UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TOMOHIRO AZUMA

Appeal 2009-0073
Application 10/415,375
Technology Center 2600

Decided: January 5, 2009

Before KENNETH W. HAIRSTON, ROBERT E. NAPPI, and JOHN A. JEFFERY, *Administrative Patent Judges.*

NAPPI, *Administrative Patent Judge.*

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 6(b) of the final rejection of claims 1 through 8.[1]

We affirm the Examiner's rejections of these claims.

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[1] A hearing directed to the appeal of these claims was held on December 9, 2008.

INVENTION

The invention is directed towards a method of "correcting the change in phase and amplitude between radio receiving portions of an array of antennas." See page 1 of Appellant's Specification. Claim 1 is representative of the invention and reproduced below:

> 1. A calibration method for an array antenna receiving apparatus having an array antenna including a plurality of antenna elements for forming a receiving-oriented pattern and radio receiving portions corresponding to the antenna elements, the method comprising the steps of:
>
> supplying calibration signals having predetermined symbol patterns to the radio receiving portions; extracting the calibration signals having passed through and output from the radio receiving portions;
>
> selecting a predetermined one of the radio receiving portions as a reference branch; and
>
> correcting the receiving-oriented pattern by using phase differences between and amplitude ratios of the calibration signals having passed through respective radio receiving portions and the calibration signal having passed through the reference branch,
>
> wherein selecting as the reference branch comprises determining a radio receiving portion having the best receiving quality from the calibration signals having passed through the radio receiving portions and selecting the radio receiving portion with said best receiving quality.

REFERENCES

Donath	US 2,753,547	Jul. 3, 1956
Hill	US 4,210,871	Jul. 1, 1980
Andersson	US 6,339,399 B1	Jan. 15, 2002 (filed Jun. 26, 2000)

Nilsson	US 6,848,065 B1	Jan. 25, 2005 (filed Jun. 21, 2000)
Seto	US 7,043,271 B1	May 9, 2006 (filed Sep. 12, 2000)

REJECTIONS AT ISSUE

The Examiner has rejected claims 1 and 5 under 35 U.S.C. § 103(a) as being unpatentable over Andersson in view of Hill, and Seto. The Examiner's rejection is on pages 3 through 5 (discussion of claim 1), and 6 through 8 (discussion of claim 5) of the Answer.[2]

The Examiner has rejected claims 2, 3, 6, and 7 under 35 U.S.C. § 103(a) as being unpatentable over Andersson in view of Hill, Seto, and Donath. The Examiner's rejection is on pages 5 and 6 (discussion of claims 2 and 3), and 9 (discussion of claims 6 and 7) of the Answer.

The Examiner has rejected claims 4 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Andersson in view of Hill, Seto, Donath and Nilsson. The Examiner's rejection is on page 6 (discussion of claim 4) and pages 9 and 10 (discussion of claim 8) of the Answer.

[2] Throughout the opinion, we make reference to the Answer, mailed December 6, 2007, for the respective details thereof.

ISSUES

Appellant argues on pages 12 through 16 of the Brief[3] that the Examiner's rejection of claim 1 under 35 U.S.C. § 103(a) is in error. Appellant asserts that Seto does not teach correcting the receiving pattern using phase differences between and amplitude ratios of the calibration signals which have passed through radio receiving portions and the calibration signal having passed through a reference branch. Appellant asserts that Seto is "directed to correcting the transmission of signals by using amplitude ratio detector that detects the amplitude deviation of the output signal of **any two branch signals of the transmitted signals**." Br. 15. Further, Appellant argues that the amplitude ratio detector of Seto does not produce an amplitude ratio of the calibration signals that have passed through the radio receiving portion as claimed. Additionally, Appellant argues on page 16 of the Brief, that Seto does not teach selecting a reference branch as the branch having the best receiving quality from the calibration signals having passed through the receiving portions.

Thus, Appellant's contentions present us with the following issues. Has Appellant shown the Examiner erred in finding that the combined teachings of the prior art teach:

a) correcting the receiving-orientated pattern by using the phase differences and amplitude ratios between calibration signals that have passed through radio receiving portions and a calibration signal received through a reference branch as claimed; and

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[3] Throughout the opinion, we make reference to the Brief, received February 9, 2007, and Reply Brief received September 17, 2007 for the respective details thereof.

b) selecting a reference branch as the branch with the best receiving quality as claimed.

With respect to the rejection of independent claim 5, on pages 17 through 22 of the Brief, Appellant discusses claim 5 and presents the same arguments as discussed with respect to claim 1. Further, with respect to the rejection of dependent claims 2 through 4 and 6 through 8, Appellant states, on pages 16, 17, and 22 of the Brief, that he relies upon the patentability of the independent claims to show the rejections of these claims are in error. Thus, Appellant's contentions with respect to the rejection of claims 2 through 8 present us with the same issue as claim 1.

PRINCIPLES OF LAW

On the issue of obviousness, the Supreme Court has stated that "the obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). Further, the Court stated "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* at 1739.

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. 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. . . . [A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

Id. at 1740. "One of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent's claims." *Id.* at 1742.

FINDINGS OF FACT

1. Andersson teaches an antenna array calibration system which injects a calibration signal into the receiving portions of the antenna. A calibration controller then collects the calibration signal after it has passed the receiving section and uses the collected signal to generate correction factors for the receiver. Abstract.
2. Andersson teaches that the correction factors can be generated by choosing one of the receiving antennas as a reference and generating the correction factors relative to the one antenna. These correction factors include phase and amplitude. Col. 7, ll. 32-39.
3. Hill teaches a diversity combiner system which combines the signals from a plurality of antenna and receivers. Col. 1, ll. 6-33.
4. Hill's combiner makes use of optimization coefficients to maximize the output signal to noise ratio. In weighting the coefficients, a signal from one antenna/receiver is selected to be used as a reference. Col. 3, ll.-20-25, 40-45.
5. Hill teaches that the reference signal is selected as the signal which has the greatest signal to noise ratio. Col. 6, ll. 60-67.

6. Seto teaches a radio communications system which includes a base station and a control station. The base station includes an array of antenna elements. The signals received from the array of antennas are multiplexed together in the base station and converted to optical signals. The optical signals are transmitted to the base station which de-multiplexes the signals. Abstract.
7. Seto teaches several embodiments for the base station and control station pair. The eighth embodiment is shown in figures 34 through 39. In this embodiment the base station can function as a transmitter and a receiver. In the receiver configuration, the base station makes use of a pilot signal inserter for inserting a feedback signal into the signal sent to the base station. The signals from the antenna and the transmitted signals are combined together to provide the pilot signals. Col. 37, ll. 4-34, col. 38, ll. 47-52.
8. The control station in Seto receives the optical signal from the base station, converts it to an electrical signal and de-multiplexes the signals. The de-multiplexed signals then are input to a frequency converter. The output from the frequency converter is provided to a feedback signal detector and is also used to synthesize the output of the control station. Col. 37, ll. 45-65.
9. The feedback signal detector is used to provide data to the calibration coefficient circuit. Coefficients calculated by this circuit are used for both reception and transmission. Seto, col. 37, ll. 57-60, col. 39, ll. 35-41.

10. The feedback signal detector makes use of a phase difference detector and an amplitude ratio detector. The inputs to both of these circuits are from the frequency converter (items 203, fig 34) for different branches and they produce values representative of phase and amplitude ratio based upon the signals they receive (i.e. they provide phase and amplitude ratio data for the de-multiplexed and frequency converted signal from the base station). Seto, col. 40, ll. 4-27. Fig. 36.
11. One of the input signals to the phase and amplitude ratio detector is used as a reference for calculations of the comparisons. Seto, col. 39, ll. 25-27.

ANALYSIS

Issue a)

Appellant's arguments directed to the first issue have not persuaded us that the Examiner erred in finding that the combined teachings of the prior art teach correcting the receiving-oriented pattern as claimed. Claim 1 recites "correcting the receiving-oriented pattern by using phase differences between and amplitude ratios of the calibration signals having passed through respective radio receiving portions and the calibration signal having passed through the reference branch." Thus, the scope of claim 1 includes that the receiving-oriented pattern is corrected using a) phase differences between the calibration signals that have passed through the respective radio receiving portions and the calibration signal which passed through the reference branch and b) amplitude ratios between the same signals.

The Examiner's rejection relies upon Andersson for teaching correcting the receiving-oriented pattern using the phase differences between calibration signals that have passed through the radio receiving portions.

Ans. 4. Appellant has not contested this finding by the Examiner and we find that the disclosure of Andersson supports this finding in Fact 2.

The Examiner relies upon Seto to teach correcting based upon amplitude ratios, Ans. 4. Appellant's arguments assert that the correction coefficients of Seto are not based upon signals that have passed through radio receiving portions. Br. 15. The Examiner on pages 10 through 12 of the Answer finds that the pilot signal meets the claimed calibration signal and that it has passed through radio receiving portions (consisting of elements 5, 201, 9, 12, and 203). Further, the Examiner finds that the calibration coefficient calculator generates the claimed corrections signals. Ans. 12. We concur with the Examiner's findings. Appellant has not provided an explanation as to why the Examiner's finding of the signals traversing items 5, 21, 9, 12, and 203 (of figure 34) does not meet the claimed radio signals passing through receiving portions of a branch. Further, we find that the evidence supports the Examiner's finding that Seto teaches the calibration coefficient circuit determines the phase difference and amplitude ratio between the signals received by the base station (which as discussed *supra* are signals that have passed through the radio receiving portions). Facts 7 and 8. Further, we are not persuaded of error by Appellant's argument, on page 15 of the Brief, that Seto is directed to correcting transmission of signals (i.e. not reception as claimed). We find that Seto teaches that the correction coefficients are applied to both reception and transmission. Fact 9. Thus, Appellant's arguments directed to the first issue have not persuaded us of error in the Examiner's rejection.

Issue b)

Appellant's arguments directed to the second issue have not persuaded us that the Examiner erred in finding that the combined references teach selecting a reference branch as the branch with the best received signal quality as claimed. Claim 1 recites selecting one of the radio receiving portions as a reference branch and "wherein selecting as the reference branch comprises determining a radio receiving portion having the best receiving quality from the calibration signals having passed through the radio receiving portions and selecting the radio receiving portion with said best receiving quality." Thus, the scope of claim 1 includes that of the radio receiving portions, a branch where the calibration signal (which passed through the branch) is of the best quality is selected to be the reference branch.

The Examiner has found that Andersson teaches selecting a reference branch, that Hill teaches that the branch with the best signal quality should be selected as the reference branch and that it would have been obvious to combine Hill's teaching with Andersson. Ans. 4 and 13. Appellant has not contested these findings, but, rather, asserts that Seto does not teach this feature. Br. 16. While Appellant may be correct that Seto does not teach selecting a reference branch based upon signal quality, the Examiner's rejection relies upon Hill to show that this was known and obvious. Thus, Appellant's arguments have not persuaded us that the Examiner erred in finding that the combination of the references teaches selecting a reference branch as claimed.

As Appellant's arguments directed to these two issues have not persuaded us of error in the Examiner's rejection of claim 1 we sustain the rejection of claim 1. Further, as discussed *supra*, Appellant's arguments directed to dependent claims 2 through 4 rely upon the arguments directed to claim 1. Accordingly, we similarly sustain the Examiner's rejections of claims 2 though 4.

As discussed *supra*, Appellant's arguments directed to independent claim 5 raise the same issues as claim 1. Independent claim 5 is directed to an apparatus which contains portions that perform functions similar to the steps discussed with respect to claim 1, i.e. generating correction information similar to claim 1 and selecting a reference branch. As discussed with respect to claim 1, Appellant's arguments have not persuaded us that the Examiner erred in finding the combination of the references teaches these limitations. Accordingly, we sustain the Examiner's rejection of claim 5 for the reasons discussed with respect to claim 1. Appellant's arguments directed to dependent claims 6 through 8 rely upon the arguments directed to claim 5. Accordingly, we similarly sustain the Examiner's rejections of claims 6 though 8.

ORDER

The decision of the Examiner to reject claims 1 through 8 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).

AFFIRMED

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