UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WILLIAM J. BENETT,
JAMES B. RICHARDS, PAUL L. STRATTON,
ELIZABETH K. WHEELER, PETER KRULEVITCH,
STEVE VISURI, and JOHN M. DZENITIS

Appeal 2008-0255
Application 10/272,178
Technology Center 1700

Decided: July 31, 2008

Before CHARLES F. WARREN, PETER F. KRATZ, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

Opinion for the Board filed by *Administrative Patent Judge* WARREN.

Opinion Dissenting filed by *Administrative Patent Judge* KRATZ.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 1 through 10 and 13 in the Office Action mailed April 17, 2006. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (2006).

We affirm-in-part the decision of the Primary Examiner.

Claims 1 through 3 illustrate Appellants' invention of a thermalcycler, and are representative of the claims on appeal:

1. A thermalcycler for processing a sample consisting of:

a first thermalcycler body unit having a first face,

a second thermalcycler body unit having a second face, said first face and said second face positioned opposite each other,

a first frame structure positioned adjacent said first thermalcycler body unit,

a second frame structure positioned adjacent said second thermalcycler body unit wherein said first frame structure and said second structure contain said first thermalcycler body unit and said second thermalcycler body unit,

a first cavity portion in said first face,

a second cavity portioned in said second face, said first cavity portion and said second cavity portion forming a cavity,

a sample holder positioned in said cavity for receiving said sample, wherein said sample holder is in full direct contact with said first face and said second face, and

a thermalcycling heating unit in at least one of said first thermalcycler body unit or said second thermalcycler body unit, said thermalcycling heating unit operatively connected to sample holder.

2. The thermalcycler of claim 1, wherein said first thermalcycler body unit and second thermalcycler body unit are made of a flexible circuit material.

3. The thermalcycler of claim 1, wherein said first thermalcycler body unit and second thermalcycler body unit are made of a circuit board material.

The Examiner relies upon the evidence in these references (Ans. 3):

Garner	US 5,241,363	Aug. 31, 1993
Northrup	US 5,589,136	Dec. 31, 1996
Hayes	US 5,736,314	Apr. 7, 1998
Furcht	US 6,054,277	Apr. 25, 2000
Hunicke-Smith	US 6,132,996	Oct. 17, 2000
Ackley	US 2001/0026935 A1	Oct. 4, 2001
Lee	US 6,312,886 B1	Nov. 6, 2001
Santini	US 2003/0104590 A1	Jun. 5, 2003

Appellants rely upon the evidence in these references:

Printed circuit board. www.wikipedia.org/wiki/Printed_circuit_board. April 18. 2007.

Silicon. www.wikipedia.org/wiki/Silicon. April 18. 2007.

Appellants request review of the following grounds of rejection under 35 U.S.C. § 103(a) advanced on appeal (App. Br. 12-13):

claims 1, 3, 6, 8, and 10 over Northrup in view of Garner (Supp. Ans. 7);

claims 1, 8 and 10 over Garner in view of Santini (Supp. Ans. 8);

claims 2, 4, 5, and 7 over Garner and Santini as applied to claim 1, further in view of Furcht and Lee (Supp. Ans. 10);

claims 3 and 6 over Garner and Santini as applied to claim 1, further in view of Ackley (Supp. Ans. 12);

claim 9 over Northrup in view of Garner as applied to claim 1, further in view of Lee or Hayes (Supp. Ans. 12); and,

claim 13 over Garner and Santini as applied to claim 1, further in view of Hunicke-Smith (Supp. Ans. 14).

Appellants argue the first and second grounds of rejection based on claim 1, and the third and fourth grounds of rejection based on the claims as a group. App. Br. in entirety. Thus, we decide this appeal based on claims 1 through 3, 9 and 13. 37 C.F.R. § 41.37(c)(1)(vii) (2005).

The principal issues in this appeal are whether the Examiner has carried the burden of establishing a prima facie case of obviousness in each of the grounds of rejection advanced on appeal which, of course, turn on the issues addressed below.

The issues require that we first interpret the language of claim 1 by giving the terms thereof the broadest reasonable interpretation in their ordinary usage in context as they would be understood by one of ordinary skill in the art, in light of the written description in the Specification unless another meaning is intended by Appellant as established therein, and without reading into the claim any disclosed limitation or particular embodiment. *See*, *e.g.*, *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004), and cases cited therein; *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997).

The plain language of claim 1 specifies any manner of apparatus that is capable of functioning as a thermalcycler, that is, a machine that can repeatedly conduct a cycle of at least two different temperatures, which can process any manner of sample of any material. *See, e.g.*, Spec. ¶ 0003. The thermalcycler "consists of" only any manner of "first thermalcycler body unit," any manner of "second thermalcycler body unit," any manner of "first frame structure," any manner of "second frame structure," any manner of "sample holder," and any manner of "thermalcycling heating unit." Each of these components is limited only by language used in the claim with respect to that component. Indeed, contrary to Appellants' contentions (e.g., App, Br., e.g., 14 and 18, and Reply Br., e.g., 2), the transitional term "consisting

of" limits the thermalcycler apparatus to the exact components specified in the claim but does not limit the scope of any component. *See, e.g.*, *AFG Indus., Inc. v. Cardinal IG Co.*, 239 F.3d 1239, 1245 (Fed. Cir. 2001) ("'[C]losed' transition phrases such as 'consisting of' are understood to exclude any elements, steps, or ingredients not specified in the claim."); *Vehicular Techs. Corp. v. Titan Wheel Int'l, Inc.*, 212 F.3d 1377, 1383 (Fed. Cir. 2000) ("In simple terms, a drafter uses the phrase 'consisting of' to mean 'I claim what follows and nothing else.'").

As specified in claim 1, the first and second thermalcycler body units can be the same or different and are limited only to the extent that each thermalcycler body unit has any manner of "face" that has any manner of "cavity portion." The respective faces are "positioned opposite each other," thus "forming" any manner of "cavity" in which can be "received," in any respect, any manner of sample holder. The sample holder "is in full direct contact" with the "first" and "second" faces to the extent that the holder is "received in" the cavity thereof. At least one thermalcycler body unit includes any manner of "thermalcycling heating unit" that has the capability to provide heat for a cycle of at least two temperatures and is "operatively connected to said sample holder" in any manner. The first and second frame structures can be the same or different and are limited only in that each must be at least positioned adjacent, that is, next to or adjoining, in any respect to the respective first and second thermalcycler body units in any manner such that the frame structures "contain" the thermalcycler body units in any respect.

We find no definition for the terms "thermalcycler body unit," "face," "cavity," "frame structure," sample holder," and "thermalcycling heating unit" in the Specification. Indeed, we find no basis in claim 1 on appeal, the Specification, or claim 1 as originally filed to read the terms "thermalcycler body" and "thermalcycler body section" into the term "thermalcycler body unit." Spec., e.g., ¶¶ 0006, 0010, and 0011, and Fig. 1. In the Specification, the only specific structures disclosed for the terms thermalcycler body and thermalcycler body section are a "face" with "a cavity for receiving" a sample holder, tubular flow through or batch, formed in at least one of the faces of the thermalcycler bodies and the thermalcycler body sections. *Id.* Otherwise, different embodiments are disclosed in which the thermalcycler bodies can, for example, "include a portion made of a flexible circuit material," which can be "insulated," or "circuit board material." *Id.*

A representative embodiment illustrated in Specification Figure 1 shows two thermalcycler body sections with faces, at least one of which forms a cavity that is operatively connected to a thermalcycler unit. Spec. ¶ 0011. It is disclosed that such an embodiment can be imbedded in "complex autonomous systems" that can have one or more of a variety of uses. Spec. ¶ 0012. In this embodiment, each thermalcycler body section 101, 102 includes a respective frame structure 103, 104, which structure can include pads 105, 106 that respectively comprise a precision resistor and a temperature sensor. Spec. ¶ 0013. Other embodiments include a fan or pneumatic air source to provide cooling. *Id.* Thermally conductive first and second chamber units 107, 108, which can be made of copper, have cavities 110, 111 and are positioned between the respective first and second

thermalcycler bodies 101, 102. Flow through sample holder tube 109 is positioned in said cavities. Spec. ¶¶ 0014-0015.

"[F]rame structures 103 and 104 can be made of a flexible circuit material or a circuit board material." Spec. ¶ 0016. The flexible circuit material allows pads 105, 106 "to move and align themselves to the surface of" thermally conductive chamber sections 107, 108. *Id.* The circuit board material allows thin frame structures, permitting "components to be thermally close coupled to the other components" and to sample tube 109. *Id.* Thermally conductive pads 112, 113, which can be elastomeric, are positioned between respective frame structures 103, 104 and thermally conductive chamber units 107, 108. Spec. ¶ 0017. Chamber units 107, 108 and conductive pads 112, 113 are held in position by frame structures 103, 104. Spec. ¶ 0018.

In another embodiment, "copper chamber sections 107 and 108 are fabricated using circuit board etching technology. Spec. ¶ 0019. In another embodiment, frame structures 103, 104 "are larger and multiple thermalcycling units are positioned" therebetween along with other elements. *Id.* In another embodiment, "thermalcycler 100 is constructed using microfabrication technologies," which permits the inclusion of any manner of, among other things, electrical and optical devices, including detectors, probes, and sensors in "a single system [that] allows the batch production of reactor-based analytical instruments." Spec. ¶¶ 0020-0021. In other embodiments, thermal chamber sections 107, 108 are in intimate contact with sample tube 109 either by inflating the tube or by pressing

sections 107, 108 on to the tube, or by replacing thermally conductive pads with thermally conductive adhesives or grease. Spec. ¶ 0021.

The first and second cycler body sections 101, 102 can be positioned together by various means including bolts 115 that extend through frame structures 103, 104. Spec. ¶ 0018 and Fig. 1.

A further representative embodiment illustrated in Specification Figure 2 shows a configuration in which foam pads 214, 215 are positioned between frame structures 203, 204 of thermalcycler body sections 201, 202, all of which is positioned between outer frame structures that are unnumbered. Spec. ¶ 0026. Between the unnumbered outer frame structures and frame structures 203, 204 of thermalcycler body sections 201, 202, are foam pads 214, 215, which can be thermal insulative foam, that can "act as compressive springs to force" heating resistors 215 and temperature sensor 216 into intimate contact with conductive pads 212, 213 and chamber units 207, 208. Spec. ¶ 0028. The first and second cycler body sections 201, 202 along with frame structures 203, 204 can be positioned together by various means including unnumbered bolts that extend through the unnumbered frame structures. Spec. ¶ 0027 and Fig. 2.

Accordingly, in giving the apparatus component terms in the body of independent claim 1 their broadest reasonable construction in the context of the claim language, including the preambular terms (*see above* p. 4), and the disclosure in the Specification, we determine the term "thermalcycler body unit" includes any manner of elements that are fabricated in any manner and involved to any extent with repeatedly conducting a cycle of at least two different temperatures, and which have any manner of face, that is, side,

having a cavity that is in contact with any part of any manner of sample holder. At least one of the two thermalcycler body units includes among its elements one or more that have the capability to function as "thermalcycler heating unit" that can provide heat to the sample holder in a cyclic manner. The thermalcycler body unit can further include any manner of elements that test the sample in the sample holder in any respect. The term "frame structure" includes any elements, such as housings, insulation materials and sample testing components, that contain the two thermalcycler body units to any extent, and which can further provide electrical and other support functions for the thermalcycler body units. Dependent claim 9 further specifies the sample holder is a flow through sample holder. Dependent claim 13 further specifies the thermalcycling heating unit comprises at least any manner of precision resistor, and thus can contain any other elements in view of the open-ended term "comprises." *See, e.g., Vehicular Technologies*, 212 F.3d at 1383; *Genentech Inc. v. Chiron Corp.*, 112 F.3d 495, 501 (Fed. Cir. 1997); *In re Baxter*, 656 F.2d 679, 686 (CCPA 1981). In reaching these determinations, we have not read any disclosed embodiments or elements as limitations into these claims because we find no basis in the claim language or in the Specification on which to do so. *See*, *e.g.*, *In re Zletz*, 893 F.2d 319, 321-22 (Fed. Cir. 1989).

The plain language of dependent claim 2 requires that both thermalcycler body units are made solely of any "flexible circuit material," and that of dependent claim 3 requires that both thermalcycler body units are made solely of any "circuit board material." The Specification does not describe a first or second thermalcycler body or thermalcycler body section

that is made entirely of either a flexible circuit material or of circuit board material. Indeed, the Specification discloses embodiments in which each of these materials can be included as "a portion" of a thermalcycler body or thermalcycler body section. *See above* p. 6. Other disclosed embodiments use one or the other of these materials in the frame structure of the thermalcycler body or thermalcycler body section, and, in this regard, the interaction of each of these materials with other components of the thermalcycler body or thermalcycler body section is described. *See above* pp. 6-7. The Specification does disclose that a copper chamber section can be fabricated using circuit board etching technology. *See above* p. 7. We note that, as originally filed, claims 2 and 3 each encompassed a first and second "thermalcycler body" that "comprise" the respective "flexible circuit material and "circuit board material, which open-ended term does not limit the "thermalcycler body" solely to the flexible circuit material or the circuit board material. *See, e.g., Vehicular Technologies*, 212 F.3d at 1383; *Genentech Inc.*, 112 F.3d at 501; *In re Baxter*, 656 F.2d 679, 686 (CCPA 1981).

We find no basis in the language of claims 2 and 3 on appeal or in the Specification and original claims 2 and 3 on which to read any disclosed embodiments or elements as limitations into these claims. *See*, *e.g.*, *Zletz*, 893 F.2d at 321-22. Nor do we find basis therein to limit the claim term "circuit board material" to the type of "circuit board" discussed in the internet article "Printed circuit board" submitted and relied in this respect by Appellants. Supp. Reply Br. 3 and 11. Indeed, Appellants point to a section of this document which states that "[i]n electronics, printed circuit boards, or

PCBs, are used to mechanically support and electrically connect electronic components using conductive pathways, or traces, etched from copper sheets laminated onto a non-conductive substrate." Supp. Reply Br. 3. We point out that this article provides no evidence that PCBs are made of materials that do more than provide mechanical support and/or electrically connections for additional, non-circuit board material components.

Thus, on this record, we conclude the language of dependent claims 2 and 3 when considered in light of the language of claim 1 and the written description in the Specification, including the original claims, as it would be interpreted by one of ordinary skill in the art as discussed above, in fact fails to set out and circumscribe the claimed thermalcycler encompassed by these claims with a reasonable degree of precision and particularity. *See In re Moore*, 439 F.2d 1232, 1235 (CCPA 1971); *see also, e.g., In re Warmerdam*, 33 F.3d 1354, 1361 (Fed. Cir. 1994); *The Beachcombers, Int'l. v. WildeWood Creative Prods.*, 31 F.3d 1154, 1158, (Fed. Cir. 1994); *Orthokinetics, Inc v. Safety Travel Chairs Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986). Therefore, claims 2 and 3 are indefinite under 35 U.S.C. § 112, second paragraph.

On this basis, we determine it is impossible to ascertain the propriety of the Examiner's grounds of rejection of claims 2 and 3 under 35 U.S.C. § 103(a) over the respective combined teachings of Garner, Santini, Furcht, and Lee and of Garner, Santini, and Ackley. *See In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970); *In re Steele*, 305 F.2d 859, 862-63 (CCPA 1962).

While we have considered this appeal in part specifically on claims

2 and 3 as we stated above, our determinations with respect to these claims extends to claims 4 through 7 which contains the same and similar claim terms. Accordingly, we reverse the grounds of rejection as applied to claims 2 through 7 under 35 U.S.C. § 103(a) *pro forma*.

Turning now to the grounds of rejection applied to the remaining appealed claims under 35 U.S.C. § 103(a), we find Northrup would have disclosed to one of ordinary skill in this art integrated microfabricated instruments for performing microscale chemical reactions requiring precise control of reactions parameters, which include silicon-based sleeve devices as reaction chambers for chemical reactions, such as the polymerase chain reaction (PCR).[1] Northrup, e.g., col. 1, ll. 12-20, 31-41, col. 2, l. 66 to col. 3, l. 12, col. 4, ll. 2-7, and col. 5, ll. 23-28. The silicon-based reaction sleeve has integrated heaters and can accept a secondary tube that contains the reaction mixture. Northrup, e.g., col. 3, ll. 33-46, and col. 5, ll. 9-20. Northrup illustrates the invention with, among other things, embodiments shown in Northrup Figures 4-9. Microfabricated reactor 40 includes silicon-based sleeve 41 as a reaction chamber which is constructed of two bonded silicon parts and has slot or opening 42 that accepts tube 45 which holds a sample or reaction mixture 46. Northrup col. 7, ll. 36-58, and Fig. 4. A similar microfabricated reaction chamber 50 has a reaction sleeve of two silicon parts 51, 52 bonded at 53, has slot or opening 54, and a heater with electrical lead 58 and contacts 59 is located on sleeve part 51. The same heater structure is on sleeve part 52. Northrup col. 7, l. 59 to col. 8, l. 33,

and Fig. 6-8. The sleeves are constructed with optical windows 48, 55, 56 which can admit light for heating and/or reaction product detection. Northrup col. 7, ll. 51-52, col. 7, l. 67 to col. 8, l. 3, and Fig. 6-8; *see also* col. 7, ll. 18-32 and Fig. 3. A thermalcycler instrument to conduct PCR has silicon reaction chambers having integrated heaters 81, 82, 83, 84 and a holder or housing 76, wherein holder or housing 76 has temperature feedback control circuitry, heater electronics, computer interface, and power source. Northrup col. 9, ll. 1-41, and Fig. 9.

We find Garner would have disclosed to one of ordinary skill in this art a micropipette adaptor with temperature control useful for thermal cycling of sample solutions for, among other things, PCR, and can be combined with spectroscopy methods of analyzing the sample solution or reaction products formed therein. Garner, e.g., Abstract, col. 1, ll. 12-20, col. 2, l. 17 to col. 4, l. 16, and col. 10, l. 65, to col. 11, l. 19. The micropipette adaptor includes a base member having an aligned hole and conical wall to receive a portion of a micropipette filled with a sample and hold it on the base member, wherein the base member has passageways which facilitate passage of light through the micropipette from an attached optical system for analysis. Garner, e.g., col. 4, ll. 32-50, and col. 5, ll. 3-5. In the latter respect, the optical system elements are positioned on opposite sides of the base member by holders and can be connected to a microprocessor. Garner, e.g., col. 4, ll. 51-68, col. 5, ll. 5-9, and col. 6,

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[1] Northrup evinces that PCR requires specific thermal cycles or repetitions of heating and cooling which can be conducted in capillary tubes. Northrup, e.g., col. 2, ll. 3-65.

ll. 1-14. The metal base member is "sandwiched between two plastic material layers," and a resistive heating wire or a thermoelectric heater/cooler controlled by a thermocouple is positioned against the metal base member by one of the plastic layers to heat the metal base. Garner, e.g., col. 5, ll. 1-3 and 10-18. The base member can be made of copper and acts as a thermal reservoir to heat the micropipette, and the temperature of the sample can be controlled by a temperature feedback control system. Garner, e.g., col. 5, ll. 18-35.

Garner illustrates the disclosed invention with micropipette adopter 10 in which base member 18 is sandwiched between elastomeric members 26, 28 and contained by holders 30, 32, all held together by screws. Garner col. 7, ll. 8-18, col. 8, ll. 26-38, and Fig. 2. The components have openings and optical elements, such as lenses 46, 48, which allow light for optical analysis to pass through adaptor 10. Garner col. 7, l. 18 to col. 8, l. 25, and Figs. 3-4. A further illustration is provided by micropipette adaptor 100 which has base member 110, that can be made of copper, sandwiched between plastic layers 112, 114, which have lenses 116, 118 and can be attached to the base member by bonding, such that the adaptor can fit into a sample holder slot of a spectrophotometer. Garner col. 8, l. 49 to col. 9, l. 3, and Figs. 5-8. Base member 110 has orifice 120 and passageway 126 "adapted to the shape of the micropipette" and thermocouple 130, and heater wire 138 is held between base member 110 and layer 112, wherein the heater wire and the thermocouple can be connected to a feedback system. Garner col. 9, l. 5 to col. 10, l. 33, and Figs. 5-9. Similar micropipette adaptor 200 in operative

association with spectrometer 202 is also illustrated. Garner col. 10, ll. 34-64, and Figs. 10-11.

We find Santini would have disclosed to one of ordinary skill in this art microchip device 10 in which substrate portions 12a, 12b are bonded together to form substrate 12 that along with backing plate 16 and barrier layer 18, forms reservoir or chamber 14, wherein the microchip can include, among other things, control circuitry and a power source. Santini, e.g., ¶¶ 0011, 0027, 0028 and 0031, and Fig. 1C. We find Hayes would have disclosed to one of ordinary skill in this art an apparatus for thermalcycling fluid, such as in PCR amplification, while it flows through tube 20, with temperature control units 22, 24, 26, wherein tube 20 has inlet fitting 28, outlet fitting 29, and storage or analysis tube 30. Hayes, e.g., col. 1, ll. 3-7 and 34-48, col. 2, ll. 42-66, col. 3, ll. 21-35, and Fig. 1. We find Hunicke-Smith would have disclosed to one of ordinary skill in this art apparatus 18 for thermalcycling a DNA sample in which heating elements 24, 26 define heating chambers 28, 30 through which extend tube 32, wherein the heating elements can include resistors 100 that can be a precision thin film metal resistor. Hunicke-Smith, e.g., col. 1, l. 2, to col. 2, l. 12, col. 6, ll. 8-21, col. 9, ll. 60-66, col. 15, ll. 35-40, and Figs. 1A-B and 4A.

The contents of Lee are unnecessary to our decision. *See In re Jones*, 958 F.2d 347, 349 (Fed. Cir. 1992); *In re Kronig*, 539 F.2d 1300, 1302-04 (CCPA 1976).

We determine the combined teachings of Northrup and Garner with respect to claim 1, of Garner and Santini with respect to claim 1, of Garner,

Santini, and Hayes with respect to claim 9, and of Garner, Santini, and Hunicke-Smith with respect to claim 13, the scope of which references we determined above, provide evidence supporting the Examiner's case that the claimed invention encompassed by claims 1, 9, and 13, as we interpreted these claims above, would have been prima facie obviousness to one of ordinary skill in the thermalcycling apparatus arts familiar with the components of such apparatus.

We agree with the Examiner that, prima facie, one of ordinary skill in this art would have been led by the combined teachings of Northrup and Garner to use Garner's plastic material layers and holders to support and contain Northrup's microfabrication reactor chambers. Supp. Ans. 7-8. Indeed, this person would have recognized that Northrup's microfabrication reactor chamber requires connections for the electrical leads and contacts of the heaters of the silicon-based sleeve of the chamber to process a sample, such as that provided by a thermalcycler instrument that can be used to conduct PCR as disclosed by Northrup. This person would have found similar structures in Garner's micropipette adaptor in which plastic material layers sandwich the micropipette receptive base member, forming a thermalcycler body unit that provides the base member with controlled heat, and in Garner's holders which function as frame sections that contain the thermalcycler body unit. Indeed, Garner's holders combined with the micropipette adaptor provide a spectrophotometer that can be used to conduct PCR in similar manner to Northrup's thermalcycler instrument. Thus, this person would have had a reasonable expectation of success in

modifying Northrup by using Garner's plastic material layers and holders to obtain a thermalcycler for processing a sample as required by claim 1.

We further agree with the Examiner that, prima facie, one of ordinary skill in this art would have been led by the combined teachings of Garner and Santini to separate Garner's metal base member into two distinct pieces in similar manner to Garner's plastic material layers and holders. This person would have recognized that the orifice and the passageway of the base member adapted to the shape of the micropipette sample holder can be divided into two parts through the orifice and the passage way, with the resistive thermalcycling heating element disposed in either part of the divided base member. Indeed, Santini discloses that a chamber can be formed by combining several parts. Thus, this person would have had a reasonable expectation of success in modifying Garner's micropipette adapter by forming the base member in two parts, each part of the base member capable of being combined with a plastic material layer to form a thermalcycler body unit, wherein the two body units are contained by the two frame structures as required by claim 1.

We agree with the Examiner that, prima facie, one of ordinary skill in this art would have been led by the combined teachings of Garner and Santini as further combined with Hayes and with Hunicke-Smith to modify Garner's micropipette adaptor to receive a flow through sample holder as shown by Hayes and to use precision resistors for heating the base member as shown by Hunicke-Smith. Supp. Ans. 13 and 14. This person would have recognized the benefits of processing larger volumes with a flow through sample holder as disclosed by Hayes, and of greater control of

temperature cycling with precision resistor heaters as disclosed by Hunicke-Smith as the Examiner points out. Supp. Ans. 13 and 14. Thus, this person would have had a reasonable expectation of success in modifying Garner's micropipette adapter by forming a second orifice in the passage way at the bottom of the base member to adapted to the shape of a flow through micropipette, and by using a precision resistor in the resistive thermalcycling heating unit as required by claims 9 and 13.

Accordingly, we are of the opinion that, prima facie, one of ordinary skill in this art routinely following the combined teachings of the references as combined by the Examiner would have reasonably arrived at the claimed thermalcycler for processing a sample encompassed by claims 1, 9, and 13 without resort to Appellants' Specification. *See, e.g., KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1740-41 (2007) ("[A]nalysis [of whether the subject matter of a claim would have been obvious] 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."); *In re Translogic Tech. Inc*., 504 F.3d 1249, 1260 (Fed. Cir. 2007) ("[A] flexible approach to the [teaching, suggestion, or motivation to combine] test prevents hindsight and focuses on evidence before the time of invention without unduly constraining the breadth of knowledge available to one of ordinary skill in the art during the obviousness analysis." (citations omitted)); *In re Kahn*, 441 F.3d 977, 985-88 (Fed. Cir. 2006); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("[T]he test [for obviousness] is what the combined teachings of the references would have suggested to those of ordinary skill in the

art."); *In re Sovish*, 769 F.2d 738, 743 (Fed. Cir. 1985) (skill is presumed on the part of one of ordinary skill in the art); *In re Bozek*, 416 F.2d 1385, 1390 (CCPA 1969) ("Having established that this knowledge was in the art, the examiner could then properly rely, as put forth by the solicitor, 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.'"); *see also In re O'Farrell*, 853 F.2d 894, 903-04 (Fed. Cir. 1988) ("For obviousness under § 103, all that is required is a reasonable expectation of success." (citations omitted)).

Upon reconsideration of the record as a whole in light of Appellants' contentions, we are of the opinion that Appellants have not successfully rebutted the prima facie case. We note again here that the transitional term "consisting essentially of" does not limit the scope of the individual claim elements, and thus, contrary to Appellants' contentions, appealed claims 1, 9 and 13 do not exclude the optical analysis systems disclosed in conjunction with the thermalcycling components in the thermalcyclers disclosed by Northrup and Garner. *See, e.g.*, App, Br., 14 and 18-20; Reply Br., 2-11 and 21-31; Supp. Reply Br. 4-5 and 8-9. In this respect, we have identified the components of the thermalcycler apparatus disclosed by Northrup, Garner, Hayes, and Hunicke-Smith which fall within the claimed elements, and thus disagree with Appellants that the claimed elements are not found in the applied prior art. *See, e.g.*, App. Br. 16, 17, 21-24, 28-29, and 30-31; Supp. Reply Br. 5. We further agree with the Examiner that, contrary to Appellants' contentions, one of ordinary skill in this art would have been led to combine Northrup and Garner as well as Garner with Santini alone and

further with each of Hayes and Hunicke-Smith on the basis that each combination of references is directed to a thermalcycler apparatus and related devices. *See, e.g.*, App. Br. 17, 23-24, 29-30, and 31-32; Supp. Reply Br. 2.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Northrup and Garner, and of Garner and Santini alone and as combined with Lee and Hayes and with Hunicke-Smith with Appellants' countervailing evidence of and argument for nonobviousness and conclude that the claimed invention encompassed by appealed claims 1, 8 through 10 and 13 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

In summary we have affirmed the grounds of rejection applied to claims 1, 8 through 10 and 13 under 35 U.S.C. § 103(a), and we reverse the grounds of rejection as applied to claims 2 through 7 under 35 U.S.C. § 103(a) *pro forma*.

The Primary Examiner's decision is affirmed-in-part.

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-IN-PART

KRATZ, *Administrative Patent Judge*, concurring-in-part, dissenting-in-part.

I concur with the majority decision to affirm: the Examiner's decision rejecting claims 1, 8 and 10 under 35 U.S.C. § 103(a) over Northrup in view of Garner; the Examiner's decision rejecting claims 1, 8 and 10 under 35

U.S.C. § 103(a) over Garner in view of Santini; the Examiner's decision rejecting claim 9 under 35 U.S.C. § 103(a) over Northrup in view of Garner, and Lee or Hayes; and the Examiner's decision rejecting claim 13 under 35 U.S.C. § 103(a) over Garner, Santini and Hunicke-Smith for substantially the reasons set forth in the majority decision and as presented in the Examiner's Answer.

However, I respectfully dissent from the majority decision to reverse: the Examiner's decision rejecting claims 3 and 6 under 35 U.S.C. § 103(a) over Northrup in view of Garner; the Examiner's decision rejecting claims 2, 4, 5, and 7 under 35 U.S.C. § 103(a) over Garner taken with Santini, Furcht and Lee; and the Examiner's decision rejecting claims 3 and 6 under 35 U.S.C. § 103(a) over Garner taken with Santini and Ackley.

A common thread running through Appellants' Brief is Appellants' assertion that there is no suggestion to modify/combine the applied references in the manner proposed by the Examiner in the rejections (*see, e.g.,* App. Br. 17-18, 23-24, and 26-32). However, the Examiner has furnished specific rationales in each stated rejection for the modifications and combinations of teachings that the Examiner asserts would have rendered the claimed subject matter prima facie obvious to one of ordinary skill in the art (Ans. 6-14, Supp. Ans. 7-14). Rather than addressing each of the specific rationales furnished by the Examiner in support of the proposed modifications set forth in the rejections head on, Appellants primarily rely on their generalized assertions as to a lack of teaching or suggestion in the applied references coupled with additional argumentation as to the scope of the rejected claims being such as to preclude a combination of the references

that would result in the subject matter claimed (*see* the Briefs in their entirety). These arguments are based, in part, on the "consisting of" transitional phrase employed in independent claim 1, which terminology is alleged to exclude certain components from the rejected claims.

Thus, on this record, the Examiner's rationales for the proposed modifications set forth in the rejection, which rationales have not been specifically challenged on appeal are found to be persuasive in suggesting a combination of the references' teachings, as proposed in the Answers. Arguments not made in the Briefs are considered to be waived. *See* 37 C.F.R. § 41.37(c)(vii) (2006).

As for the arguments premised on the rejected claim scope being such as to distinguish over the applied combined references' teachings, I agree with the majority that independent claim 1, as well as dependent claims 8-10 and 13 are of such a scope that the applied combination of references furnish sufficient evidence coupled with the unchallenged suggestion to combine rationales presented by the Examiner to make out a prima facie case of obviousness as to these claims. In this regard, it is further noted that claiming an apparatus including a subcombination of elements employing "consisting of" terminology does not, by itself, serve to persuasively explain why a prior art reference, or combination of references, that discloses such a subcombination of elements, albeit used in combination with other features or elements, is not also a description and/or a suggestion of that claimed subcombination of elements as an apparatus (final or intermediate) product, without the added combination features. Appellants disclose a plethora of additional apparatus features that are useful with their apparatus in

combination, as noted by the majority. This Specification disclosure undercuts Appellants' argument as to the claims being directed to a subcombination apparatus that is non-obvious over the applied prior art that allegedly includes other features.

Moreover, I agree with the majority that Appellants have basically argued the commonly rejected claims as a group with perhaps the exception of claims 3 and 6 as to the first ground of rejection. Thus, I agree with the majority's selection of claims 2 and 3, respectively, as the representative claims for the third and fourth grounds of rejection set forth by the Examiner in the Answer and consider claims 3 and 6 as a group separately with respect to the Examiner's first ground of rejection with claim 3 being representative.

However, in construing representative claims 2 and 3 while giving these claims their broadest reasonable construction as they would be understood by one of ordinary skill in the art while taken in light of the Specification, I consider each of these dependent claims as additionally requiring that the body units of claim 1 include, as at least a part thereof, some material that could also be a material used as part of a flexible circuit (claim 2) or a material used as part of a circuit board (claim 3). Given that claim construction, I agree with the Examiner's obviousness position as to these claims as set out in the Answers. In this regard, Appellants have not established, based on the appeal record properly before us, that silicon and/or other well known materials that would have been obvious to use in constructing the relevant part of Northrup's apparatus are materials that are not found in a circuit board, such that they could be characterized as non-circuit board materials. Nor have Appellants established that the materials

suggested by the combined teachings of Garner, Santini, Fuecht, and Lee or Garner, Santini, and Ackley for forming at least a part of the corresponding body structure (body unit) found in Garner and Santini would not be an appropriate material corresponding to a material useful as part of a flexible circuit, as broadly claimed.

In my view, Appellants have not established reversible error in the Examiner's rejections for any of the rejected claims on this record. Therefore, I would affirm the Examiner's Decision to reject the appealed claims as set forth in the Answers for the reasons discussed above.

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