a recessed valve box.

Document D1 contradicts the teaching of document D2 as far as features of the tank-framework-combination are concerned. Document D1 precludes an exterior rigid framework for its tank since this would result in a loss of tank volume and hinder the ability to roll freely: document D1 teaches placing inlets and outlets in a recessed well and avoiding a rigid attached framework so that the tank can roll away from any impact. Document D2 teaches externally projecting inlets, outlets and manholes that require protection by a rigid framework while at the same time affording space for storing the accessories for converting the tank between bottom and top discharge configurations on site and within a few minutes (column 2, lines 61 to 64).

Before the claimed invention, no prior art suggested a combination of a tank and a rigid framework as specified in the characterising features e) to g) of claim 1 with a recessed valve box in which fill or discharge valves are disposed thereby combining the advantages of modular transportation and the use of standard modular shipping methods (paragraph [0025] of the patent

specification) while maximising the volume of product in the tanks (paragraph [0003] of the specification).

The skilled person starting from document D2 as the closest prior art, would not consider document D1 since this provides no useful teaching with respect to a tank-framework-combination. The skilled person is thus not motivated to modify the tank-valve framework-systems disclosed in document D2 in view of the frameless tank of document D1. The tank of document D2 is not built to form the tank of a tank vehicle. The tank is permanently arranged in its framework, as is typical for tank-framework systems. The framework is not provided for temporary use only as a means to transport the respective tank to a manufacturer for installing the tank on e.g. a vehicle. The tank is not designed to roll away from impacts, since it is surrounded by a box-shaped framework. The reasons stated in document D1 for recessing the valve box do not apply. Should the skilled person consider increasing the volume of the tank, they would rather modify the cross-sectional shape of the tank to make better use of the volume defined by the framework instead of countersinking a protruding valve box. The recessed arrangement of the valve box would, at first sight, decrease the internal volume of the tank. The skilled person would not undertake the two steps, firstly, to countersink the valve box associated with a loss of internal volume and, secondly, to expand the diameter of the tank accordingly to regain the lost internal volume and then gain additional volume. The patented solution becomes obvious only in hindsight. The subject-matter of claim 1 thus involves an inventive step.

Auxiliary request

Attaching the bottom wall to the bracket or ring of the side wall by means of bolts (23) (feature h of claim 1 according to the auxiliary request and figures 3 and 4 and paragraph [0034], [0038] and [0039] of the patent) provides the advantage of a releasable bottom wall. This bottom cover and the one or more valves disposed in the valve box may be detached and the resulting opening may be used as a manhole. Thus the tank only needs to be "*punched*" once. This is a decisive advantage for tanks for storing and transporting hazardous, high purity and ultra-high purity products. None of the prior art documents teaches such an arrangement.

The bottom walls of the various valve boxes of the tanks disclosed in document D1 are apparently welded to the respective side walls, as illustrated in the figures. Releasable covers, like man-way cover 126 (figures 3 and 4) and 466 (figure 18) are arranged in additional boxes separate from the valve box of the type described in the preamble of claim 1 of the patent. No valve pipes pass through these covers.

The consequences of feature h) of claim 1 are only immediately obvious to the skilled person from the patent and not from the prior art. The skilled person would conclude from the description of the valve pipes in the patent in suit (paragraph [0037]) that the bottom cover can be removed together with the valves and pipes. Immediate recognisability of the associated advantage is an indication for implicit disclosure but not for lack of inventive step.

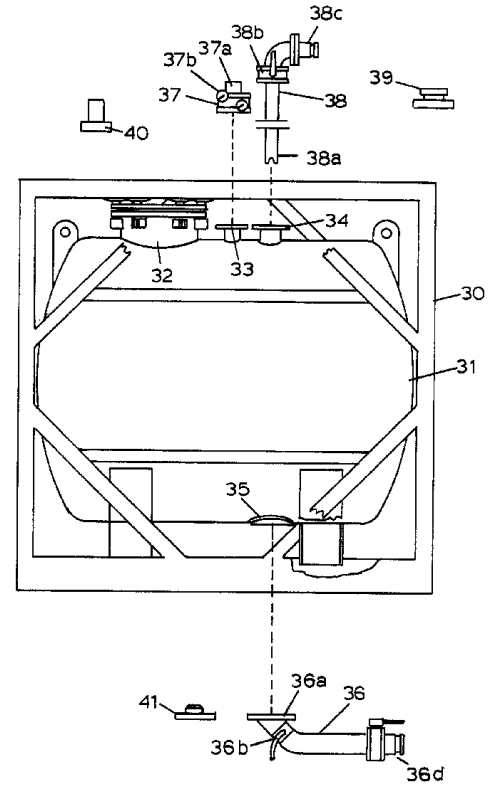
The respondent would be prepared to replace the term "*bottom wall*" in feature h) of claim 1 according to the auxiliary request with the term "*bottom cover*".

Reasons for the Decision

1. *Claim 1, main request - inventive step (Article 56 EPC 1973)*

1.1 Document D2 constitutes the closest prior art and disclose a cylindrical tank 31 provided with a framework 30 around it and having outwardly extending (non-recessed) fittings 32 to 34 (figure 3 of document D2).

FIG. 3



1.2 The subject-matter of claim 1 differs therefrom in terms of a valve box which is at least partially recessed into the tank and which can be sealed (features b) and d) of claim 1 as granted).

1.3 According to the patent in suit, the technical effect of this feature is to meet safety requirements (paragraph [0028]): to this end it "*serves three purposes*
- *it protects the valves, pipe segments, and sealable closures from externally-caused mechanical damage;*
- *it isolates from the atmosphere any leaks which may occur in the valves, pipe segments, and sealable closures; and*
- *it prevents possible contamination of the product in the tank by back-diffusion of atmospheric contaminants*" (paragraph [0043]).

These effects are independent of whether or not the tank is surrounded by a framework.

The board cannot accept the respondent's argument that these reasons for providing a recessed and sealed valve would not apply to the system of document D2. On the contrary, the objective of isolating from the atmosphere any leaks which may occur in the valves, pipe segments and sealable closures and preventing contamination of the product in the tank by back-diffusion of atmospheric contaminants do carry over to the tank system of document D2. Even though the framework of document D2 provides some protection for the exposed valves, it does not address the issue of contamination to and from the tank interior via the valves or other fittings.

1.4 The resulting objective problem is thus to enhance safety, in particular, with regard to contamination to and from the tank interior via the valves or other fittings.

1.5 Document D1 teaches that by providing a recessed and sealed valve box ("*well*") the valves can be protected

from impact and vandalism and that it improves emergency leak control during shipment (column 6, lines 39 to 49; column 7, lines 26 to 51; column 29, lines 4 to 13): "*The wells can be readily pressurized with an inert sealing fluid, if necessary, thereby providing another effective means of sealing off any leakage from a defective fitting therein*" (column 29, lines 49 to 68, underlining added by the board).

This teaching of document D1 is independent of whether the tank is provided with a framework or not. Furthermore, since the valve box of document D1 is recessed, it will not interfere with any framework around the tank. In other words, the benefits obtained by providing a recessed and sealed valve box are independent of whether the tank is provided with a framework or not. Therefore, the absence of a framework for the tank disclosed in document D1 is not a valid reason for the skilled person not to consider the teaching of document D1 concerning the benefits of a recessed sealed valve box, with regard to contamination to and from the tank interior via the valves or other fittings.

1.6 The respondent further argued in terms of the needs set out in the patent in suit in paragraph [0003]. This paragraph sets out the advantages of using standard-sized structural frames which are amenable to standard shipping methods and the desirability of safely maximizing the volume of product in the tanks.

1.6.1 This latter issue is only explained in the patent in suit in paragraph [0046] which points out that a tank in a standard ISO frame size can store considerably more product than the cylinders with capacities up to 500 liters used previously. However, merely using a larger container to store more product when required is

obvious to the skilled person. In addition, the subject-matter of claim 1 does not set out the volume of the tank or the size of the framework. The subject-matter of claim 1 thus does not necessarily achieve the objective of safely maximizing the volume of product in the tank of paragraph [0003] of the patent in suit. In consequence, this objective cannot contribute towards justifying an inventive step.

1.6.2 With respect to the former issue of using standard-sized structural frames which are amenable to standard shipping methods, document D2 concerns "*an improved tank for … storing, transporting, and handling of liquids, mixes and emulsions that will flow by gravity or under pressure. The tank is intended to be crane, and forklift, handled and comprise deck cargo and the like situations*" (column 1, lines 3 to 9). "*Tanks that may be transferred between vessels and between vessels and shore have protective framework that provides lifting, handling, stackability, and barrier functions*" (column 1, lines 23 to 25). In consequence, the framework disclosed in document D2 already provides the advantage of using standard-sized structural frames which are amenable to standard shipping methods. This is one of the reasons why document D2 is considered to disclose the closest prior art.

1.6.3 Thus the needs set out in paragraph [0003] of the patent in suit cannot contribute towards justifying an inventive step of the subject-matter of claim 1.

1.7 Granted claim 1 combines two independent features, namely,

- a framework 5 surrounding the tank 3 - for ease of transportation (document D2) and

- a recessed sealable valve box 13 - to avoid contamination (document D1).

Each of these features is known in the prior art as such for its respective advantages. The skilled person does not require an inventive step when combining independent features used for their respective known advantages.

The skilled person starting from a conventional tank with a framework, such as the one shown in document D2 and seeking to improve safety with regard to contamination to or from the tank interior via the valves or other fittings would consider the teaching of document D1 with regard to the benefits of a sealed and recessed valve box and thereby immediately arrive at the subject-matter of claim 1.

In consequence, the subject-matter of claim 1 does not involve an inventive step (Article 56 EPC 1973).

2. *Claim 1, auxiliary request - inventive step (Article 56 EPC 1973)*

2.1 Claim 1 according to the auxiliary request includes feature h) with further details concerning the bottom wall of the recessed valve box.

2.2 The subject-matter of claim 1 according to the auxiliary request thus further differs from the system of document D2 (see point 1.2 above) in term of feature h).

2.3 Feature h) is based on the disclosure of paragraphs [0034], [0038] and [0039] of the patent. Paragraph [0034] essentially corresponds to the wording of feature h). Paragraphs [0038] and [0039] refer to

figure 4 which only shows part of the pipe extending below the bottom wall from one of the valves.

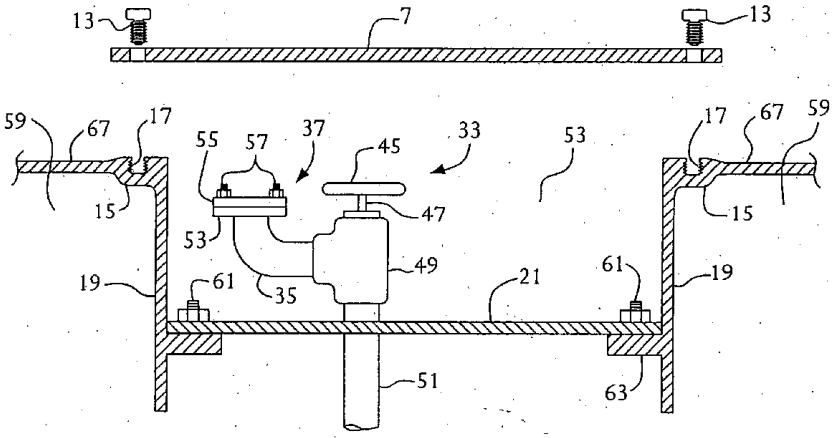


FIG. 4

The patent further discloses that "*additional valves 33 and 39 each have a downward-oriented port connected to a section of pipe which passes through bottom wall 21 into the interior of tank 3, and this section of pipe is welded to bottom wall 21*" (column 8, lines 13 to 17) and that "*the downward-oriented port of valve 33 may be connected to a section of pipe which passes downward through bottom wall 21 to a point near the bottom of the interior of tank 3. […] Each of the downward-oriented ports of valves 25 and 39 may be connected to a piping assembly which passes downward through bottom wall 21 and into the upper portion of tank 33*" (column 8, lines 20 to 29). Contrary to the argument of the respondent, the board does not consider this to be sufficient to conclude that the bottom wall and the one or more valves disposed in the valve box can be necessarily detached together or that the resulting opening is necessarily suitable for use as a manhole. The patent in suit is silent on these issues.

In addition, the subject-matter of claim 1 according to the auxiliary request does not require the tank to have only one opening with the dual function of providing

access to the recessed, sealable valve box and being suitable for use as a manhole.

In consequence, the advantages advanced by the respondent do not have a basis in the patent in suit.

Thus the technical effect of additional feature h) is merely to specify the manner in which the pipes are arranged in the recessed, sealable valve box and provide a detachable/releasable bottom wall.

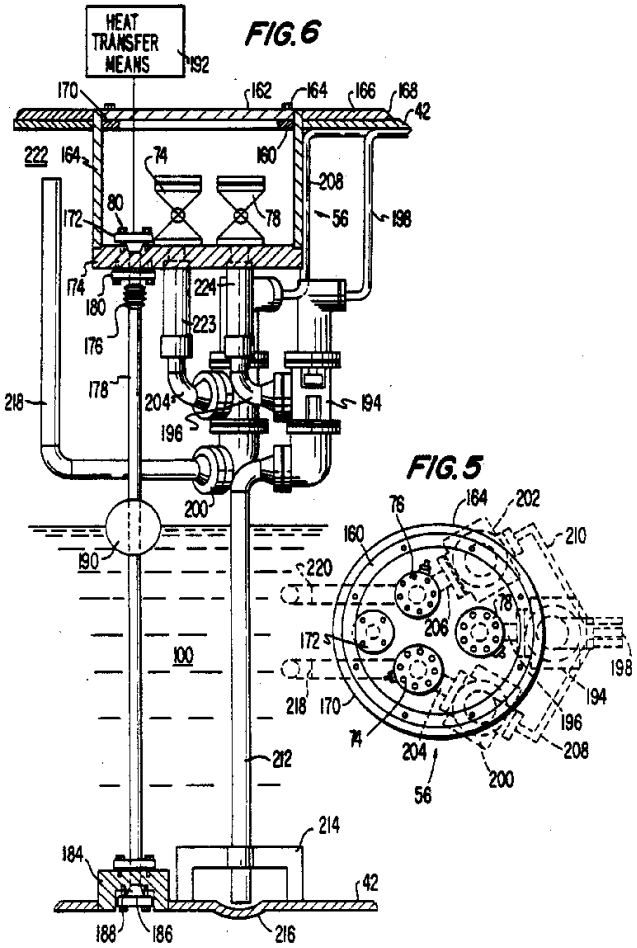
This effect is not related to either the framework or the reasons for providing a partially recessed sealable valve box and there is no synergy therewith.

2.4 The corresponding objective (partial) problem is to specify the manner in which the pipes are arranged in the recessed, sealable valve box and to specify a releasable means of attaching the bottom wall.

2.5 The reasons for considering document D1 carry over from the main request, as set out above. The skilled person will thus also consider the teaching of document D1 with respect to the objective (partial) problem of arranging the pipes in the recessed, sealable valve box and attaching the releasable bottom wall.

2.5.1 Document D1 discloses a "*fluid valve well 56, which is shown in FIGS. 5 and 6, [and which] contains two vapor valves 74 and 76 flanged to the bottom of the well, a liquid valve 78 also flanged to the bottom of the well …*" (column 9, lines 36 to 42). "*The internal configuration of fluid valve well 56 and its connected mechanisms and pipings is shown in elevation in FIG. 6 and in plan view in FIG. 5*" (column 12, lines 6 to 8). "*In a preferred embodiment an internally mounted, remotely*

controlled (liquid) valve and actuator 194 is positioned in the liquid education [sic] line 196 from the external liquid valve 78" and "*In this embodiment internally mounted, remotely controllable (vapor) valves and actuators 200 and 202 are similarly provided on vapor eduction lines 204 and 206 for the external vapor valves 74 and 76, respectively*" (column 13, lines 14 to 17 and 20 to 24).



Therefore, document D1 discloses that the pipes (liquid eduction line 196; vapour eduction lines 204 and 206) extending from the valves (external liquid valve 78; external vapour valves 74, 76) pass through the bottom wall 174 of the well (figures 5 and 6).

Arranging the pipes to pass through the bottom wall is already known from document D1 and thus cannot contribute to an inventive step.

2.5.2 Insofar as the manner of attaching the bottom wall (i.e. "*well head*") is concerned, document D1 only discloses that "*the well head 538 […] is secured to the lower ends of the well shell 518*" (column 24, lines 1 to 3). Thus, document D1 leaves it up to the skilled person to select a suitable manner of securing the bottom wall to the lower ends of the well shell.

The skilled person is aware as part of his common general knowledge that a cover plate may be secured to the one or more side wall or walls by conventional means such as welding or by means of a flange and bolts whose respective advantages (e.g. in terms of forming a releasable connection or not) are also known.

Consequently, the skilled person, when seeking to provide a releasable means of securing the bottom wall to the side walls, would have necessarily considered securing the bottom wall ("*well head*") 174 of figure 6 of document D1 by conventional means such as by a plurality of bolts to a bracket or ring which is part of the one or more side walls. Such a conventional solution does not require an inventive step, especially as the advantage of a releasable connection can be readily contemplated in advance.

2.5.3 In consequence, the subject-matter of claim 1 according to the auxiliary request lacks an inventive step with respect to the combination of documents D2 and D1.

Furthermore, the board considers that this finding would not be affected if the term "*bottom wall*" had

been replaced by the term "*bottom cover*" in claim 1 of the auxiliary request, because the same reasoning applies equally to both.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

N. Schneider M. Poock

Decision electronically authenticated