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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WILLIAM H. LUKENS, LYNN M. ROG, PAUL M. D'ORLANDO, FRANCESCO A. DEVITA, JOHN T. GATZURAS, and WILLIAM D. HOYT

Appeal 2019-001081
Application 14/616,121
Technology Center 3700

Before STEFAN STAICOVICI, JAMES P. CALVE, and MICHAEL J. FITZPATRICK, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the decision of the Examiner to reject claims 1–15. Appeal Br. 6. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

[1] "Appellant" refers to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies Hamilton Sundstrand Corporation as the real party in interest. *See* Appeal Br. 4.

CLAIMED SUBJECT MATTER

Claims 1 and 10 are independent. Claim 1 is reproduced below.

> 1. An aircraft environmental conditioning system, comprising
>
> an air cycle machine for conditioning an airflow comprising hot compressed air by reducing its temperature and pressure to produce conditioned, pressurized air in a delivery conduit to a pressurized area of the aircraft, the air cycle machine disposed in a housing in an unpressurized area of the aircraft;
>
> a smoke sensor disposed within the conduit or within the housing external to the conduit; and
>
> a controller in communication with the smoke sensor, configured to respond to detection of smoke by the smoke sensor.

REJECTIONS[2]

Claims 1–3 are rejected under 35 U.S.C. § 103 as unpatentable over Drew (US 5,511,385, iss. Apr. 30, 1996), Space (US 7,871,038 B2, iss. Jan. 18, 2011), and Le (US 2015/0099444 A1, pub. Apr. 9, 2015).

Claims 1, 4, and 6–9 are rejected under 35 U.S.C. § 103 as unpatentable over Drew, Space, and Rotta (US 7,119,700 B2, iss. Oct. 10, 2006).

Claim 5 is rejected under 35 U.S.C. § 103 as unpatentable over Drew, Space, Le, and Rotta.

Claims 10–13 are rejected under 35 U.S.C. § 103 as unpatentable over Drew, Space, and Rotta.

Claims 14 and 15 are rejected under 35 U.S.C. § 103 as unpatentable over Drew, Space, Rotta, and Le.

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[2] The Examiner withdrew a rejection of claim 1 under 35 U.S.C. § 112(b) for indefiniteness and a rejection of claims 2 and 4 under 35 U.S.C. § 112(d) for failing to further limit claim 1. Ans. 17.

ANALYSIS

Claims 1–3 Rejected over Drew, Space, and Le

Regarding claim 1, the Examiner finds that Drew teaches an aircraft environmental conditioning system with air cycle machine 116, temperature sensor 352 disposed in a delivery conduit to a pressurized area of the aircraft (entrance duct 292), and controller 364, but the air cycle machine is not in a housing in an unpressurized area of the aircraft and it lacks a smoke sensor. Non-Final Act. 4–5. The Examiner cites Space to teach it is known to locate aircraft environmental control systems in a housing in an unpressurized area of an aircraft. *Id.* at 5. The Examiner cites Le to teach the use of a smoke sensor within a delivery conduit of an aircraft environmental control system to detect smoke generated by fan 304 due to overheating. *Id.*; Ans. 18.

Appellant argues that Space and Le fail to teach "a smoke sensor in the delivery conduit from the air cycle machine to the pressurized area of the aircraft" as claimed. Reply Br. 2 ("Le's smoke sensor 326 is clearly located downstream of the circulation mixing manifold 300, not in the un-numbered delivery conduit from air cycle machine 316."); *see* Appeal Br. 12–13 ("Le's smoke sensor 326 is on the *pressurized* side of the aircraft with circulation manifold 300, separated from the unpressurized ECS pack 316 by the unnumbered check valve shown in Fig. 3 adjacent to the ECS pack 316.").

In response, the Examiner agrees that Drew, Space, and Le lack a smoke sensor in a delivery conduit in an *unpressurized area* of the aircraft. Ans. 18. The Examiner interprets claim 1 to encompass a smoke sensor located anywhere "in a delivery conduit to a pressurized area of the aircraft" rather than being located only in a portion of a delivery conduit that itself is located in an unpressurized area of the aircraft as Appellant asserts. *Id.*

Claim 1 recites "an air cycle machine . . . to produce conditioned, pressurized air in a delivery conduit to a pressurized area of the aircraft, the air cycle machine disposed in a housing in an unpressurized area of the aircraft; a smoke sensor disposed within the conduit or within the housing external to the conduit." Thus, we agree with the Examiner that claim 1 does not require the smoke sensor to be disposed in any specific portion of the *delivery cond*uit, such as a portion that is located within an unpressurized area of the aircraft. This interpretation is consistent with the Specification, which describes smoke sensor 154 disposed in conduit 145, which extends from environmental air conditioning system 100 in an unpressurized housing 105 through bulkhead 110 to a pressurized area of the aircraft. Spec. ¶¶ 8, 11, Fig. 1.[3] Appellant's drawing shows smoke sensor 154 in conduit 145 going to a pressurized section (*and* on a pressurized side of bulkhead 110), but claim 1 only requires a smoke sensor to be disposed *within* a delivery conduit *to* a pressurized area. Spec. Fig. 1. Claim 1 does not require this portion of the delivery conduit to be in a pressurized or unpressurized area. We interpret the plain language of claim 1 without reading unclaimed features into it. *See In re Van Geuns*, 988 F.3d 1181, 1184 (Fed. Cir. 1993).

> Appellant does not offer a contrary interpretation but instead argues
>
> the determination of whether or not the claims are obvious over the cited references does not depend on the precise location of the smoke sensor with respect to the bulkhead separating the pressurized and unpressurized areas of the aircraft, but whether it would have been obvious to locate a smoke sensor in a delivery conduit from the air cycle machine to the pressurized area of the aircraft as specified by claims 1 and 10.

[3] The Specification includes a single drawing, which is not labelled. We refer to it as Figure 1 or Fig. 1.

Reply Br. 2. Appellant also argues that "Le's smoke sensor 326 is on the *pressurized* side of the aircraft with circulation manifold 300." Appeal Br. 12–13; Reply Br. 2 (Le's smoke sensor 326 is downstream of manifold 300).

If Le's smoke sensor 326 is located on a pressurized side of manifold 300, as Appellant asserts, Le teaches a smoke sensor in a *delivery conduit* to a pressurized area of the aircraft, as claimed. Ans. 18. This is so because Le's recirculation duct 302 delivers conditioned airflow from manifold 300 to return air compartment 106, which Appellant asserts is a pressurized side of manifold 300. This arrangement is shown in Figure 3 reproduced below.

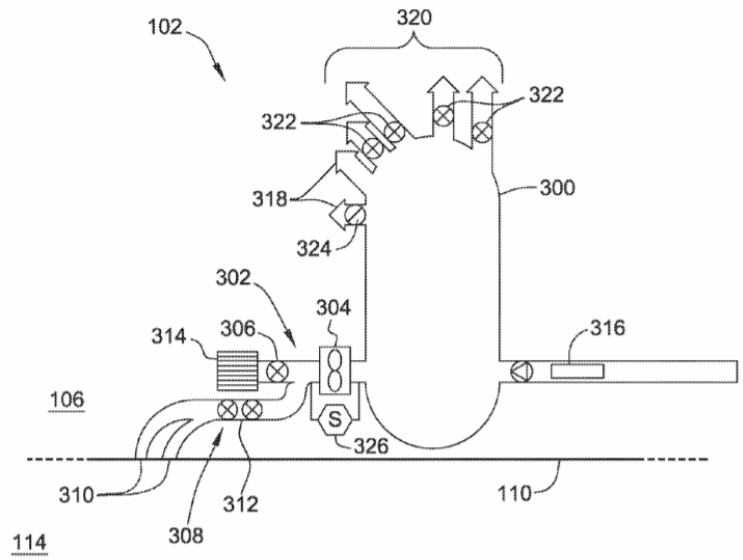

FIG. 3

Figure 3 of Le shows manifold 300 receiving air from air conditioning pack 316. Le ¶¶ 21–22. Recirculation duct 302 extends from manifold 300 to return air compartment 106, which Appellant asserts is a pressurized area. Appeal Br. 12–13. Conditioned air in manifold 300, which includes air from air conditioning pack 316, is delivered by fan 304 through duct 302 and filter 314 to return air compartment 106. Le ¶¶ 21–22. Smoke sensor 326 detects smoke passing through recirculation duct 302. *Id.* ¶ 23.

Because recirculation duct 302 is a delivery conduit for conditioned air to a pressurized area of the aircraft, namely return air compartment 106, Le teaches a smoke sensor in a delivery conduit to a pressurized area of the aircraft as claimed. *See* Non-Final Act. 5; Ans. 18.

The Examiner determines that it would have been obvious to a skilled artisan to use Le's teaching to dispose a smoke sensor in a delivery conduit to detect smoke, e.g., when a fan overheats and generates smoke, for similar benefits in Drew's environmental conditioning system as modified by Space to be located in an unpressurized housing, "to ensure that the environmental conditioning system is functioning and not in a state of equipment failure." Non-Final Act. 5–6. The Examiner's determination is supported by rational underpinnings based on the teachings in Le of these benefits. *See* Le ¶ 23; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) ("[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.").

Accordingly, we are not persuaded that "the references do not provide any disclosure that would motivate or lead the skilled person to locate a smoke sensor in an air cycle machine delivery conduit." Appeal Br. 13. Appellant does not explain why the Examiner's findings and reasoning discussed above are in error. *See* 37 C.F.R. § 41.37(c)(1)(iv) (the Appeal Brief "shall explain why the examiner erred as to each ground of rejection contested by appellant."); *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (approving of the Board's long-standing practice under its rules to require an applicant to identify the alleged error in an examiner's rejections).

Appellant does not dispute that Le's smoke sensor 326 is within a conduit but argues that the conduit is not an air cycle machine *delivery* conduit from the air cycle machine to a pressurized area of the aircraft. *See* Appeal Br. 12–13; Reply Br. 2. This argument ignores Le's teaching that recirculation duct 302 *delivers* air from manifold 300 (and air conditioning pack 316, which feeds conditioned air to manifold 300 as discussed above) to return air compartment 106 (Le ¶ 22), which Appellant asserts would be understood by a skilled person "to be located in the pressurized area of the aircraft" (Appeal Br. 13). Thus, Le teaches a smoke sensor in a delivery conduit to a pressurized area of the aircraft as recited in claim 1.

Accordingly, we sustain the rejection of claim 1 and its dependent claims 2 and 3, which are not argued separately. *See* Appeal Br. 11–13; 37 C.F.R. § 41.37(c)(1)(iv).

Claims 1, 4, and 6–9 Rejected over Drew, Space, and Rotta

Regarding claim 1, the Examiner finds that Drew teaches an aircraft environmental conditioning system including air cycle machine 116, but the air cycle machine is not disposed in a housing in an unpressurized area of the aircraft, and Drew lacks a smoke sensor disposed in the housing external to the conduit. Non-Final Act. 7–8. The Examiner cites Space to teach that it is known to locate an environmental control system (ECS) in a housing in an unpressurized area of an aircraft. *Id.* at 8 (citing external air supply device 120 in Figure 1). The Examiner relies on Rotta to teach an Aircraft Cooling and Smoke System (ACSS) 10 with a smoke sensor used to control smoke detection and ventilation systems in overhead crown area 20 and lower lobe area 22 with a controller configured to respond to smoke detection by the smoke sensor in those areas. *Id.* at 8–9; Ans. 19.

In response, Appellant argues that Rotta's teaching to include a smoke sensor in overhead crown area 20 or lower lobe area 22 would not motivate a skilled artisan to locate a smoke sensor in an air cycle machine delivery conduit or in an unpressurized housing outside of the delivery conduit, as it is not clear whether those areas are pressurized. Appeal Br. 14.

The Examiner has the better position. Space places an aircraft ECS (external air supply 120 and an air-conditioning pack) in an unpressurized area of an aircraft to receive external air that can include engine bleed air. Space, 3:12–63; Non-Final Act. 8. Appellant agrees that it is known to place an air cycle machine in an unpressurized area of an aircraft. Appeal Br. 12, 14; *see also Riverwood Int'l Corp. v. R.A. Jones & Co.*, 324 F.3d 1346, 1354 (Fed. Cir. 2003) ("This court and its predecessor have held that a statement by an applicant during prosecution identifying certain matter not the work of the inventor as 'prior art' is an admission that the matter is prior art.").

Rotta places aircraft cooling and smoke systems 10 in overhead crown area 20 and lower lobe area 22 to control smoke detection and ventilation systems for electronic equipment that is installed in any area of aircraft 12 to include those AREAS 1 and 2. Rotta, 4:49–67, Fig. 1. The system and its smoke sensors detect smoke events and identify cooling faults in those areas. *Id.* at 4:64–67; Non-Final Act. 8–9. The Examiner reasons that a skilled artisan would be motivated to place such a smoke sensor in a system housing external to an airflow conduit, as Rotta teaches, and in the same or similar areas of an aircraft, which Space teaches are unpressurized areas, for similar benefits and predictable results of detecting smoke events of the air cycle machine, ECS pack, and other electronic equipment. Non-Final Act. 9; Ans. 19; Rotta, 4:49–67, 5:49–6:22, Fig. 4; *see KSR*, 550 U.S. at 417.

As with the previous rejection, Appellant admits it is known in the art to dispose an air cycle machine or ECS pack in an unpressurized area of an aircraft. Appeal Br. 14. Such an admission that the prior art encompasses a claim limitation may be relied on to find claim 1 obvious. *Dow Chem. Co. v. Mee Indus., Inc.*, 341 F.3d 1370, 1377 (Fed. Cir. 2003) (admission that prior art encompasses a claim limitation supported obviousness with other prior art); *see In re Gardner*, 449 F. App'x 914, 916 (Fed. Cir. 2011) (non-precedential) (holding Board's reliance on applicant's disclosure that prior art battery was a fast charge-discharge battery as proper citing *Dow Chem.*).

The Examiner determines that it would have been obvious to a skilled artisan to locate Drew's aircraft ECS in an unpressurized area as taught by Space because combining such familiar elements by known methods to yield predictable results is obvious. Non-Final Act. 8; *see also* Space, 3:12–56 (external air supply device 120 is positioned to receive air from the exterior of the aircraft and supply a portion of the external air to interior volume 106 of the aircraft as supply air). The Examiner's determination is supported by rational underpinnings based on Appellant's admission that this arrangement is known and Space's teachings. *KSR*, 550 U.S. at 416–417. Appellant does not provide evidence of unpredictability or unexpected results. Appeal Br. 14. The Specification discloses that smoke sensors are used in the housing and delivery conduit to detect smoke emanating from different portions of the air cycle machine indicating impending or actual equipment failure. *See* Spec. ¶ 11. The smoke sensor can be any known type of sensor. *Id.*

Appellant does not dispute the Examiner's finding that Rotta places a smoke sensor in a system housing external to an airflow conduit. Appeal Br. 13–14; Reply Br. 2; *see* 37 C.F.R. § 41.37(c)(1)(iv); *Jung*, 637 F.3d at 1365.

"Often, it will be necessary for a court to look to interrelated teachings of multiple patents . . . to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418. As discussed above, Drew teaches to place sensors in delivery conduits to a pressurized area. Space teaches advantages of placing ECS packs in an unpressurized area of an aircraft to obtain and condition external air for such pressurized areas. Rotta teaches to place smoke sensors in housings of such ECS packs to detect smoke and equipment failure.

For the foregoing reasons, we sustain the rejection of claim 1 and its dependent claims 4 and 6–9, which are not argued separately.

Claim 5 Rejected over Drew, Space, Le, and Rotta

Dependent claim 5 recites a smoke sensor disposed in the delivery conduit *and* a smoke sensor disposed in the housing external to the delivery conduit. Appeal Br. 19 (Claims App.). The Examiner cites Drew, Space, Le, and Rotta to teach these features based on the findings and reasoning set forth in the previous rejections. Non-Final Act. 12–13. Appellant argues that claim 5 is patentable for the same reasons as claims 2 and 4, which together recite the subject matter of claim 5. Appeal Br. 15. This argument is not persuasive because the Examiner relies on Drew, Space, and Le to teach "the smoke sensor is disposed within the delivery conduit" for claim 2. Non-final Act. 6. The Examiner relies on Drew, Space, and Rotta to teach "the smoke sensor is disposed within the housing external to the delivery conduit" for claim 4. *Id.* at 9–10. The rejection of claim 5 relies on the teachings of Le and Rotta in conjunction with those of Drew and Space to render obvious smoke sensors in a delivery conduit *and* in a housing external to the delivery conduit as claimed. *Id.* at 12–13.

The Examiner's reason for combining teachings of Drew, Space, Le, and Rotta are based on rational underpinnings based on the teachings of the references of the benefits of enclosing an ECS housing in an unpressurized area with smoke sensors in a delivery conduit and a housing external to the delivery conduit as discussed above. *See id.* at 12–13. Appellant has not apprised us of Examiner error in this regard. Thus, we sustain the rejection of claim 5.

Claims 10–13 Rejected over Drew, Space, and Rotta

Independent claim 10 recites a method of operating an environmental conditioning system by operating an air cycle machine that is disposed in a housing in an unpressurized area of the aircraft to produce conditioned, pressurized air in a delivery conduit to a pressurized area of the aircraft and monitoring the output of a smoke sensor disposed in the delivery conduit or within the housing external to the conduit. Appeal Br. 20 (Claims App.). The Examiner relies on teachings of Drew, Space, and Rotta as set forth above for the second rejection of claim 1. Non-Final Act. 13–15; Ans. 19.

Appellant raises the same arguments that were asserted for the rejection of claim 1 based on the teachings of those references. *See* Appeal Br. 13–16. These arguments are not persuasive for the reasons discussed above for claim 1 and its similar limitations. We thus sustain the rejection of claim 10 and claims 11–13, which are not argued separately.

Claims 14 and 15 Rejected over Drew, Space, Rotta, and Le

The Examiner relies on Le to teach a smoke sensor 326 disposed in a delivery conduit (recirculation duct 302) of airflow control system 102 as recited in claims 14 and 15, which depend from claim 10. Non-Final Act. 18.

Appellant argues that Le's smoke sensor 326 is on the pressurized side of the aircraft with circulation manifold 300 and is separated from the unpressurized ECS pack 316 by an unnumbered check valve in Figure 3 and therefore none of the references would motivate a skilled artisan to locate a smoke sensor in an air cycle machine delivery conduit or in an unpressurized housing around the delivery conduit as claimed. Appeal Br. 17.

We addressed this argument for the rejection of claim 1 and find it to be unpersuasive for the rejection of claims 14 and 15 for the same reasons.

Thus, we sustain the rejection of claims 14 and 15.

CONCLUSION

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–3	103	Drew, Space, Le	1–3	
1, 4, 6–9	103	Drew, Space, Rotta	1, 4, 6–9	
5	103	Drew, Space, Le, Rotta	5	
10–13	103	Drew, Space, Rotta	10–13	
14, 15	103	Drew, Space, Rotta, Le	14, 15	
Overall Outcome			1–15	

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).

AFFIRMED