The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROLAND A. WOOD

Appeal 2007-1983
Application 09/800,366
Technology Center 2800

Decided: September 19, 2007

Before JOSEPH F. RUGGIERO, ROBERT E. NAPPI,
and JOHN A. JEFFERY, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from the Examiner's rejection of claims 1-27 and 29-39. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

STATEMENT OF THE CASE

Appellant invented a technique for fast scanning an array of bolometers,[1] in particular microbolometers, used in infrared imaging systems. Specifically, at least two bias pulses are applied sequentially to each microbolometer in the array during a frame time (i.e., the time it takes for the array to produce a complete image of an object being viewed by the array). Then, the resulting signals associated with the applied pulses are measured and an average value computed. By applying multiple pulses during the frame time, a more uniform temperature results.[2] Claim 1 is illustrative:

1. A method for improving performance sensitivity and facility of operation of an array including one or more microbolometers, comprising:

applying two or more bias pulses substantially sequentially during a frame time to each microbolometer in the array;

measuring two or more resulting signals corresponding to the two or more bias pulses;

computing an average signal value from the two or more resulting signals corresponding to each microbolometer in the array during the frame time; and

producing an output signal based on the computed average signal value for each microbolometer in the array during the frame time.

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[1] A bolometer is a thermal radiation detector that operates by (1) absorbing incident electromagnetic radiation (typically infrared radiation); (2) converting the absorbed radiation into heat; and (3) indicating the resulting temperature change in the detector by a change in its electrical resistance (which is a function of temperature) (Specification 1:17-20).

[2] *See generally* Specification P, 3, l. 27 – P, 4, l. 7; Abstract; Fig. 5.

The Examiner relies on the following prior art references to show unpatentability:

Thiede	US 5,129,595	Jul. 14, 1992
Duvall	US 5,258,619	Nov. 2, 1993
Wood '419	US 5,420,419	May 30, 1995
Wood '149	US 5,675,149	Oct. 7, 1997

Appellant's admitted prior art on page 6 of the Specification (APA).

1. Claims 1, 2, 7, 9-17, 20, and 22-26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Wood '149 and Wood '419 (incorporated by reference).
2. Claims 3-5 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Wood '149, Wood '419, and APA.
3. Claim 6 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Wood '149, Wood '419, APA, and Thiede.
4. Claims 8, 21, 27, 29, and 33-39 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Wood '149, Wood '419, and Duvall.
5. Claims 18 and 19 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Wood '149, Wood '419, and Thiede.
6. Claims 30-32 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Wood '149, Wood '419, Duvall, and Thiede.

Rather than repeat the arguments of Appellant or the Examiner, we refer to the Briefs and the Answer[3] for their respective details. In this

[3] Throughout this opinion, we refer to the Supplemental Brief filed Feb. 9, 2006 which replaced all previously-filed Briefs (Br. 1). We also refer to the most recent Examiner's Answer filed Mar. 16, 2006.

decision, we have considered only those arguments actually made by Appellant. Arguments which Appellant 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).

OPINION

The Anticipation Rejection of Claims 1, 2, 7, 9-17, 20, and 22-26

We first consider the Examiner's rejection of claims 1, 2, 7, 9-17, 20, and 22-26. Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. *RCA Corp. v. Applied Digital Data Systems, Inc.*, 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984); *W.L. Gore and Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983).

The Examiner has indicated how the claimed invention is deemed to be fully met by the Wood references (Answer 3-10). Regarding independent claim 1, Appellant argues that Wood '419 does not apply *multiple* bias pulses substantially sequentially during a frame time to each microbolometer in the array, nor does the reference measure multiple signals corresponding to the bias pulses as claimed. Rather, Appellant contends, Wood '419 sweeps the microbolometers in the array with a *single*, five-microsecond pulse (Br. 18-22) (emphasis added).

Appellant further argues that the approaches used in the Wood references solve different problems: Wood '149 describes a *still frame* camera where multiple scans may be used to increase sensitivity, but Wood

‘419 discloses a *video* application that uses a single bias pulse to reduce heat. According to Appellant, not only is there no teaching or suggestion to combine these distinct elements, but also averaging scans for a full second in the still frame camera of Wood ‘149 would allegedly be incompatible with producing real time video (Br. 21-22).

The Examiner indicates that a key feature of the camera of Wood ‘149 is the improvement of sensitivity by providing multiple measurements and averaging of sensor signals, thus producing a complete image within the exposure (frame) time. Although the Examiner acknowledges that Wood ‘419 obtains a single measurement by applying a single bias pulse to a single microbolometer in an array, the Examiner nevertheless finds that the multiple measurement and averaging feature of Wood ‘149 necessarily implies applying multiple bias pulses substantially sequentially to each microbolometer in the array. According to the Examiner, applying multiple sequential pulses in this manner would facilitate averaging multiple measurements to ultimately obtain a complete image (Answer 11-12).

We will sustain the Examiner’s rejection of independent claim 1. We agree with the Examiner that the multiple measurements and averaging of the sensitivity improvement feature of Wood ‘149, coupled with the incorporated teachings of Wood ‘419 of applying a single bias pulse to produce an image, at least implicitly discloses applying multiple bias pulses substantially sequentially during a frame time for each microbolometer as claimed.

We note at the outset that although Wood ‘149 pertains to a still image camera and Wood ‘419 involves a video camera, they both share a

common, fundamental attribute: they both *acquire images* via an array of sensors that detect incoming infrared radiation.

As the Examiner indicates (Answer 11-12), images in Wood '149 can be acquired with improved sensitivity either by (1) averaging successive images (i.e., complete images) (Wood '149, col. 5, ll. 11-16), or (2) averaging multiple measurements from sensors to obtain a complete image (Wood '149, col. 5, ll. 47-53). The latter method, in effect, occurs prior to acquiring a complete image.

Although the preferred embodiment of Wood '149 employs thermoelectric sensors to detect infrared radiation (Wood '149, col. 2, ll. 25-46), Appellant has not pointed out -- nor can we find -- any meaningful distinction between the bolometers used in the incorporated Wood '419 disclosure and the thermoelectric infrared sensors used in Wood '149.

In any event, we agree with the Examiner that obtaining these distinct, preliminary measurements from the infrared sensors (and subsequent averaging) would, at least implicitly, involve pulsing the sensors in the manner shown in Figure 6 of the incorporated Wood '419 disclosure. The issue, then, is whether these preliminary measurements occur during a "frame time" as claimed giving the term its broadest reasonable interpretation.

To interpret the term "frame time," we first turn to Appellant's Specification. According to the Specification, "'frame time' refers to a time in which a microbolometer array produces each *complete* picture or image of an object being viewed" (Specification 2:6-7) (emphasis added).[4]

[4] *See also* Specification 9:24-26.

Notwithstanding this express definition, Appellant nevertheless has, in effect, distinguished the scope of the term "frame time" in claim 1 from this definition. Significantly, claim 13 depends from claim 1 and further narrows the "frame time" limitation. But this narrower limitation is commensurate with Appellant's definition in the Specification -- namely that the frame time "is the time it takes for the array to produce a complete image of an object being viewed by the array."

"The doctrine of claim differentiation creates a presumption that each claim in a patent has a different scope…The difference in meaning and scope between claims is presumed to be significant to the extent that the absence of such difference in meaning and scope would make a claim superfluous." *Free Motion Fitness, Inc. v. Cybex Intern., Inc.*, 423 F.3d 1343, 1351, 76 USPQ2d 1432, 1438 (Fed. Cir. 2005) (internal quotation marks and citations omitted).

Under the doctrine of claim differentiation, we therefore presume that the scope of the term "frame time" in claim 1 is broader than the limitation recited in claim 13 -- a limitation commensurate with the definition of "frame time" in the Specification. To do otherwise would render claim 13 superfluous.

With this interpretation in mind, we turn to the prior art. In our view, the preliminary measurements from the infrared sensors in Wood '149 are each obtained (and subsequently averaged) prior to obtaining a *complete* image with improved sensitivity. Therefore, these preliminary measurements -- measurements obtained by applying at least one pulse to the infrared sensors corresponding to each preliminary measurement --

would inherently occur during a "frame time" (i.e., the time required to obtain a complete image with improved sensitivity).[5]

Even if we assume, without deciding, that only one pulse was applied to the infrared sensors for each preliminary measurement in Wood '149 (e.g., in the manner shown in Figure 6 of Wood '419),[6] such a technique would nonetheless effectively result in multiple pulses applied during the "frame time" as claimed since *multiple preliminary measurements* are conducted prior to averaging. That is, each preliminary measurement (and their corresponding pulses) *taken together* effectively result in multiple sequential pulses during the "frame time" as claimed.

For at least the foregoing reasons, Wood '149, considered with its incorporated Wood '419 disclosure, fully meets claims 1 and 13. Accordingly, the Examiner's rejection of those claims is sustained.

Regarding claim 2, the scope and breadth of the claim does not preclude obtaining multiple complete images with increased sensitivity using the still camera of Wood '149. As the Examiner indicates (Answer 4), Wood '149 teaches recording and displaying multiple still frame images (Wood '149, col. 1, ll. 55-58). In our view, each complete, increased-

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[5] Under this interpretation, we find that the "frame time" in Wood '149 actually meets the narrower recitation of "frame time" recited in claim 13 -- an interpretation which likewise meets the broader recitation of the term in claim 1.

[6] Although Wood '419 in Figure 6 shows multiple bias pulses over time, we presume that the time between these pulses is the "frame time" as the term is defined in the Specification and recited in claim 13. That is, we presume that Wood '419 applies one pulse during the frame time -- a teaching commensurate with the admitted prior art shown in Figure 4 of the present application. *See also* Br. 32 (noting that Figure 4 of the present application "corresponds" to Figure 6 of Wood '419).

sensitivity image of a set of such images would be obtained during the respective frame time for each image using the plural measurement and averaging technique noted above with respect to claim 1. Therefore, the recited steps (applying, measuring, computing, and producing) would be repeated for each respective image. The claim is therefore fully met by the Wood references.

Claims 7, 9, 10, 11, 14-17, 20, and 22-26

Although Appellant nominally argues the rejection of dependent claims 7, 9, 10, 11, 14-17, 20, and 22-26 separately (Br. 23-27), the arguments presented do not separately argue with particularity the limitations of the dependent claims, nor do they specifically point out the alleged deficiencies of the Wood references with respect to the limitations recited in the dependent claims. Rather, the arguments essentially reiterate the same arguments we considered above with respect to claims 1 and 13. We therefore sustain the rejection of these claims for the same reasons discussed above in connection with claims 1 and 13. That is, we find that the Examiner has established at least a prima facie case of anticipation for 7, 9, 10, 11, 14-17, 20, and 22-26 on pages 3-6 of the Answer that Appellant has not persuasively rebutted. The Examiner's rejection of these claims is therefore sustained.

The Obviousness Rejections

Claims 3-5

We now consider the Examiner's rejection of claims 3-5 under 35 U.S.C. § 103(a) as unpatentable over Wood '149, Wood '419, and APA. In

rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

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, 82 USPQ2d 1385 (2007) explains:

> 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. *Sakraida* [*v. AG Pro, Inc.*, 425 U.S. 273, 189 USPQ 449 (1976)] and *Anderson's-Black Rock*[*, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 163 USPQ 673 (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, 82 USPQ2d at 1396. If the claimed subject matter cannot be fairly characterized as involving the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement, a holding of obviousness can be based on a showing that "there was an apparent reason to combine the known elements in the fashion claimed." *Id.*, 127 S. Ct. at 1740-41, 82 USPQ2d at 1396. Such a showing requires "some articulated reasoning

with some rational underpinning to support the legal conclusion of obviousness. . . . [H]owever, the 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.*, 127 S. Ct. at 1741, 82 USPQ2d at 1396 (quoting *In re Kahn*, 441 F.3d 977, 987, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)).

If the Examiner's burden is met, the burden then shifts to the Appellant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

Turning to the Examiner's rejection, we conclude that the Examiner has established at least a prima facie case of obviousness of claims 3-5 that Appellant has not persuasively rebutted. Specifically, the Examiner has (1) pointed out the teachings of the Wood references, (2) noted the perceived differences between these references and the claimed invention, and (3) reasonably indicated how and why the references would have been modified to arrive at the claimed invention (Answer 6-7). Once the Examiner has satisfied the burden of presenting a prima facie case of obviousness, the burden then shifts to Appellant to present evidence or arguments that persuasively rebut the Examiner's prima facie case. Appellant did not persuasively rebut the Examiner's prima facie case of obviousness, but merely reiterated that the Wood references fail to disclose applying two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time (Br. 28-29).

For the reasons previously discussed with respect to claim 1, we do not consider Appellant to have persuasively rebutted the Examiner's prima facie case of obviousness for claims 3-5. The Examiner's rejection of these claims is therefore sustained.

Claim 6

Likewise, we will sustain the Examiner's rejection of claim 6 under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Wood '149, Wood '419, APA, and Thiede. We conclude that (1) the Examiner has established at least a prima facie case of obviousness for this claim on page 7 of the Answer, and (2) Appellant has not persuasively rebutted the Examiner's prima facie case. Rather, Appellant merely reiterated the unpersuasive argument that the prior art fails to disclose applying two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time (Br. 30). For the foregoing reasons, the rejection is therefore sustained.

Claims 8, 21, 27, 29, and 33-39

We will also sustain the Examiner's rejection of claims 8, 21, 27, 29, and 33-39 under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Wood '149, Wood '419, and Duvall. Based on the record before us, we conclude that (1) the Examiner has established at least a prima facie case of obviousness for this claim on pages 8-9 of the Answer, and (2) Appellant has not persuasively rebutted the Examiner's prima facie case.

First, we note that regarding dependent claims 8 and 21, Appellant merely reiterates that the prior art fails to disclose applying two or more bias

pulses substantially sequentially to each microbolometer in an array in each frame time (Br. 31). As discussed *supra*, we are not persuaded by this argument. For the reasons previously discussed, the Examiner's rejection of these claims is sustained.

Regarding independent claim 27, Appellant further contends that there is ostensibly no teaching or suggestion to apply two or more substantially sequential bias pulses within a given time frame since Wood '419 already uses a single pulse in a frame time to reduce heat generation which results in a non-uniform temperature (Br. 32).

First, our previous discussion regarding applying multiple bias pulses during a frame time applies equally here and we incorporate that discussion by reference.[7] Second, we find Appellant's arguments are not commensurate with the scope of the claim. In this regard, a "substantially uniform" temperature as claimed is merely a matter of degree: a degree that is relative to a particular temperature range. Simply put, even a 2° C difference in temperature is "substantially uniform" at least with respect to wider temperature ranges.

We recognize that Appellant contrasts the "substantially uniform" temperature profile achieved with the claimed invention in Figure 5 of the present application with that of the prior art in Figure 4 which shows an approximately two-degree difference. This profile, however, merely reflects a *preferred embodiment* of the invention -- an embodiment that hardly limits the scope of the claim. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1323, 75 USPQ2d 1321, 1334 (Fed. Cir. 2005) ("[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly

[7] *See* p. 5-8, *supra*, of this opinion.

warned against confining the claims to those embodiments...[C]laims may embrace different subject matter than is illustrated in the specific embodiments in the specification" (citations and internal quotation marks omitted)). In short, absent some specific reference to a range of temperatures in the claim, the two-degree difference shown in Figure 6 of Wood '419 fully meets a "substantially uniform" temperature during a frame time as claimed.

Notwithstanding this conclusion, we also find the Examiner's reliance on Duvall reasonable for the teaching of varying certain waveform parameters of bias pulses to minimize unwanted detector heating (Answer 18-19). Significantly, these varied parameters include, among other things, varying pulse width and time between the pulses (i.e., frequency of the pulses) (Duvall, col. 6, ll. 43-53; Figs. 8(a)-(d)). Although these bias waveforms have gradual, predetermined rise-times as opposed to instantaneous rise-times of bias pulses shown in Wood '149, the skilled artisan would nevertheless glean from this teaching that adjusting various pulse parameters, including pulse width and frequency, will provide an added degree of control over the detector's temperature, since such parameters directly affect heating of the detector. In view of Duvall's teaching, we conclude that the skilled artisan would have ample suggestion to adjust the frequency and width of the bias pulses in the arrangement of Wood references to more readily control heating of the detectors, including heating in a more uniform manner. For the foregoing reasons, we will therefore sustain the Examiner's rejection of claim 27.

Regarding dependent claims 29 and 33-39, we conclude that (1) the Examiner has established at least a prima facie case of obviousness for these

claims on pages 8 and 9 of the Answer, and (2) Appellant has not persuasively rebutted the Examiner's prima facie case, but merely reiterated that the prior art fails to disclose applying two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time (Br. 32-36). For the foregoing reasons, the rejection is therefore sustained.

Claims 18 and 19

Likewise, we will sustain the Examiner's rejection of claims 18 and 19 under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Wood ‘149, Wood ‘419, and Thiede. We conclude that (1) the Examiner has established at least a prima facie case of obviousness for these claims on pages 9 and 10 of the Answer, and (2) Appellant has not persuasively rebutted the Examiner's prima facie case. Rather, Appellant merely reiterated the unpersuasive argument that the prior art fails to disclose applying two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time (Br. 37). For the foregoing reasons, the rejection is therefore sustained.

Claims 30-32

Likewise, we will sustain the Examiner's rejection of claims 30-32 under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Wood ‘149, Wood ‘419, Duvall, and Thiede. We conclude that (1) the Examiner has established at least a prima facie case of obviousness for these claims on Page 10 of the Answer, and (2) Appellant has not persuasively rebutted the Examiner's prima facie case Rather, Appellant merely reiterated the

unpersuasive argument that the prior art fails to disclose applying two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time (Br. 38-39). For the foregoing reasons, the rejection is therefore sustained.

DECISION

We have sustained the Examiner's rejections with respect to all claims on appeal. Therefore, the Examiner's decision rejecting claims 1-27 and 29-39 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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