

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 21

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BIRENDRA N. AGARWALA

Appeal No. 1997-1248
Application 08/480,109

ON BRIEF

Before HAIRSTON, BARRETT and LALL, Administrative Patent Judges.

LALL, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection¹ of claims 9 to 11.

The disclosed invention pertains to a solder pad

¹An amendment after the final rejection was filed as paper no. 14 and its entry was approved [paper no. 15]. However, said amendment made no changes to the claims on appeal.

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structure for adhering a semiconductor chip to a supporting substrate. The invention comprises three specific types of thin-film layers supported on a chip, namely, a bottom layer of solder non-wettable material, an intermediate layer of a mixture of solder wettable and non-wettable material, and a top layer of solder wettable material. For best results, the film edges are ideally shaped as a frustum cone and the solder must have the shape of a ball and it must be electrically and mechanically attached to said frustum cone structure encasing the edges of the top and the intermediate layers. The invention is further illustrated by the following claim.

Representative claim 9 is reproduced as follows:

9. A ball limiting metallurgy pad structure for mechanically and electrically attaching a ball of solder to a surface of a substrate, comprising:

a solder non-wettable layer adhering to said surface of said substrate;

a solder wettable layer;

a phased layer comprised of a phased composition of said solder non-wettable layer and said solder wettable layer positioned between said solder non-wettable layer and said solder wettable layer, said phased layer and said solder wettable layer forming a frustum cone structure on said solder non-wettable layer; and

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a solder ball electrically and mechanically attached to said frustum cone structure encasing edges of said wettable layer and said phased layer with said solder ball forming a solder bead away from said solder non-wettable layer.

The reference relied on by the Examiner is:

Satou 59-117135 Jul. 6, 1984
(Japanese Kokai Patent Publication)

Claims 9 to 11 stand rejected under 35 U.S.C. § 103 over Satou.

Reference is made to Appellant's briefs² and the Examiner's answer for their respective positions.

OPINION

We have considered the record before us and we will reverse the rejection of claims 9 to 11.

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 is expected to make the factual

² A reply brief [paper no. 19] was filed and its entry approved without any further response from the Examiner [paper no. 20].

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determinations set forth in Graham v. John Deere Co., 383 U.S.
1, 17, 148 USPQ 459, 467

(CCPA 1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hosp. System., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the Examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

Furthermore, the Federal Circuit states that "[the] mere fact that the prior art may be modified in the manner

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suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fitch, 972 F.2d 1260, 1266 n.14, 23 USPQ2d 1780, 1783-84 n.14 (Fed. Cir. 1992), citing In re Gordon, 773 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). "Obviousness may not be established using hindsight or in view of the teachings or

suggestions of the inventor." Para-Ordnance Mfg. V. SGS Importers Int'l, 73 F.3d at 1087, 37 USPQ2d at 1239 (Fed. Cir. 1995), citing W. Lish. Gore & Assocs., v. Garlock, Inc., 721 F.2d at 1553, 220 USPQ at 312-13 (Fed. Cir. 1983).

We take the independent claim 9 as representative claim. The Examiner asserts [answer, page 3] that Satou shows "layers 7 and 8 substantially formed as a frustrum [sic] cone." The Examiner further contends [id.] that "[i]t would have been obvious ... to melt the solder ball by heating to some degree in order to form a contact, thereby the solder ball would bead away from the non-wettable layer... ."

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Appellant argues [brief, pages 8 to 9 and Appendix B] that there is no motivation or suggestion to heat the solder ball in Satou, and, even if there were, to what degree would one heat the ball. Appellant further argues [id.] that Satou does not show the frustum cone structure recited in claim 9.

We find that the Examiner is using Appellant's disclosure as a blue print to come up with the structure recited in claim 9. We note that Satou is a highly relevant reference. However, Satou falls short of the specific structure claimed in claim 9. Thus, for example, whereas it may be true that when and if the solder ball were sufficiently heated, the solder ball would probably bead away from the non-wettable bottom layer because the latter is non-wettable, the question is what would motivate one to heat the ball. The Examiner provides no reasoning for it. Furthermore, the Examiner's assertion that Satou shows a substantially frustum cone structure for the edges of the layers is also unsupported. Satou does show a stepped arrangement of the various layers, but it does not disclose a frustum cone structure. The Examiner also argues [answer, pages 4] that "the appellant's

claims do not clearly specify that the solder ball is in direct contact/touch with only the Cu layer or the phased Cu/Cr layer, but simply as 'a solder ball ... encasing edges of said wettable layer and said phased layer with...' as set forth in claim 9." Appellant counters [reply brief, pages 2 to 3] that "encasing" is reasonably synonymous with "direct contact/touch". We find that the phrase "encasing edges" (claim 9, line 13) reasonably implies that the ball is in direct contact with the edges forming the frustum cone. Furthermore, we do not find such structure in Satou, and nor do we find that it would have been obvious to come up with this structure by merely using the disclosure of Satou.

Thus, we do not sustain the obviousness rejection of claim 9 over Satou. Furthermore, since there is no additional evidence or any other line of reasoning, the obviousness rejection of dependent claims 10 and 11 over Satou is also not sustained.

REVERSED

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