

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHN G. DAVIS,
JOSEPH D. POOLE,
KRIS A. SLESINGER AND
MICHAEL C. WELLER

Appeal No. 2005-2558
Application 10/408,149

ON BRIEF

Before KIMLIN, WALTZ, and FRANKLIN, Administrative Patent Judges.
FRANKLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 26-44. A copy of each of these claims is set forth in the attached appendix.

The examiner relies upon the following references as evidence of unpatentability:

Mase et al. (Mase)	5,261,156	Nov. 16, 1993
Bearinger et al. (Bearinger)	5,611,884	Mar. 18, 1997
Schar	5,842,273	Dec. 1, 1998

Claims 26-44 stand rejected under 35 U.S.C. § 103 as being obvious over Schar in view of Bearinger and Mase.

To the extent that appellants provide specific arguments

Appeal No. 2005-2558
Application No. 10/408,149

regarding patentability, with respect to a particular claim, we consider such claim in this appeal. See 37 CFR § 41.37(c)(1)(vii)(September 2004); formerly 37 CFR § 1.192(c)(7)(2003). Also see Ex parte Schier, 21 USPQ2d 1016, 1018 (Bd. Pat. App. & Int. 1991).

OPINION

We have carefully reviewed appellants' brief and reply brief, the examiner's answer, and the evidence of record. This review has led us to the following determinations.

I. The 35 U.S.C. § 103 rejection of claims 26-44

Claims 26, 34, 35, and 40

Beginning on page 5 of the brief¹, appellants argue the patentability of claims 26 and 35 (claim 34 depends upon claim 26 and claim 40 depends upon claim 35; hence appellants have grouped these claims together).

Each of claims 26 and 35 recites a method for mounting a component including a plurality of leads wherein the method comprises, inter alia, aligning the component with the substrate such that each lead is juxtaposed with its corresponding conductive adhesive element. Figure 4 of appellants' specification depicts the resulting electronic package.

¹We refer to the brief filed on February 18, 2005.

Appeal No. 2005-2558
Application No. 10/408,149

Appellants first argue that Schar teaches away from the use of leads, and refers to column 2, lines 34-35, wherein it is disclosed the "the method ought to be lead-free and no-clean". Appellants also refer to column 5, lines 37-42 of Schar in this regard. Brief, page 5. Appellants also point out that while the examiner relies upon Beringer for teaching that it is well known in the art and conventional to utilize leads, Schar teaches away from such use. Brief, pages 5-6. Appellants conclude that "[t]hus, modifying Schar by adding leads as allegedly taught by Beringer would destroy Schar's invention". Brief, page 6.

We are not convinced by such argument for the following reasons.

Firstly, while Schar teaches that the method "ought to be lead-free", we disagree with appellants that such a teaching would have dissuaded one of ordinary skill in the art from using leads in making an electronic component. In this context, we consider the case of In re Gurley, 27 F.3d 551, 553, 31 U.S.P.Q.2d 1130, 1132 (Fed. Cir. 1994). The Court in In re Gurley considered a "teaching away" as representing one of several factors in ultimately affirming the board's decision on obviousness. Gurley claimed an epoxy-based printed circuit board exhibiting bendable and shape retaining qualities. The board sustained the examiner's section 103 rejection of Gurley's claims over prior art that disclosed material for forming circuit boards

Appeal No. 2005-2558
Application No. 10/408,149

similar to those of Gurley, except that the material was a polyester imide-based resin rather than the epoxy resin claimed by Gurley. The prior art did acknowledge that epoxy was known for such use, but viewed epoxy-containing boards as inferior to polyester-imide-containing boards. On appeal to the Federal Circuit, Gurley argued that the prior art taught away from his invention by describing epoxy-containing boards as inferior. The Court, however, rejected this argument, stating that a "teaching away" represents only one of a number of factors considered and weighed in determining obviousness. Stressing the importance of considering the "teaching away" in context, and according it appropriate weight, the court held that a known or obvious material does not become patentable simply because the art described it as somewhat inferior. Id. In the instant case, we determine that the teaching that the method "**ought** to be lead-free" [emphasis added] is a preferred embodiment, and does not teach away from using leads.

Next, beginning on page 8 of the answer, the examiner argues that the bumps on the LGA disclosed in Schar can be considered leads. Beginning on page 1 of the reply brief, appellants argue that the bumps cannot be leads as recited in claims 26 and 35.²

² Appellants also argue extensively this issue on pages 7-12 of the

We determine that this issue is not relevant because, as stated, supra, while Schar states that the method "ought to be lead-free" (and, assuming, *arguendo*, that the bumps on the LGA disclosed in Schar cannot be considered to fall under the definition of a "lead"), such would not dissuade one skilled in the art from using a plurality of leads in place of bumps in a method of making an electronic package, especially in view of the teachings of Bearinger (discussed further below).

Bearinger teaches a chip connection including a chip and substrate and a conductive adhesive. See Figure 2 of Bearinger. Figure 2 shows an interconnect (lead) on a substrate. The conductive adhesive element is located between one of the plurality of contact pads (bond pad) and the corresponding lead (interconnect). Figure 3A also shows an embodiment having a substrate, pad, contact adhesive, and balls, on a chip. The balls correspond to leads. Figure 3B shows the adhesive is located between the pad and the lead. Appellants do not dispute that the configuration taught by Bearinger meets the claim limitations in claim 26 and claim 35 regarding the plurality of leads and the location of the conductive adhesive element.

With regard to other aspects of appellants' claimed subject matter, beginning on page 4 of the answer, the examiner states that Schar teaches attaching a second substrate while the

brief, which we have fully considered.

Appeal No. 2005-2558
Application No. 10/408,149

conductive adhesive is in an uncured or partially cured state, to allow for testing and repair that can be performed at all stages prior to final and complete curing. See column 3, at lines 35-39 of Schar. Answer, page 4. On page 5 of the answer, the examiner states that Schar is silent regarding the step of partially curing the adhesive after mounting the second substrate. The examiner refers to Mase for teaching this aspect of the claimed invention.

Beginning on page 8 of the reply brief, appellants argue that because Schar teaches that Schar's invention provides for easy and flexible testing during all stages of assembly, there would be no reason to modify Schar according to Mase because Schar does not need such modification to achieve flexible testing during all stages of assembly. We are not convinced by this argument for the following reasons.

Schar teaches that the conductive adhesive can be partially cured and the second substrate is attached. See column 3, lines 35-39. One of ordinary skill in the art would appreciate that this could be achieved by applying the conductive adhesive in an uncured state, followed by a step of partially curing the conductive adhesive, followed by attachment of the second substrate. Alternatively, this could be achieved by applying the conductive adhesive in an uncured state, attaching the second substrate, and then partially curing the conductive adhesive. We

Appeal No. 2005-2558
Application No. 10/408,149

see no criticality regarding the order of these steps. As pointed out by the examiner at the bottom of page 5 of the answer, Mase teaches applying an adhesive, followed by mounting of a chip, followed by partially curing the adhesive. Whether the adhesive is partially cured before the chip is mounted, or after the chip is mounted, the result is a chip attached to a substrate by a partially cured adhesive. As stated, supra, Schar teaches that a partially cured adhesive allows for testing and repair to be performed at all stages prior to final and complete curing. In this regard, we agree with the examiner's statements made in the paragraph bridging pages 12-13 of the answer.

In view of the above, we affirm the rejection of claims 26, 34, 35 and 40.

Claims 31 and 41

On page 14 of the brief, appellants argue that Schar in view of Bearinger and Mase do not teach or suggest the features of claims 31 and 41 regarding "determining whether the component is defective or misaligned" and "replacing the component, if defective, with a new component and adjusting the position of or repositioning the component, if misaligned." We disagree. On page 14 of the answer, the examiner explains how Schar teaches testing while the substrates are adhered with the partially cured adhesive and repairing if necessary, and refers to column 3, lines 35-39 and 59-65. We agree with the examiner that testing

Appeal No. 2005-2558
Application No. 10/408,149

and repairing suggests adjusting the positioning or replacing a component.

In view of the above, we affirm the rejection of claims 31 and 41.

Claims 28, 37, 32 and 42

Beginning on page 11 of the reply brief, appellants state that Schar in view of Bearinger and Mase do not suggest the feature of claims 28 and 37 "wherein heating each of the conductive adhesive elements is performed at 50 to 105°C for 10 minutes to 1 hour." Appellants also argue that the applied art does not suggest the features of claims 32 and 42 "wherein performing the full cure comprises heat curing the conductive adhesive elements at 50 to 200°C for 15 seconds to 12 hours."

It is the examiner's position, as set forth on page 14 of the answer, that parameters such as time and temperature for curing would have been within the mechanical skill of the one skilled in the art. We agree. As stated by the examiner, such parameters would depend on the type of adhesive utilized, for example. We note that where general conditions of the appealed claim are disclosed in the prior art, it is not inventive to discover optimum or workable ranges by routine experimentation, and appellants have the burden of proving any criticality. In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 218-19 (CCPA 1980); In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Appeal No. 2005-2558
Application No. 10/408,149

In view of the above, we affirm the rejection of claims 28, 37, 32 and 42.

Claims 27, 29, 30, 36, 38, 39, and 44

It is the examiner's position that it is well known in the art to use heat, radiation exposure, or chemical exposure to partially and fully cure a conductive adhesive. Answer, page 15.

In response, beginning on page 12 of the reply brief, appellants argue that the examiner does not discuss why it would have been obvious to modify Schar to use heat or radiation exposure or chemical exposure.

We determine that the examiner has explained that because it is well known and conventional in the art to use various types of methods to partially and fully cure a conductive adhesive (such as heat, radiation exposure or chemical exposure, and appellants' do not dispute this position), it would have been obvious to use such methods in the method of Schar.

In view of the above, we affirm the rejection of claims 27, 29, 30, 36, 38, 39 and 44.

Claims 33 and 43

On page 15 of the answer, the examiner states that with

Appeal No. 2005-2558
Application No. 10/408,149

regard to claims 33 and 43, one skilled in the art would have readily appreciated applying additional conductive adhesive elements while repairing if such was necessary in order to ensure an adequate electrical connection between each lead and contact site.

On page 13 of the reply brief, appellants argue that the examiner's position represents no more than the examiner's personal opinion because the examiner does not support this position by evidence from the prior art. We are not persuaded by this argument for the following reasons.

Claims 33 and 43 require that additional conductive adhesive elements are applied before replacing the new component on the substrate and before repositioning the misaligned component to its correct position such that each additional conductive adhesive element is on each contact pad.

Appellants are correct that the applied art does not specifically discuss adding more conductive adhesive elements before replacing or repositioning. We believe, however, that it is within the purview of one skilled in the art to modify the amount of adhesive needed to ensure sufficient bonding of the parts. As such, we agree with the examiner's statement made at the bottom of page 15 of the answer where the examiner states that the point of having an adhesive is to ensure adequate adhesion, and one skilled in the art would have been motivated to

Appeal No. 2005-2558
Application No. 10/408,149

determine if the repair process required applying additional adhesive.

In view of the above, we therefore affirm the rejection of claims 33 and 43.

II. Conclusion

The 35 U.S.C. § 103 rejection of claims 26-44 as being obvious over Schar in view of Bearinger and Mase is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv)(effective Sept. 13, 2003; 69 Fed. Reg. 49960 (Aug. 12, 2004); 1286 Off. Gaz. Pat., Office 21 (Sept. 7, 2004)).

AFFIRMED

Appeal No. 2005-2558
Application No. 10/408,149

Edward C. Kimlin)	
Administrative Patent Judge)	
)	
)	
)	BOARD OF PATENT
Thomas A. Waltz)	APPEALS AND
Administrative Patent Judge)	INTERFERENCES
)	
)	
)	
Beverly A. Franklin)	
Administrative Patent Judge)	

BAF/cam

Appeal No. 2005-2558
Application No. 10/408,149

SCHMEISER, OLSEN & WATTS
3 Lear Jet Lane
Suite 201
Latham, NY 12110

APPENDIX

26. A method for mounting a component including a plurality of leads on a substrate including a plurality of contact pads such that each contact pad corresponds to at least one of the plurality of leads, the method comprising the following steps performed in the indicated order:

a) applying a plurality of conductive adhesive elements such that each conductive adhesive element is on each contact pad;

b) aligning the component with the substrate such that each lead is juxtaposed with its corresponding conductive adhesive element and each conductive adhesive element is located between one of the plurality of contact pads and its corresponding at least one lead; and

c) performing a partial cure of the conductive adhesive elements, the partial cure of the conductive adhesive elements providing temporary mechanical connections that affix the plurality of contact pads to their corresponding leads while allowing for adjustment in relative positions of the plurality of contact pads and their corresponding leads such that electrical connections suitable for testing are provided between the plurality of contact pads and their corresponding leads.

27. The method of claim 26, wherein performing the partial cure of the conductive adhesive elements comprises heating each of the conductive adhesive elements.

28. The method of claim 27, wherein heating each of the conductive adhesive elements is performed at 50 to 105°C for 10 minutes to 1 hour.

29. The method of claim 26, wherein performing the partial cure of the conductive adhesive elements comprises radiatively exposing each of the conductive adhesive elements.

30. The method of claim 26, wherein performing the partial cure of the conductive adhesive elements comprises chemically exposing each of the conductive adhesive elements.

31. The method of claim 26, further comprising the following steps in the indicated order, after the step of performing a partial cure:

d) testing the component and determining whether the component is defective or misaligned;

e) replacing the component, if defective, with a new component and adjusting the position of or repositioning the component, if misaligned; and

f) performing a full cure of the conductive adhesive elements, the full cure of the conductive adhesive elements providing permanent fixed mechanical and electrical connections between the plurality of contact pads and their corresponding leads.

32. The method of claim 31, wherein the step of performing a full cure comprises heat curing the conductive adhesive elements at 50 to 200°C for 15 seconds to 12 hours.

33. The method of claim 31, wherein additional conductive adhesive elements are applied before replacing the new component on the substrate and before repositioning the misaligned component to its correct position such that each additional conductive adhesive element is on each contact pad.

34. The method of claim 26, wherein the substrate comprises a circuit card.

35. A method for mounting a component including a plurality of leads on a substrate including a plurality of contact pads such that each contact pad corresponds to at least one of the plurality of leads, the method comprising the following steps performed in the indicated order:

applying a plurality of uncured conductive adhesive elements such that each conductive adhesive element is on each contact pad and is not in mechanical contact with the component;

aligning the component with the substrate such that each lead is juxtaposed with its corresponding conductive adhesive element and each conductive element is located between one of plurality of contact pads and its corresponding at least one lead; and

after said applying and aligning steps, performing a partial cure throughout each of the conductive adhesive elements while each conductive adhesive element is on its respective contact pad and is not in mechanical contact with the component, the partial cure of the conductive adhesive elements providing temporary

mechanical connections that affix the plurality of contact pads to their corresponding leads while allowing for adjustment in relative positions of the plurality of contact pads and their corresponding leads such that electrical connections suitable for testing are provided between the plurality of contact pads and their corresponding leads.

36. The method of claim 35, wherein performing the partial cure comprises heating each of the conductive adhesive elements throughout each of the conductive adhesive elements while each conductive adhesive element is on its respective contact pad and is not in mechanical contact with the component.

37. The method of claim 36, wherein heating each of the conductive adhesive elements is performed at 50 to 105°C for 10 minutes to 1 hour.

38. The method of claim 35, wherein performing the partial cure comprises radiatively exposing each of each of the conductive adhesive elements throughout each of the conductive adhesive elements while each conductive adhesive element is on its respective contact pad and is not in mechanical contact with component.

39. The method of claim 35, wherein performing the partial cure comprises chemically exposing each of each of the conductive adhesive elements throughout each of the conductive adhesive elements while each conductive adhesive element is on its respective contact pad and is not in mechanical contact with the component.

40. The method of claim 35, wherein the substrate comprises a circuit board.

41. The method of claim 35, further comprising:

testing the component and determining whether the component is defective or misaligned;

replacing the component, if defective, with a new component and adjusting the position of or repositioning the component, if misaligned; and

performing a full cure of the conductive adhesive elements throughout each adhesive element, the full cure of the conductive adhesive elements providing permanent fixed mechanical and electrical connections between the plurality of contact pads and their corresponding leads.

Appeal No. 2005-2558
Application No. 10/408,149

42. The method of claim 41, wherein performing the full cure comprises heat curing the conductive adhesive elements at 50 to 200°C for 15 seconds to 12 hours.

43. The method of claim 41, wherein additional conductive adhesive elements are applied before replacing the new component on the substrate and before repositioning the misaligned component to its correct position such that each additional conductive adhesive element is on each contact pad.

44. The method of claim 41, wherein performing the full cure comprises heating each of the conductive adhesive elements.