The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RONALD CAUDILL,
ROBERT BECK, GARY NEWMAN,
and LIM HONORIO

Appeal 2007-1112
Application 10/692,116
Technology Center 3700

Decided: 19 July 2007

Before FRED E. McKELVEY, *Senior Administrative Patent Judge*, and SALLY GARDNER LANE, and MICHAEL P. TIERNEY, *Administrative Patent Judges*.

LANE, *Administrative Patent Judge*.

DECISION ON APPEAL

I. Statement of the case

This ex parte appeal under 35 U.S.C. § 134(a) is from a rejection of claims 1-16 of application 10/692,116.

We affirm the Examiner's rejections.

We have jurisdiction under 35 U.S.C. § 6(b).

The application was filed on 23 October 2003. The real party in interest is said to be Harsco Technologies Corporation (Appeal Br. at 1).

The following U.S. patents are relied upon by the Examiner:

Name	Patent No.	Issue Date
Haldenby	US 5,474,846	Dec. 12, 995
Seal et al.	US 5,822,838	Oct. 20, 1998
Luttmann et al.	US 6,244,020	Jun 12, 2001

The following grounds of rejection are appealed:

Claims 1, 2, 6-9, and 14-16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Haldenby in view of Seal et al. (Seal).

Claims 3-5 and 10-13 are rejected under 35 U.S.C. §103(a) as being unpatentable over Haldenby in view of Seal and Luttmann et al. (Luttmann).

In this decision, we refer to the applicants Caudill et al. as "Caudill".

II. Findings of fact

The record supports the following findings of fact as well as any other findings of fact set forth in this decision by a preponderance of the evidence.

1. The "invention relates to high pressure gas cylinders and, more specifically, to aluminum cylinders having a plastic interior coating." (Specification at 1).
2. The cylinders are said to be "especially adapted to be used as a self-contained breathing apparatus, a home oxygen therapy cylinder, a commercial aviation cylinder, a fuel storage cylinder in

natural gas and hydrogen vehicles, and with military and aerospace applications." (Specification at 2).

3. Caudill acknowledges that prior art cylinders include "metal shell over-wrapped with composite materials" and "plastic shell over-wrapped with composite materials." (Specification at 1).
4. Caudill recognizes that "[s]teel cylinders have been wrapped with composite materials to allow thinner, lighter shells while maintaining their strength" and "steel cylinders have included independent plastic linings to prevent reaction with stored fluids." (Specification at 1).
5. According to the Specification, "[i]t has been determined that when an [sic] composite/aluminum cylinder is combined with a plastic coating, the total weight of the cylinder is reduced, compared with the all metal cylinders, and the cycle life is significantly extended…between about 50% to 150%." (Specification at 1).
6. The composite is identified as being "typically carbon or aramid and fiberglass filaments held within an epoxy resin matrix." (Specification at 2).
7. Claim 1, below, is representative of claims 1, 2, 6-9, and 14-16, rejected over the combination of Haldenby and Seal.

> 1. A gas cylinder comprising:
>
> an aluminum shell having an outer side and an inner side defining a storage space;
>
> a composite wrap disposed about said aluminum shell; and
>
> a plastic coating disposed on said inner side.

8. Claim 3, below and which depends from claim 2, also below, is representative of claims 3-5 and 10-13 rejected over the combination of Haldenby, Seal, and Luttmann.

2. The gas cylinder of Claim 1, wherein said plastic coating is heat bonded to said inner side.

3. The gas cylinder of Claim 2, wherein said plastic coating is a polyethylene copolymer.

9. Haldenby teaches metal, and particularly steel, cylinders for containing gases and liquids wherein a uniform, relatively thick layer of a polymeric material is applied to the interior surface of the cylinders such that none of the gas or liquid comes into contact with the metal. (Haldenby at 5-15 and 49-61).

10. Preferred coating materials are said to be polyolefins such as polyethylene. (Haldenby at 2:41-46).

11. Haldenby further notes that "[i]t is known to coat the interior of metal cylinders with a plastic coating to prevent attack by reactive gases." (Haldenby at 22-25).

12. In discussing the background of its invention, Seal states that "there are basically two primary technologies" used for "lightweight, high-pressure gas containment" one of which is "graphite/epoxy composite with a yielding aluminum liner." (Seal at 1:39-41).

13. Seal states that these composite overwraps "offer very high strength-to-weight ratios and are ideal for making lightweight pressure vessels." (Seal at 1:24-27).
14. According to Seal, the overwraps "have relatively high permeability and cannot contain high pressure liquids or gases or low pressure gases for extended periods of time" and therefore "must have a liner to prevent leakage." (Seal at 1:27-31).
15. Seal notes that one of the two "primary technologies" is "graphite/epoxy composite with a yielding aluminum liner". (Seal at 1:39-42).
16. The invention of Seal is described as a composite overwrapped pressure vessel made of a titanium alloy such as titanium alloyed with aluminum. (Seal at 2:6-19).
17. The overwrap "can comprise a graphite/epoxy composite." (Seal at 2:64-68).
18. An object of Seal is to provide a cylinder that is strong while being low in weight. (Seal at 3:16-26).
19. Luttmann states that its "invention relates to a process for producing a filled, sealed and sterilized container [such as a metal can] comprising at least one can body and at least one lid body, which can be opened without the aid of a tool…" (Luttmann at 1:11-15).
20. According to Luttmann, "[a] particular problem occurs in containers where, after filling and sealing, the contents must be preserved by sterilization [since] the internal pressure within the

can resulting from the elevated sterilization temperatures must be withstood by the container." (Luttmann at 1:29-33).

21. Luttmann notes that "[t]he connection between the lid body and the can body, in particular, constitutes a weak point in the case of such easy open systems." (Luttmann at 1:33-35).

22. In a preferred embodiment of the invention, the inside of the can is coated with a copolymer of polypropylene and polyethylene. (Luttmann at 4:3-7). While Luttmann uses the language copolymer of polypropylene and polyethylene, what Luttmann probably means is a copolymer of propylene and ethylene, the monomers used to make the described copolymer. For consistency, we will use Luttmann's language in this opinion, understanding Luttmann to be describing a copolymer of propylene and ethylene.

23. According to Luttmann this coating "undergoes deformation and consequently forms a sealing closure of the container interior [which is] particularly advantageous on sterilizing the filled sealed can, so as to ensure that during sterilization the can is not made to leak due to the pressure occurring in the interior thereof." (Luttmann at 4:8-14).

III. Issue

1. Whether Caudill has shown that the Examiner's rejection of claims 1, 2, 6-9, and 14-16 under 35 U.S.C. §103(a) as being unpatentable over Haldenby in view of Seal et al. is in error based on an improper combination of the teachings of the references?

2. Whether Caudill has shown that the Examiner's rejection of claims 3-5 and 10-13 a under 35 U.S.C. §103(a) as being unpatentable over Haldenby in view of Seal and Luttmann et al. is in error based on an improper combination of the teachings of the references?

IV. Legal principles

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 USC § 103(a).

In determining whether claimed subject matter would have been obvious we take into consideration (1) the scope and content of the prior art, (2) any differences between the claimed invention and the prior art, (3) the level of skill in the art, and (4) any relevant objection evidence of obviousness or non-obviousness. *KSR Int'l Co. v. Teleflex, Inc.,* 127 S.Ct. 1727, 1730, 82 USPQ2d 1385, 1388 (2007), *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966). The references of record may be relied upon to show the level of skill in the art. *In re GPAC*, 57 F.3d 1573, 1579, 35 USPQ2d 1116, 1121 (Fed. Cir. 1995).

There need not be explicit suggestion in the prior art to combine the teachings of prior art references. As stated by the Supreme Court, "[t]he

obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents." *KSR*, 127 S. Ct. at 1741, 82 USPQ2d at 1396,. Therefore, "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR*, 127 S.Ct. at 1739, 82 USPQ2d at 1395.

"If there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." *KSR*, 127 S.Ct. at 1727, 82 USPQ2d at 1386.

We have considered only those arguments made before us in coming to our decision. Arguments not made are waived. See 37 C.F.R. § 41.37(c)(1) (vii) (2004).

V. Analysis

Haldenby and Seal

Claims 1, 2, 6-9 and 14-16 are rejected over the combination of Haldenby and Seal.

Caudill acknowledges that metal cylinders overwrapped with composite materials and plastic cylinders overwrapped with composite materials were known in the art. (FF[1] 3). Caudill further acknowledges that lining metal cylinders with plastic linings was known in the art. (FF 4). However, according to Caudill "there has not been a need to combine these two technologies" since the composite/aluminum cylinders and the

[1] Finding of fact.

composite/plastic cylinders share the advantage of being light. (Specification at 1).

The Examiner relies upon Haldenby to show that it was known to line metal cylinders with plastic. The Examiner acknowledges that Haldenby does not disclose an aluminum cylinder or a composite material overwrap as required by the claims. (Ex. Ans. at 3). However, the Examiner relies upon Seal to show an aluminum cylinder having a composite overwrap.

Caudill concedes that "the Examiner has identified one reference that discloses the use of a plastic coating on the inner side of a steel shell (*Haldenby)* and another reference that discloses an aluminum shell having a composite wrap (*Seal*)." (Br. at 6). Caudill argues, however, that the Examiner "has not…indicated where the references teach or suggest such a combination and, as such, the Examiner has not presented a *prima facie* case of obviousness." (Br. at 6).

We disagree. As demonstrated by Haldenby and Seal, as well as that prior art discussed in the Specification, the scope of the prior art includes cylinders for containing gases where the cylinders are aluminum, where the cylinders are lined with plastic, and where the cylinders are wrapped with a composite material. We agree with the Examiner that it would have been obvious to take the cylinder of Haldenby, substitute aluminum, known to be a light weight metal as compared to steel, provide an overwrap and therefore form a lighter weight cylinder (one of the advantages discussed in Seal (See FF 13) . To the extent Caudill is arguing that there is no explicit suggestion in the references to combine the prior art teachings of Haldenby and Seal, Caudill's argument is misplaced since there is no requirement that an

explicit suggestion be present for obviousness to exist. In this case, Caudill has done nothing more than combine "familiar elements according to known methods" without demonstrating that any unpredictable results were obtained. See *KSR*, , 127 S.Ct. at 1739, 82 USPQ2d at 1395.

Caudill argues that the Examiner has provided no sufficient reason to combine Haldenby and Seal. Caudill argues that the Examiner has not explained "why those skilled in the art of designing high pressure steel cylinders for storing hazardous chemicals in steel cylinders and used in manufacturing would find it obvious to switch to an aluminum shell upon reading the *Seal* reference." (Reply Br. at 4). However, as explained by the Examiner, gas containing cylinders are discussed in both Haldenby and Seal. Haldenby discusses metal cylinders and steel cylinders in particular, lined with plastic. The Examiner explains that one skilled in the art would have reason to select a light weight metal such as aluminum for the Haldenby cylinder and to use an overwrap having a high "strength to weight ratio" for the purpose of reducing the weight of the cylinders while maintaining the necessary strength. (Ex. Ans. at 5-6).

Caudill argues that the cylinders of Haldenby and the cylinders of Seal are used in different environments and thus one skilled in the art would not be motivated to combine the two. (Reply Br. at 5). Both Haldenby and Seal discuss cylinders used for storing gases. (FFs 9 and 12). Thus, we do not find Caudill's argument persuasive.

Finally, Caudill argues that a plastic lining might not be necessary if the metal selected is aluminum. (Reply Br. at 4). Haldenby notes that plastic liners are used on the interior of "metal cylinders" to prevent attack

by reactive gases. (FF 11). Caudill has directed us to no evidence establishing that aluminum is a metal that would not be subject to attack by reactive gases.

Haldenby, Seal, and Luttmann

Claims 3-5 and 10-13 are rejected over the combination of Haldenby, Seal, and Luttmann. These claims require that the plastic liner is a polyethylene copolymer. Haldenby discloses a liner that is a polyethylene polymer but does not disclose a copolymer.

The Examiner relies upon Luttmann which discloses lining a container, such as a metal can, that is lined with, e.g., "a copolymer of polypropylene and polyethylene." (FF 22). According to the Examiner, "[i]t would have been obvious to modify the coating [of Haldenby] ….in order to get the benefit of another plastic material in addition to the benefit of polyethylene." (Ex. Ans. at 4).

Haldenby and Luttmann each disclose metal cylinders for containing liquid material. As explained by the Examiner, the cylinders of Haldenby and the cylinders of Luttmann are designed to withstand pressure exerted from their contents. (Ex. Ans. at 6). The Examiner's reasoning that it would be obvious to use a plastic liner that was used in the cylinder of Luttmann as the polymeric material to be used in the cylinder of Haldenby is sound. We note that Haldenby generally calls for any suitable polymeric material that would prevent the cylinder contents from contacting the metal portion of the cylinder and gives a polyethylene polymer as an example of the material. Luttmann discloses a polypropylene/polyethylene copolymer liner material that prevents the cylinder contents from contacting the metal portion of the

cylinder. One skilled in the art would recognize that the liner material of Luttmann would function to prevent contact between the cylinder contents and the metal portion of the cylinder as called for by Haldenby. In other words, Caudill has done nothing more than use a known material for the purpose of having it achieve one of its known functions without directing us to any evidence establishing that an unpredictable result was achieved.

Considering the scope and the content of the prior art to Haldenby and Luttmann, we agree with the Examiner that it would have been obvious to one skilled in the art to use a polyethylene copolymer as the plastic liner of the cylinder taught by Haldenby and Seal. We conclude that it would have been obvious to combine the teachings of the references cited and arrive at the claimed invention.

VI. Order

Upon consideration of the record and for reasons given, it is

ORDERED that the Examiner's rejection of claims 1, 2, 6-9, and 14-16 under 35 U.S.C. §103(a) as being unpatentable over Haldenby in view of Seal et al. is AFFIRMED;

FURTHER ORDERED that the Examiner's rejection of claims 3-5 and 10-13 under 35 U.S.C. §103(a) as being unpatentable over Haldenby in view of Seal and Luttmann et al. is AFFIRMED; and

FURTHER ORDERED that no time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1) (iv) (2006).

AFFIRMED

ECKERT SEAMANS CHERIN & MELLOTT, LLC
600 Grant Street, 44th Floor
Pittsburgh, PA 15219