

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HOSSEIN IZADPANA, ROBERT R. S. BARNARD,
JUAN F. LAM, BRETT A. WARNEKE,
GARY M. LINDGREN, and ROBERT Y. LOO

Appeal 2008-5558
Application 10/160,986
Technology Center 2600

Decided: December 2, 2008

Before MAHSHID D. SAADAT, JOHN A. JEFFERY, and CARLA M.
KRIVAK, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from the Examiner's rejection of claims 5-8. We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

STATEMENT OF THE CASE

Appellants invented a communication module using micro-electromechanical (MEM) switches. The module has an antenna for receiving signals and first and second switches. An amplifier is common to both switches and used to handle both transmitted and received signals. An oscillator changes the received frequency relative to the transmitted frequency.¹ Independent claim 5 is reproduced below:

5. A front end module comprising:
 - an antenna;
 - a filter connected to said antenna;
 - a first low power microelectromechanical switch having high isolation, said first microelectromechanical switch being connected to said filter and switchable between a first path and a second path;
 - a single amplifier common to both first and second paths, shared by both first and second paths and capable of handling transmit and receive frequencies;
 - a second low power microelectromechanical switch having high isolation, said second microelectromechanical switch being switchable between said first and second paths and connected to said single amplifier;
 - a mixer connected to said second microelectromechanical switch;
 - a local oscillator connected to said mixer; and
 - a third low power microelectromechanical switch having high isolation, said third microelectromechanical switch following said mixer and being switchable between said first and second paths,said first, second and third microelectromechanical switches are switchable between said first and second paths for selecting a transmit and a receive mode for said front end module over a range of operating frequencies including high frequencies and including transmit and receive frequencies that may be different from each other.

¹ See generally Spec. 1:10-14 and 4:17-6:16.

The Examiner relies upon the following as evidence in support of the rejection:

Lam	US 5,541,613	Jul. 30, 1996
Sawai	US 5,590,412	Dec. 31, 1996
Kitakubo	US 5,634,200	May 27, 1997
De Los Santos	US 5,808,527	Sep. 15, 1998

(1) The Examiner rejected claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Sawai, De Los Santos, and Kitakubo (Ans. 4-6).

(2) The Examiner rejected claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Sawai, De Los Santos, Kitakubo, and Lam (Ans. 6-7).

Rather than repeat the arguments of Appellants or the Examiner, we refer to the Briefs and the Answer² for their respective details. In this decision, we have considered only those arguments actually made by Appellants. Arguments, which Appellants could have made but did not make in the Briefs, have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

OBVIOUSNESS REJECTION OVER SAWAI, DE LOS SANTOS, AND KITAKUBO

The Examiner first rejected claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Sawai, De Los Santos, and Kitakubo. The Examiner finds that Sawai discloses all the limitations in representative

² Throughout the opinion, we refer to (1) the most recent Appeal Brief filed December 11, 2006, (2) the Examiner's Answer mailed March 31, 2007, and (3) the Reply Brief filed May 10, 2007.

independent claim 5,³ except for the MEM switches and the transmitted and received frequencies being different from each other (Ans. 4-5). The Examiner relies on De Los Santos and Kitakubo to teach these missing limitations (Ans. 5-6). Appellants first argue that neither Sawai nor De Los Santos discloses a single amplifier common to both the first and second paths (App. Br. 4-6). Appellants also contend one skilled in the art would not have looked to modify the Sawai switches with MEM switches as taught by De Los Santos (App. Br. 6). Appellants assert that the inclusion of the MEM switches with Sawai would be complicated and render the device inoperable (App. Br. 6-7).

ISSUES

(1) Have Appellants shown the Examiner erred in finding that the combination of Sawai, De Los Santos, and Kitakubo teaches or renders obvious a single common amplifier as recited in claim 5 under 35 U.S.C. § 103(a)?

(2) Have Appellants shown the Examiner erred in finding that an ordinary skilled artisan would have recognized substituting the MEM switches of De Los Santos for the FET switches would improve the Sawai device?

(3) Have the Appellants shown that the combination of Sawai, De Los Santos, and Kitakubo render the device inoperable for its intended purpose?

³ Appellants do not particularly argue claim 6 (App. Br. 4-7). Accordingly, we select independent claim 5 as representative. 37 C.F.R. § 41.37(c)(1)(vii).

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Sawai discloses a communication apparatus having field effect transistor (FET) switches 4, 6, and 7 and common amplifiers 23 and 24 to both the transmit and receive paths (Sawai, col. 6, ll. 26-61 and col. 7, ll. 36-37, 59-60, and 63-65; Fig. 4).
2. Sawai discloses the common amplifiers and switches can be easily fabricated on a single monolithic microwave integrated chip (MMIC) (Sawai, col. 12, ll. 34-37).
3. Sawai further discloses the power requirements of the apparatus vary during transmission and reception and that more power is needed during transmission to distant places (Sawai, col. 9, ll. 29-41 and col. 10, ll. 3-14).
4. De Los Santos describes several advantages of MEM switches over FET switches used in communications apparatus having MMICs (De Los Santos, col. 1, ll. 7-11 and col. 3, ll. 6-9).
5. De Los Santos teaches that MEM switches consume less power than FET switches, are better suited for microwave applications than FET switches because they have high isolation and negligible distortion at high frequencies, and do not need continuous power to maintain a bias voltage (De Los Santos, col. 4, ll. 46-53). De Los Santos further notes that MEM switches exhibit excellent switching characteristics, including high isolation in the “off” state at high frequencies and are better suited for microwave applications than FET switches because

- they have high isolation and negligible distortion at high frequencies (De Los Santos, col. 4, ll. 15-45).
6. De Los Santos shows a single amplifier 70 transmits signals (De Los Santos, col. 7, ll. 19-23; Fig. 5).

PRINCIPLES OF LAW

Discussing the question of obviousness of a patent that claims a combination of known elements, *KSR Int'l v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007), explains:

If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if 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. *Sakraida [v. AG Pro, Inc.]*, 425 U.S. 273 (1976)] and *Anderson's-Black Rock[, Inc. v. Pavement Salvage Co.]*, 396 U.S. 57 (1969)] are illustrative—a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

KSR, 127 S. Ct. at 1740. “[T]he analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 1740-41.

ANALYSIS

Claim 5 recites the limitation, “a single amplifier common to both first and second paths.” Appellants argue that this limitation requires one amplifier be common to the first and second paths (App. Br. 4-5; Reply Br.

2-3). The Examiner contends that the transitional phrase, “comprising” in claim 5 coupled with the claim differentiation in claim 6 to “one of said first and second paths has an additional amplifier” does not limit claim 5 to a single amplifier (Ans. 7-8). Claim 5 uses the open-ended transitional phrase, “comprising,” and, thus, does not exclude additional and unrecited elements in the front end module. Nonetheless, within the body of claim 5, the Appellants have chosen to restrict the amplifier to a *single* amplifier common to both paths and not just an amplifier. This additional limitation to a “single” amplifier further limits the claim. Otherwise, there would be no distinction in claim 5 between “an amplifier” and “a single amplifier.” Additionally, while claim 6 recites that the additional amplifier is in one of the paths, this recitation does not demonstrate the single amplifier of claim 5 was intended to include an additional amplifier common to both paths.

Sawai discloses a communication apparatus having common amplifiers 23 and 24 used to transmit and receive signals (FF 1). Thus, as Appellants argue (App. Br. 4-5), Sawai does not disclose a single amplifier common to both the first and second paths as recited in claim 5. However, Sawai discloses amplifier 23 and 24 as nothing more than common amplifiers and does not disclose amplifier 23 or 24 has a unique purpose separate from the other amplifier. Thus, the amplifiers function identically and there is no evidence in the record that the functionality of the two amplifiers could not be realized in a single amplifier. Moreover, the obviousness analysis “need not seek out precise teachings . . . for a court can take account of inferences and creative steps that a person of ordinary skill would employ.” *KSR* at 1741. De Los Santos also shows a communication system that uses a single amplifier 70 to transmit signals (FF 6). The Sawai

and De Los Santos disclosures thus suggest to one having ordinary skilled in the art that one amplifier common to the transmit and receive paths would operate in a manner similar to and serve the same purpose as two amplifiers with equally divided gain. *KSR* at 1740. Additionally, an ordinary skilled artisan would have recognized that replacing the two amplifiers with a single amplifier common to the first and second path would predictably result in an amplifier that handles the gain of Sawai's two amplifiers common to the first and second paths. *Id.*

Sawai further discloses the power requirements of the apparatus vary during transmission and reception and that more power is needed during transmission to distant places (FF 3). De Los Santos describes several advantages of MEM switches over FET switches used in communications apparatus having MMICs (FF 4). De Los Santos teaches that MEM switches consume less power than FET switches, are better suited for microwave applications than FET switches because they have high isolation and negligible distortion at high frequencies, and do not need continuous power to maintain a bias voltage (FF 5). One skilled in the art would have recognized substituting the MEM switches of De Los Santos for the FET switches of Sawai would have improved the Sawai device by reducing the power consumption of the Sawai device during transmission over long distances and extend the life of the communication device. Additionally, De Los Santos teaches MEM switches exhibit excellent switching characteristics, including high isolation in the "off" state at high frequencies and are better suited for microwave applications than FET switches because they have high isolation and negligible distortion at high frequencies (*Id.*). One skilled in the art would have therefore recognized that MEM switches

are better suited than the FET switches in the disclosed MMIC application of Sawai (FF 2) and would have improved the Sawai device by providing high isolation and negligible distortion at high frequencies.

Including a MEM switch for the FET switch would also not render the combined Sawai and De Los Santos device unsatisfactory for its intended purpose. Appellants argue that the Sawai filters require a higher gain than the bias the MEM switches can provide and replacing the switches would render the device inoperable (App. Br. 8-9; Reply Br. 3-4). However, Appellants have only argued, without any evidence, that the device would not operate. Arguments made by counsel do not take the place of evidence in the record. *In re Schulze*, 346 F.2d 600, 602 (CCPA 1965); *see also In re Geisler*, 116 F.3d 1465 (Fed. Cir. 1997).

Nevertheless, Appellants readily admit that the Sawai device could operate and function with MEM switches through modification or by adding more components (App. Br. 6-7; Reply Br. 4). But even if we assume, without deciding, that the Examiner's proposed modification would involve additional components as Appellants allege, such additional complexity does not otherwise defeat the Examiner's prima facie case of obviousness. While additional components may be involved, we see no reason why this disadvantage would be offset to at least some extent by the relative advantages in using MEM switches over FET switches as indicated above.

In short, there would be an engineering tradeoff in using MEM switches over FET switches. In our view, designing the system to account for this tradeoff by considering the relative advantages and disadvantages of these devices would have been an engineering decision well within the level of skilled artisans.

Nonetheless, Appellants contend that the Sawai device would no longer operate at the designed frequency range if the FET switches were replaced with MEM switches (App. Br. 7). Both Sawai and De Los Santos, however, teach that MEM switches located on an MMIC can operate in a microwave frequency bandwidth (FF 2 and 4). Thus, we are not persuaded that the combined Sawai and De Los Santos device would be rendered unsatisfactory for its intended purpose.

For the above reasons, we will sustain the rejection of claims 5 and 6 over the combination of Sawai, De Los Santos, and Kitakubo.

OBVIOUSNESS REJECTION OVER SAWAI, DE LOS SANTOS,
KITAKUBO, AND LAM

The Examiner next rejected claims 7 and 8 under U.S.C. § 103(a) as being unpatentable over Sawai, De Los Santos, Kitakubo, and Lam. Representative claim 7⁴ recites the antenna is a reconfigurable antenna and the filter is a reconfigurable filter. Lam was cited to teach a reconfigurable antenna with MEM switches is known in the art to achieve a desired radiation pattern (Ans. 6). Without making any specific argument, Appellants state the purported differences between the reconfigurable antenna of Lam and the invention (App. Br. 7). Drawing distinctions between the prior art and the invention without addressing claim limitations or making a specific arguments fall well short of rebutting the Examiner's rejection under obviousness – a position that we find reasonable. Appellants also refer to canceled independent claim 3 and non-existent “section 8(a)” of

⁴ Appellants do not particularly argue claim 8 (App. Br. 7). Accordingly, we select independent claim 7 as representative. 37 C.F.R. § 41.37(c)(1)(vii).

the Appeal Brief (App. Br. 7). To the extent that Appellants intended to refer to section 7(a) of the appeal, we are unpersuaded for the previous reasons discussed in connection with claim 5.

For the above reasons, we will sustain the rejection of claims 7 and 8 over the combination of Sawai, De Los Santos, Kitakubo, and Lam.

CONCLUSIONS OF LAW

(1) The Appellants have not shown the Examiner erred in finding that the combination of Sawai, De Los Santos, and Kitakubo teaches or renders obvious a single common amplifier as recited in claim 5 under 35 U.S.C. § 103(a).

(2) The Appellants have not shown the Examiner erred in finding that an ordinary skilled artisan would have recognized substituting the MEM switches of De Los Santos for the FET switches of Sawai would improve the Sawai device.

(3) Appellants have not shown that the combination of Sawai, De Los Santos, and Kitakubo render the device inoperable for its intended purpose.

ORDER

We have sustained the Examiner's rejection of all claims on appeal. Accordingly, the Examiner's rejection of claims 5-8 is affirmed.

No period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

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AFFIRMED

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