

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

Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CYNTHIA MELTON and THERESA L. BAKER

Appeal No. 1998-3053
Application 08/677,755

ON BRIEF

Before PAK, OWENS and LIEBERMAN, *Administrative Patent Judges*.
OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the examiner's final rejection of claims 13-18, which are all of the claims remaining in the application.

THE INVENTION

The appellants' claimed invention is directed toward a method for attaching an integrated circuit component to a

substrate by solder bump connections, wherein the solder has a specified composition. Claim 13 is illustrative:

13. A method for attaching an integrated circuit component to a substrate by solder bump interconnections, said substrate comprising a plurality of first bond pads, said integrated circuit component comprising a plurality of second bond pads formed of solder-wettable metal, said method comprising:

forming a solder bump onto each second bond pad, said solder bump being formed of a lead-free solder alloy composed predominantly of tin and optionally up to 1.5 weight percent silver and containing between 2 and 8 weight percent copper,

superposing the integrated circuit component onto the substrate to form an assembly such that each solder bump rests against a corresponding first bond pad,

heating the assembly for a time and at a temperature effective to melt said lead-free solder, whereupon each solder bump forms molten solder that wets the corresponding first bond pad, and

cooling to solidify the solder to form solder bump interconnections bonding the first bond pads and the second bond pads.

THE REFERENCES

Tulman 1989	4,806,309	Feb. 21,
Melton et al. (Melton '341) 1992	5,154,341	Oct. 13,
Melton et al. (Melton '453) 1993	5,269,453	Dec. 14,

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THE REJECTIONS

Claims 13-18 stand rejected as follows: under the judicially created doctrine of obviousness-type double patenting over

claim 1 of Melton '453 in view of Tulman, and under 35 U.S.C. § 103 as being unpatentable over Melton '341 in view of Tulman.

OPINION

We reverse the aforementioned rejections.

Obviousness-type double patenting rejection

Claim 1 of Melton '453 recites that the assembly is heated to a temperature greater than the melting temperature of a solder composition formed of first and second metal constituents, but less than the melting temperature of each of these constituents, such that the first and second metals cooperate to form an interfacial liquid phase that wets a metal plate composed of the first metal and a metal bump composed of the second metal.

Tulman discloses a solder composition which typically is

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95.5 wt% tin, 4 wt% copper and 0.5 wt% silver, and teaches that this solder composition has an undesirably high melting point of approximately 440EF (226.7EC) and is undesirably hard (col. 1, lines 24-29).

The examiner argues that "it would have been obvious to one of ordinary skill in the art to have formed the solder bump interconnection according to Melton '453, using the solder disclosed by Tulman by heating to a temperature between 225EC and 240EC due to the disclosed melting point and because of the known benefit of raising the melting point of a solder by the addition of copper {Paper #9, Preliminary Amendment 'C', page 5, line 22}" (final rejection, paper no. 13, page 3). The preliminary amendment referred to by the examiner states: "It is well known in the art that copper raises the melting point of solders." The examiner states that "the examiner takes official notice that it would be obvious to one of ordinary skill in the art to heat solder bumps above their melting temperature to promote the connection of components" (final rejection, page 5).

As discussed above, however, claim 1 of Melton '453 does not recite melting the at least one solder bump but, rather,

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recites heating to a lower temperature than the melting temperatures of the first and second metal constituents such that an interfacial liquid phase is formed which wets the metal plate and the solder bump. Melting the solder bump clearly would not have produced the required interfacial liquid phase which wets the solder bump. Moreover, the examiner has not explained why, if Tulman's solder were used in the method of claim 1 of Melton '453, the claim requirement would be met that the second metal of which the solder is composed forms, with the first metal of which the metal plate is composed, a solder composition having a melting temperature lower than that of the first and second metals.

The examiner, therefore, has not carried the burden of establishing a *prima facie* case of obviousness over claim 1 of Melton '453 in view of Tulman. Accordingly, we reverse the rejection over these references.

Rejection under 35 U.S.C. § 103

Melton '341 discloses forming a high-melting spacer solder bump (28) surrounded by lower-melting solder (36), and heating to a temperature below the melting temperature of the

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spacer solder bump such that the lower-melting solder liquefies and wets the spacer solder bump (col. 4, lines 21-24 and 50-56; col. 4, line 66 - col. 5, line 5; col. 5, lines 38-43; col. 6, lines 27-35).

The examiner argues that "it would have been obvious to one of ordinary skill in the art to have formed the solder bump interconnection according to Melton '341, using the solder disclosed by Tulman because of the known benefit of raising the melting point of a solder by the addition of copper {Paper #9, Preliminary Amendment 'C', page 5, line 22}" (final rejection, page 4).

Even if Tulman's solder were substituted for the Melton '341 spacer bump solder in order to obtain a higher melting temperature resulting from the copper component, the result would not be the appellants' claimed invention. The reason is that the Melton '341 spacer solder bump is not melted, whereas the appellants' claims require melting the solder bump. Consequently, we reverse the rejection over Melton '341 in view of Tulman.

DECISION

The rejection of claims 13-18 under the judicially

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created doctrine of obviousness-type double patenting over
claim 1 of Melton '453 in view of Tulman, and under 35 U.S.C.
§ 103 over Melton '341 in view of Tulman, are reversed.

REVERSED

	CHUNG K. PAK)	
	Administrative Patent Judge)	
)	
)	
)	
	TERRY J. OWENS)	BOARD OF
PATENT	Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
)	
)	
	PAUL LIEBERMAN)	
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