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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JEFFREY GAIL HOLLOWAY

Appeal 2015-005879
Application 13/442,998
Technology Center 2800

Before CHUNG K. PAK, LINDA M. GAUDETTE, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner's decision² finally rejecting claims 29, 31, 35, and 36 under 35 U.S.C. § 102(e) as anticipated by Choi et al. (US 7,638,861 B2, iss. Dec. 29, 2009 ("Choi")).³ App. Br. 7. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

The invention relates to a device for supporting cantilever leads in a semiconductor package. Specification filed Apr. 10, 2012 ("Spec.") ¶ 2. Claim 29, the sole independent claim on appeal, is reproduced below:

29. A semiconductor package, comprising:

a metallic leadframe having a mounting area for mounting a die and a plurality of cantilever leads with a first end oriented away from the mounting area and a second end oriented toward the mounting area, wherein the cantilever leads each has a first thickness at the first end and a second thickness at the second end to form a recessed surface at the second end, the first thickness being greater than the second thickness; and

one or more non-conductive supports disposed adjacent to the recessed surface of the cantilever leads to support the cantilever leads, wherein

the die is mounted in the mounting area and electrically connected to the cantilever leads at the second end, and

¹ Appellant identifies the real party in interest as Texas Instruments Incorporated. Appeal Brief filed Jan. 12, 2015 ("App. Br."), 3.

² Final Office Action mailed Oct. 10, 2014 ("Final Act."), 3–6 (note that page 1 erroneously indicates the claims as "objected to," rather than "rejected").

³ The Examiner has withdrawn the rejection of claims 29, 31, 35, and 36 under 35 U.S.C. § 103(a) as obvious over Choi. Examiner's Answer mailed Apr. 7, 2015 ("Ans."), 2. The Examiner has also withdrawn the rejection of claims 29, 31 and 35 on the ground of nonstatutory double patenting as unpatentable over claims 29, 31 and 35 of copending US Appln. 14/251,849, in light of Appellant's filing of a Terminal Disclaimer on November 20, 2014. *Id.*

at least a portion of the die, the leadframe, and the supports is encapsulated with an encapsulant.

App. Br. 12 (Claims App'x).

Appellant raises the following issue on appeal: Did the Examiner reversibly err in finding Choi describes a semiconductor package comprising (1) cantilever leads, and (2) non-conductive supports as recited in claim 29? We answer this question in the affirmative for the reasons discussed below.

The Examiner relies on Figure 5B of Choi for a description of the invention as recited in claim 29. *See* Final Act. 4–5. Figure 5B is reproduced below

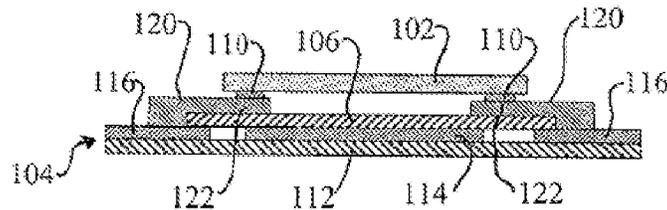


Figure 5B is a cross-sectional view of die 102, leadframe 104, and the non-conducting tape portions of a semiconductor package. Choi 3:51–52. Leadframe 104 includes non-conducting backing 112, die support 114, lead support 116, and a plurality of leads 118 (not shown). *Id.* at 4:61–63. Die support 114 and lead support 116 are electrically isolated from one another by encapsulation material 108 (not shown) that fills the trench between them. *Id.* at 5:1–4. Non-conducting tape 106 covers die support 114 and a portion of lead support 116 such that the edge of tape 106 is proximate or covering a portion of leads 118. *Id.* at 5:5–6, 19–22. A plurality of electrically conductive paths 120 comprising an electrically conductive ink are printed on non-conducting tape 106 using any suitable technique, such as stencil printing. *Id.* at 5:9–10, 25–27. Each of conductive paths 120 includes “an enlarged portion or terminus 122” that lines up with a respective

one of stud bumps 110, whereby die 102 is connected to leads 118 via conductive paths 120. *Id.* at 5:9–13.

The Examiner finds the claim recitation “cantilever leads” reads on Choi’s electrically conductive paths 120. *See* Final Act. 4; Ans. 3. The Examiner further finds the claim recitation “non-conductive supports” reads on Choi’s non-conducting tape 106. Final Act. 4. Based on Choi’s Figure 5B illustration of the semiconductor package, the Examiner finds the thickness of a first end of each of Choi’s cantilever leads (electrically conductive paths 120), i.e., the end oriented away from the die mounting area, is greater than the thickness of a second end, i.e., the end oriented toward the die mounting area (i.e., the end adjacent a respective one of stud bumps 110). *Id.* (annotating Choi Fig. 5B). Based on Choi’s Figure 5B illustration of the semiconductor package, the Examiner finds the first and second ends of each of Choi’s cantilever leads (electrically conductive paths 120) form a recessed surface that is supported on one of Choi’s non-conductive supports (non-conducting tape 106). *Id.* (annotating Choi Fig. 5B).

Appellant contends Choi’s electrically conductive paths 120 do not have sufficient rigidity to meet the claim limitation of a cantilever lead. App. Br. 10. Appellant also argues Choi’s non-conducting tape 106 is not rigid or strong enough to act as a support for a cantilever lead, as required by claim 29. *Id.*

The Examiner, in response, contends the claims do not include any limitations requiring that the cantilever leads and supports have a particular rigidity or strength, and, therefore, finds Appellant’s arguments unpersuasive because they are based on unclaimed features. Ans. 3.

During examination, claim terms must be given their broadest reasonable construction consistent with the Specification. *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007).

The Specification describes the cantilever leads as being formed by stamping or etching the lead frame to the desired shape and thickness. Spec. ¶ 26. The leadframe is described as being “made of any suitable metal or metal alloy, such as copper or a copper alloy . . . , an iron-nickel alloy. . . , or the like, or any combination thereof. *Id.* ¶ 25. The Specification describes the non-conductive supports as “compris[ing] any electrically non-conductive material having sufficient rigidity to support cantilever leads 230a of leadframe 230 during package assembly, such as ceramic, plastic, anodized metal, or the like, or any combination thereof.” *Id.* ¶ 28.

Based on our review of the argued claim terms in light of the Specification, we agree with Appellant that the claim term “cantilever lead” would be understood by the ordinary artisan as part of the leadframe structure itself, i.e., as being made from the “*metallic* leadframe” (claim 29 (emphasis added)). One of ordinary skill in the art further would understand that the claim term “non-conductive supports” requires structures having sufficient rigidity to support the ends of the cantilever leads that form the die mounting area of the leadframe when a die is mounted thereon.

The Examiner has not explained with sufficient clarity how the electrically conductive ink that forms Choi’s electrically conductive paths 120 is a structure formed from the material of Choi’s leadframe. *See* Ans. 3–4. Nor has the Examiner explained adequately how Choi’s non-conducting tape 106 has sufficient rigidity to support a cantilever lead formed from part of Choi’s leadframe when a die is mounted thereon. *See id.* The Examiner’s finding that Choi’s non-conducting tape 106 is a plastic (*see* Final Act. 5 (finding tape 106 meets the claim 35 recitation of a support comprising plastic)) is insufficient to establish that non-conducting tape 106 is a “non-conductive support[.]” within the meaning of the

claims, because the Examiner has not identified evidence that Choi's non-conducting tape 106 is constructed of a plastic having sufficient rigidity to support a cantilever lead in the manner recited in claim 29. We further note Choi's disclosure does not support the Examiner's finding that the ends of Choi's cantilever leads (electrically conductive paths 120) oriented away from the die mounting area have a greater thickness than the ends oriented toward the mounting area, as required by claim 29. *See* Final Act. 4. Choi describes only the ends oriented toward the mounting area as having "an enlarged portion or terminus 122." *See* Choi 5:9–11.

For the above reasons, Appellants have argued persuasively that the Examiner reversibly erred in finding claims 29, 31, 35, and 36 are anticipated by Choi.

REVERSED