

**THIS OPINION WAS NOT WRITTEN FOR PUBLICATION**

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 14

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte STEPHEN P. RITTMUELLER, J. ADIN MANN,  
DAVID K. HOLGER and DOUGLAS E. JOHNSON

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Appeal No. 98-2325  
Application No. 08/546,116<sup>1</sup>

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ON BRIEF

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Before McCANDLISH, Senior Administrative Patent Judge, ABRAMS  
and GONZALES, Administrative Patent Judges.

McCANDLISH, Senior Administrative Patent Judge.

**DECISION ON APPEAL**

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<sup>1</sup> Application for patent filed October 20, 1995.

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This is a decision on an appeal from the examiner's final rejection of claims 1 through 7. No other claims are pending in the application.

The claimed invention relates to a central vacuum cleaner having a muffler (20) communicating with an exhaust air flow pipe (14). According to claim 1, the only independent claim on appeal, the muffler comprises a muffler pipe (30) and a foam liner (40) disposed in the muffler pipe. Claim 1 recites that inner surface of the liner is substantially flush with an inlet and an outlet of the muffler pipe<sup>2</sup>. Claim 1 also recites that the foam liner has "a minimum length sufficient to achieve substantial exhaust air flow noise reduction" (emphasis added)<sup>3</sup>.

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<sup>2</sup> Contrary to the implications of this claim limitation, the inner peripheral surface of the annular liner is not flush with inner surfaces of the inlet and outlet ends of the muffler pipe 30 itself. Instead, the inner surface of the liner is described in the specification as being flush with the inner surfaces 32e and 34e of inlet and outlet end cap tubes 32 and 34 which are joined to the muffler pipe 30. More suitable claim language would be in order in the event of further prosecution before the examiner.

<sup>3</sup> With regard to this limitation, we note that the word "substantial" is a word of degree which may raise a question of indefiniteness under 35 U.S.C. § 112, second paragraph. Note Seattle Box Co. v. Industrial Crating & Packing Inc., 731 F.2d 818, 826, 221 USPQ 568, 574 (Fed. Cir. 1984). In present case, however, appellants' specification has certain guidelines for  
(continued...)

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A copy of claim 1, which is illustrative of the subject matter at issue, is appended to this decision.

The following references are relied upon by the examiner as evidence of obviousness in support of his rejections under 35 U.S.C. § 103:

Cannan et al. (Cannan) 1975	3,882,961	May 13,
Williams 1977	4,015,683	Apr. 5,
Belley 1988	4,759,422	Jul. 26,
Japanese patent application <sup>4</sup> 1978 (Sakaki)	53-113173	Oct. 3,

Claims 1 through 4, 6 and 7 stand rejected under 35 U.S.C. § 103 as being unpatentable over Belley in view of Sakaki and Williams, and claim 5 stands rejected under 35 U.S.C. § 103 as being unpatentable over the references applied in the

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<sup>3</sup>(...continued)  
measuring the degree of this term. In particular, appellants' specification indicates on page 3 that a muffler of greater length would gain "little more in noise reduction," an example being a reduction of about 17 db from a value of about 80 db.

<sup>4</sup> Translation attached.

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rejection of claim 1 above and further in view of Cannan. Reference is made to the examiner's answer for the complete details of these rejections.

With regard to claim 1, the examiner concludes in substance that the teachings of Sakaki would have made it obvious to provide Belley's exhaust air muffler 18 with a foam liner having an inner surface which is substantially flush with the inner surfaces of the inlet and outlet ends of the muffler. The Williams patent is also cited for its teaching of utilizing a foam liner in an exhaust air muffler for reducing noise caused by flow of exhaust air in a vacuum sweeper.

We have carefully considered the issues raised in this appeal together with the examiner's remarks and appellants' arguments. As a result, we conclude that the § 103 rejection of claims 5 and 6 cannot be sustained. However, we will sustain the § 103 rejection of claims 1 through 4 and 7, although not for all of the reasons stated by the examiner.

Considering first the § 103 rejection of claim 1, the Belley reference discloses a central vacuum cleaner system having a motor-driven compressor 14 in a central vacuum chamber housing. The central housing is connected by an

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exhaust air outlet pipe 16 to the inlet end of an exhaust air muffler 18. Muffler 18 is described in the Belley specification as being a "conventional known muffler" (column 1, line 63) for attenuating noise due to the exhaust air flow from the central unit. Other than stating that the exhaust air muffler is "conventional" the Belley specification does not describe any of the internal noise-absorbing components in the muffler. Appellants do not contest these findings.

Admittedly, Belley lacks an express teaching of a noise-absorbing liner in the exhaust air muffler as argued by appellants. The Sakaki reference, however, teaches a vacuum cleaner muffler for reducing noise due to exhaust air flow from the vacuum cleaner unit. According to Sakaki's specification, the exhaust air muffler is advantageously provided with a liner 2 (described as a tube in the accompanying translation) of suitable noise-absorbing material, such a urethane foam, in an elongated muffler pipe between the inlet and outlet ends of the muffler.

Based on the prior art evidence before us, foam liners, particularly polyurethane foam liners, were well known in the muffler art at the time of appellants' invention as evidenced

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not only by Sakaki, but also by Belley and Williams. Williams expressly recognizes the advantageous utilization of a polyurethane foam liner in an exhaust air muffler for a vacuum unit for reducing air exhaust noise (see column 2, lines 22-26). The Belley patent itself also recognizes the advantageous utilization of a noise-absorbing polyurethane liner in a muffler, albeit in a silencer 22 for the motor-cooling fan 20 in the central vacuum cleaning unit.

In light of the foregoing evidence, it follows that the advantages of utilizing noise-absorbing foam liners in air exhaust liners mufflers for reducing noise due to air flow were known in the art at the time of appellants' invention, thus providing the motivation or suggestion for one of ordinary skill in the art to provide Belley's exhaust air muffler 18 with a foam, noise-absorbing liner. In this regard, the skilled artisan is presumed to know something more about the art than what the references expressly disclose. See In re Jacoby, 309 F.2d 513, 516, 135 USPQ 317, 319 (CCPA 1962). Thus, contrary to appellants' argument regarding a lack of suggestion on page 3 of the brief, we share the examiner's view that it would have been obvious to provide Belley's

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exhaust air muffler 18 with a foam liner as taught by Sakaki for the reasons stated supra.

With regard to the limitation pertaining to the flush relationship of the liner's inner surface to the inner surfaces of the muffler's inlet and outlet, Sakaki expressly recognizes the noise-reducing advantage of locating the liner's inner surface (d1) such that it is aligned or "flush" (to use appellants' language) with the inner surfaces (d2) of the muffler's inlet and outlet ports. It therefore would have been obvious to provide such a flush relation in the muffler to be utilized in place of Belley's exhaust air muffler 18.

With regard to the claim limitation pertaining to the "minimum length" of the liner, it would have been expected and therefore obvious to provide the liner (which is the noise-reducing component in the muffler) with a length that is at least long enough to achieve a substantial noise reduction inasmuch as the fundamental purpose of such a muffler is to reduce the noise as much as practically possible. Appellants' remarks (see page 5 of the brief) about the failure of a second Sakaki publication (identified as application No. 52-31831 on page 4 of the brief) to suggest the claimed liner

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length is unavailing inasmuch as this reference is not relied upon by the examiner in his answer to support the rejection of the appealed claims. Furthermore, the recitation that the liner is required to have a "minimum length" for achieving the stated noise reduction does not exclude liners of greater lengths as appellants seem to suggest in their arguments.

In view of the foregoing, we are satisfied that the combined teachings of the Belley, Sakaki and Williams references would have suggested the subject matter of claim 1 to one of ordinary skill in the art to warrant a conclusion of obviousness under the test set forth in In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). Accordingly, we will sustain the § 103 rejection of claim 1.

We will also sustain the § 103 rejection of claim 2 since the patentability of this claim has not been separately argued with any degree of specificity. See In re Nielson, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987). In any event, Sakaki expressly teaches the claimed end cap construction for the self-evident purpose of providing a diametrically enlarged liner-receiving attenuating chamber to render such a construction obvious within the meaning of §

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103. It will be noted that the language in claim 2 is broad enough to encompass end caps which are unitary with the muffler pipe.

With regard to claim 3, we also share the examiner's view that it would have been obvious to make the claimed muffler parts from plastic. Appellants have not contested the examiner's findings in the first full paragraph on page 6 of the answer. We are convinced that at the time of appellants' invention, those skilled in the muffler art would have been aware of the beneficial results stemming from parts made of plastic as opposed to other materials. Accordingly, we will also sustain the § 103 rejection of claim 3.

With regard to claim 4, the beneficial results stemming from an open cell foam structure to attenuate noise was known in the muffler art prior appellants' invention as evidenced by Belley's express suggestion of such a cell structure for making the foam liner used in the silencer 22. We therefore agree with the examiner that it would have been obvious to utilize an open cell structure for the muffler's foam liner. Accordingly, we will also sustain the § 103 rejection of claim 4.

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With regard to claim 7, the examiner concedes that the applied references do not disclose the claimed dimensions of the liner. However, it is well settled that where patentability is predicated upon some range or other variable, such as numerical values in the present case, the applicant must show that such variables are critical by establishing that the claimed values achieve unexpected results. See In re Haung, 100 F.3d 135, 139, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996), In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-1937 (Fed. Cir. 1990) and In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

In the present case, appellants have not demonstrated that the numerical values recited in claim 7 produce unexpected results or are critical in any other sense. Accordingly, we will sustain the § 103 rejection of claim 7.

With regard to claim 6, Williams teaches a polyester polyurethane liner, not a polyether polyurethane liner. Polyether polyurethane is to be distinguished from polyester polyurethane. Accordingly, we must reverse the § 103 rejection of claim 6.

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With regard to claim 5, appellants have recognized that a pore density of 65 pores per linear inch renders the foam liner effective for noise reduction under high velocity air conditions (see page 4 of appellants' specification). Cannan does not recognize such an effect of the pore density for polyurethane foam. Instead, Cannan teaches an exhaust air muffler in which the pore densities of multiple polyurethane foam layers in an air filter progressively increase from the inlet end of the filter to the outlet end of filter. In Cannan's preferred embodiment, an intermediate layer is provided with a pore density of 65 pore per linear inch. However, we agree with appellants that the arbitrary selection of this intermediate pore density for modifying Sakaki's tubular sound-attenuating liner is based on hindsight knowledge of appellants' teachings. Hindsight analysis, however, is clearly improper. In re Deminski, 796 F.2d 436, 443, 230 USPQ 313, 316 (Fed. Cir. 1986). Accordingly, we must also reverse the § 103 rejection of claim 5.

The examiner's decision rejecting the appealed claims is affirmed with respect to claims 1 through 4 and 7, but is reversed with respect to claims 5 and 6.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

**AFFIRMED-IN-PART**

HARRISON E. McCANDLISH	)	
Senior Administrative Patent Judge	)	
)	)	
	)	
	)	
	)	BOARD OF PATENT
NEAL E. ABRAMS	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
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JOHN F. GONZALES	)	
Administrative Patent Judge	)	

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**APPENDIX**

1. A central vacuum cleaner having a muffler communicated in air flow relation to an exhaust air flow pipe, said muffler comprising an elongated muffler pipe having an inlet and outlet and a foam liner disposed in said muffler pipe, said foam liner having an inner surface that is substantially flush with inner surfaces of said inlet and outlet, said foam liner having a minimum length sufficient to achieve substantial exhaust air flow noise reduction.