

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 DONALD E. ARMY, JR.,
DOUGLAS L. CHRISTIANS
and FREDERICK PEACOS, III

Appeal 2006-1849
Application 10/387,139
Technology Center 3700

Decided: November 14, 2006

Before GARRIS, WARREN, and WALTZ, *Administrative Patent Judges*.
GARRIS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal involves claims 1, 4, 9 and 10. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 134.

We AFFIRM.

INTRODUCTION

The claims are directed to an air generation unit having two air cycle machines suitable for use on an aircraft wherein each air cycle machine preferably has two turbines (Specification ¶ [0001]). Claim 1 is illustrative:

1. An air generation unit comprising:

a pressurized air source providing air;

first and second air cycle machines fluidly connected to said pressurized air source for receiving the air, said first and second air cycle machines including a compressor compressing the air to provide compressed air, and at least one of said air cycle machines including first and second turbines with said first turbine expanding the compressed air to a first conditioned air having a first temperature, and said second turbine expanding the first conditioned air to a second conditioned air having a second temperature lower than said first temperature; and

a heat exchanger interconnecting said first and second air cycle machines, said heat exchanger cooling the air and the compressed air respectively from said pressurized air source and said compressor of both of said first and second air cycle machines.

The Examiner relies on the following prior art references as evidence of unpatentability:

Christians	US 5,704,218	Jan. 6, 1998
Hipsky	US 6,257,003 B1	Jul. 10, 2001

The rejection as presented by the Examiner is as follows:

1. Claims 1, 4, 9 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Christians in view of Hipsky.

Rather than reiterate the respective positions advocated by the Appellants and by the Examiner concerning this rejection, we refer to the Brief and Reply Brief and to the Answer respectively for a complete exposition thereof.

OPINION

Appellants do not argue the claims separately. Rather, Appellants broadly argue the combination of Christians with Hipsky. Accordingly, we choose claim 1, the only independent claim on appeal, as a representative claim on which to render our decision.

§ 103(a) REJECTION OVER CHRISTIANS IN VIEW HIPSKY

The Examiner rejected claim 1 under § 103(a) over Christians in view of Hipsky (Answer 3). The Examiner found that Christians teaches substantially all of claim 1, except “using two turbines with the second [turbine] receiving the expanded air from the first turbine” (Answer 3). However, the Examiner found that Hipsky teaches “this feature to be old [i.e., sending the conditioned air of a first turbine to a second turbine] in the air cycle art” (Answer 3). The Examiner concluded that it would have been obvious based on the teaching of Hipsky to modify Christians’ integrated environmental control system to use two turbines with the second turbine receiving expanded air from the first “to achieve a colder temperature than is attainable using one turbine, and improving the control of the output temperature by controlling the amount of air which enters the second turbine and to permit removal of water from a cooled stream prior to final cooling” (Answer 3).

Appellants argue lack of motivation to modify the air cycle machines in Christians' integrated environmental control system to include two turbines as taught by Hipsky (Br. 6). Appellants argue that there must be "some need in Christians that would cause one of ordinary skill to modify Christians to use the two turbines of Hipsky" (Br. 6). Based on the Examiner's motivation statement in the rejection (Answer 3), Appellants argue that the Examiner must establish that Christians needs a colder final temperature or excess water removal (Br. 6).

Appellants further argue that the Examiner's argument is flawed in the determination that icing "will occur in Christians if the final temperature is the same as Hipsky" (Br. 6). Specifically, Appellants contend that "there is no condenser icing problem in Christians, and . . . the Examiner's stated problem [i.e., condenser icing] is conjecture and nowhere supported in the references" (Br. 6).

Appellants argue that Christians already provides a solution to the icing problem, that is, using bypass control valve 152 to provide heated air to melt any ice (Br. 6-7). Regarding the Examiner's finding that icing "will occur" in the condenser, Appellants argue neither Christians nor Hipsky provides the turbine exit temperatures or any of the numerous operating parameters such that there is no way to determine that icing will occur in Christians' condenser (Br. 7).

Appellants additionally argue that the Examiner is incorrect in his determination that Hipsky's two turbine environmental control system may be applied to the "multiple cycle/one heat exchanger [environmental control] system of Christians" (Br. 7). Appellants argue that for the combination of Christians with Hipsky to be proper, there must be some need or problem in

Christians' integrated environmental control system that requires either a lower final temperature or separate rotation speeds (Br. 7).

The Examiner responds that "one of ordinary skill in the art would be led from the teachings of Hipsky to modify the dual cooling system [i.e., integrated environmental control system having two air cycle machines] of Christians . . . by using two turbine cooling systems [i.e., environmental control system in Hipsky] to improve the control over the final temperature of the air fed to the cabin" (Answer 3-4). The Examiner finds that "improved control over the final conditions of the treated air is always desirable" and that Hipsky teaches at column 4, line 65 to column 5, line 29 that an air cycle machine that "controls the feed to serially arranged turbines . . . provide[s] improved control over the final temperature while still preventing icing of the heat exchangers" (Answer 4).

Moreover, the Examiner states that "one of ordinary skill in the art would be taught by Hipsky that the use of separate turbines with controllable valves between them provides an efficient cooling system [i.e., environmental control system] which is easily and safely controlled" (Answer 4). The Examiner points to Hipsky's teachings "beginning in line 50 of column 5, that the separate control of the bypass valves between the turbines enables the delivery of air at the desired conditions at improved efficiency by bypassing the condenser when the inlet air is relatively less humid" (Answer 4). Also, the Examiner indicates that Hipsky in column 5 teaches that separate powering of the fan and compressor using separate turbines improves control over the system during different inlet conditions (Answer 4). Based on these teachings the Examiner concludes that it would have been obvious to "add a second turbine which is fed by the outlet of the

first turbine to the dual air cycle machine [i.e., integrated environmental control system] of Christians . . . to provide an air cycle machine which efficiently provides air at the desired conditions when the inlet air will be at different conditions during use (as is the case with both systems which are disclosed for use in airplanes)” (Answer 4-5).

Appellants counter that in order for the combination of Christians with Hipsky to be proper, the Examiner must provide proof that Christians’ integrated environmental control system is “inferior” to Hipsky’s environmental control system (Reply Br. 2). Moreover, Appellants contend that the Examiner has not established that making modifications to Christians’ integrated environmental control system would indeed improve the system (Reply Br. 2).

Appellants further counter that the portion of the Hipsky disclosure cited by the Examiner (i.e., column 4, line 65 to column 5, line 29) is directed to using the second turbine for deicing not for providing “improved” control of an environmental control system (Reply Br. 2). Based on this contention, Appellants indicate that the Examiner has not established that Christians’ integrated environmental control system has a problem with icing such that one would have been motivated to use Hipsky’s two turbine deicing mechanism (Reply Br. 2, 3). Appellants point out that Hipsky discloses that icing may be desirable in some situations (Reply Br. 2).

Finally, Appellants contend that the Examiner improperly bases his motivation for combining the references on the fact that they “may be” or “could be” combined (Reply Br. 2). According to Appellants, the mere fact that Hipsky provides air at a desired temperature and humidity does not

provide motivation for combining the second turbine with Christians' integrated environmental control system (Reply Br. 2).

We agree with the Examiner's ultimate determination that claim 1 is unpatentable over Christians in view of Hipsky.

Generally, "evidence of a motivation to combine need *not* be found in prior art references themselves, but rather may be found in the knowledge of one of ordinary skill in the art, or, in some cases from the nature of the problem to be solved." *Dystar Textilfarben GMBH & Co. v. C.H. Patrick Co.*, 464 F.3d 1356, 1366, ___ USPQ2d ___, ___ (Fed. Cir. 2006). "Common knowledge and common sense" are sufficient to establish motivation to combine without any additional suggestion or hint in a particular reference where the Examiner has first established that knowledge of a claimed feature is in the art. *Id.* 464 F.3d at 1367 (citing *In re Bozek*, 416 F.2d 1385, 1390 (C.C.P.A. 1969)).

Moreover, implicit motivation to combine exists not only when a suggestion may be gleaned from the prior art as a whole, but when the "improvement" is technology-independent and the combination of references results in a product that is more desirable, for example because it is stronger, cheaper, faster, lighter, smaller, more durable or more efficient. *Dystar*, 464 F.3d at 1368. "Because the desire to enhance commercial opportunities by improving a product or process is universal -- and even common-sensical -- we have held that there exists in these situations a motivation to combine prior art references even absent any hint of suggestion in the references themselves." *Id.* In those situations, "the proper question is whether the ordinary artisan possesses knowledge and skills rendering him *capable* of combining the prior art references." *Id.*

Christians discloses an integrated environmental control system having two air cycle machines (col. 2, ll. 13-21) wherein each air cycle machine has a compressor, fan and a turbine (col. 3, ll. 62-67, Figure 1). Christians does not disclose an air cycle machine having a second turbine.

Hipsky discloses a two turbine environmental control system wherein the conditioned air from a first turbine is fed to a second turbine for additional cooling (col. 2, l. 64 to col. 3, l. 7). Hipsky further discloses that his environmental control system “efficiently provide[s] an increased conditioned air flow” (col. 2, ll. 17-20). Hipsky also discloses that using his two turbine environmental control system permits the use of a simpler, cheaper condenser that does not need to be designed to handle icing (col. 2, ll. 4-15).

Based on these aforementioned disclosures, we conclude that Hipsky’s disclosure of producing a cheaper and more efficient environmental control system using the two turbine set-up provides implicit motivation to combine the second turbine with an air cycle machine in Christians’ integrated environmental control system in order to “enhance commercial opportunities by improving a product” (i.e., environmental control systems). *Dystar*, 464 F.3d at 1368.

Additionally, we agree with the Examiner’s findings that the combination of Christians with Hipsky would “efficiently provide air at the desired temperature and humidity” and that universally it is “desirable” to improve control over the final conditions of the treated air (Answer 4).

We further note that an ordinarily skilled artisan would have possessed the knowledge and skills to be “capable” of combining Hipsky’s second turbine with an air cycle machine in Christians’ integrated

environmental control system. *Dystar*, 464 F.3d at 1368. As shown in Hipsky's Figure 1, the second turbine (15) is positioned after the condenser (22) but before the aircraft cabin (shown by air flow 67 which is directed to the cabin or load). Therefore, according to Hipsky's disclosure, the second turbine would have been combined with Christians' integrated environmental control system such that it is positioned between the condenser and the aircraft cabin and is attached to the shaft of one of the air cycle machines (Hipsky, Figure 1).

As additional support for the combination of Hipsky's second turbine with an air cycle machine in Christians' integrated environmental control system, we find the Examiner has established that Hipsky's disclosure demonstrates it is "commonly known" in the art to use a two turbine environmental control system to cool an aircraft such that conditioned air from the first turbine is fed to the second turbine for additional cooling and treatment. Based on "common knowledge" of a two turbine aircraft environmental control system as shown by Hipsky, we conclude that it would have been obvious to modify Christians' integrated environmental control system by adding a second turbine to an air cycle machine. *Dystar*, 464 F.3d at 1368. Additional "suggestion or hint" (i.e., motivation) from the reference is not required to support the combination because it based on established "common knowledge and common sense" in the art. *Id.*

From the foregoing and contrary to Appellants' arguments, motivation is implicitly provided by the prior art (i.e., the universal desire to enhance commercial opportunities by improving a product) under the circumstances of this appeal. *Id.* Additionally, the Examiner has established that a two turbine environmental control system was commonly known in the art such

that the Examiner may “properly rely . . . on a conclusion of obviousness ‘from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference.’”

Id.

We are not persuaded by Appellants’ arguments that the Examiner must establish motivation by showing a “need” or some deficiency in Christians’ integrated environmental control system that is fulfilled by Hipsky’s environmental control system. Appellants appear to require an explicit motivation from the references themselves for the combination to be proper. The aforementioned authority does not support such a requirement.

We are not persuaded by Appellants’ argument that the Examiner has improperly combined references based solely on whether the references “may be” or “could be” combined. While it is improper to combine references simply because they “could be” combined, *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430, 1432 (Fed. Cir. 1990), that is not the situation in this appeal. Rather, in this appeal, the Examiner has demonstrated that by the combination of Hipsky’s second turbine with an air cycle machine in Christians’ integrated environmental control system, a cheaper and more efficient aircraft environmental control system results such that implicit motivation for the combination stems from the universal desire to improve a product (i.e., environmental control systems). *Dystar*, 464 F.3d at 1368. Additionally, the Examiner has established that using a second turbine in an aircraft environmental control system is commonly known in the art such that no additional evidence of motivation for the combination of Hipsky’s second turbine with an air cycle machine in Christians’ integrated environmental control system is required. *Id.*

For two reasons, we are not convinced by Appellants' argument that, since Christians does not disclose any condenser icing problem, there is no motivation to combine Hipsky's two turbine environmental control system that prevents icing with Christians' integrated environmental control system. First, Christians indicates that ice forms in the passages 140 and 142 leading to the condenser 92 (col. 7, ll. 65-67, Figure 1). Ice formation in the passages leading to the condenser suggests ice formation in the condenser. Second, though Christians does use some of the heated bleed air to remove the ice from the passages, using the two turbine system of Hipsky would allow the air to be made colder using the second turbine while also preventing ice formation in the condenser and in the passages leading thereto. This benefit from using the two turbine system provides added motivation for combining Hipsky's second turbine with an air cycle machine in Christians' integrated environmental control system. Using Hipsky's two turbine environmental control system imparts greater temperature control of the air leaving each of the turbines, such that the air leaving the first turbine will be at a higher temperature thereby preventing ice formation (Hipsky, col. 4, ll. 45-47).

We are not persuaded by Appellants' argument that Hipsky's disclosure that icing is advantageous in some applications teaches away from the combination. In fact, the ability to control whether or not icing occurs is a desirable feature that is achievable using the two turbine system of Hipsky where the expansion ratios of the turbines are controlled (Hipsky, col. 5, ll. 10-25). Instead of teaching away from the combination of Hipsky's second turbine with an air cycle machine in Christians' integrated environmental

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control system, we find that such a teaching provides additional motivation for the combination.

In view of the foregoing, we affirm the § 103(a) rejection over Christians in view of Hipsky.

CONCLUSION

We have affirmed the § 103(a) rejection of claims 1, 4, 9 and 10 over Christian in view Hipsky.

The Examiner's decision is affirmed.

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

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Carlson, Gaskey & Olds PC
400 W. Maple Road
Suite 350
Birmingham, MI 48009