

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MAKOTO KANDA

Appeal 2007-2179
Application 10/247,825
Technology Center 1700

Decided: October 15, 2007

Before EDWARD C. KIMLIN, BRADLEY R. GARRIS, and
CHARLES F. WARREN, *Administrative Patent Judges*.

GARRIS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the Examiner's decision rejecting claims 1, 2, and 4-13. We have jurisdiction under 35 U.S.C. § 6.

We AFFIRM.

Appellant claims a manufacturing apparatus of a semiconductor integrated circuit comprising a positive electrode 4, a negative electrode 5, and an induction coil 8 for causing the semiconductor substrate to vibrate

through electromagnetic force, and a high-frequency power source 9 for supplying a high-frequency current to the induction coil (claim 8, Fig. 1).

Representative claims 8, 9, 10, and 12 read as follows:

8. A manufacturing apparatus of a semiconductor integrated circuit, which passes a current through a target plating surface of a semiconductor substrate, provided on a plating liquid, so as to provide a bump electrode on the semiconductor substrate by electrolytic plating method, the manufacturing apparatus comprising:

a positive electrode which is provided in a tank section for storing the plating liquid,

a negative electrode which is connected to the target plating surface of the semiconductor substrate;

an induction coil for causing the semiconductor substrate to vibrate through electromagnetic force; and

a high-frequency power source for supplying a high-frequency current to the induction coil.

9. The manufacturing apparatus of the semiconductor integrated circuit according to claim 8, wherein the semiconductor substrate vibrates at an audio frequency.

10. The manufacturing apparatus of the semiconductor integrated circuit according to claim 8, wherein the induction coil is provided outside the tank section.

12. The manufacturing apparatus of the semiconductor integrated circuit according to claim 8, wherein the high-frequency power source can vary an amplitude and a frequency of an alternating current to be supplied.

The references set forth below are relied upon by the Examiner as evidence of obviousness:

Ikeda	4,841,775	Jun. 27, 1989
Landau	6,261,433 B1	Jul. 17, 2001
Wang	6,610,189 B2	Aug. 26, 2003

All appealed claims are rejected under 35 U.S.C. § 103(a) as being unpatentable over Landau or Wang in view of Ikeda.¹

The Examiner finds that each of Landau and Wang discloses an electro-chemical deposition apparatus which includes a vibrating device for enhancing deposition (Landau, Fig. 2, col. 9, l. 47 - col. 10, l. 18; Wang, Figs. 1 and 3B, col. 13, l. 59 - col. 16, l. 54)(Answer 3-7). The Examiner also finds that the vibrating device of Landau and Wang is not disclosed as including an induction coil with a high-frequency power source as required by the rejected claims but concludes that it would have been obvious for one with ordinary skill in the art to provide the Landau or Wang vibrating device in the form of an induction coil with high-frequency power source in view of Ikeda's disclosure of a vibrating device which comprises an induction coil with a high-frequency power source (Fig. 15, col. 6, l. 66 – col. 7, l. 7)(Answer 3-7).

Appellant does not contest the Examiner's findings but argues that the Examiner's obviousness conclusion is incorrect because the applied prior art

¹ Appellant has separately argued certain groups of claims (Appeal Br. 16-18). We select claims 8, 9, 10, and 12 as representative of these respective groups since they are the broadest claims on appeal.

contains no teaching or suggestion of combining the teachings of Landau or Wang with those of Ikeda to thereby achieve the apparatus defined by claims 8-10 and 12 (Appeal Br. 10-12, 16-18; Reply Br. 2-4). This argument is unpersuasive.

Landau teaches that the vibrational agitation member 82 comprises a vibrational transducer (col. 9, ll. 62-64) and Wang teaches that "[a]ny vibration inducing device that applies sufficient vibration to the substrate is within the scope of one embodiment of vibration inducing device" (col. 15, ll. 52-54). In light of these teachings, an artisan would have used a vibrating transducer having an induction coil with a high frequency power source as the vibrating device of Landau or Wang in view of Ikeda's teaching (Fig. 15, col. 6, ll. 66- col. 7, l. 7) that such a transducer is known in the prior art as an effective vibrating device.

We conclude that this combination of prior art teachings is likely to be obvious because it combines familiar elements (i.e., the apparatus with vibrating device of Landau or Wang and Ikeda's vibrating transducer with induction coil and high frequency power source) according to known methods (i.e., the connection of vibrating device to apparatus as taught by Landau or Wang) to thereby yield no more than predictable results (i.e., the vibration desired by Landau or Wang via the aforementioned vibrating transducer of Ikeda). *See KSR Int'l v. Teleflex*, 127 S. Ct. 1727, 1739 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results").

For these reasons, Appellant is incorrect in believing that an artisan would not have combined the applied reference teachings to thereby obtain the apparatus defined by independent claim 8. Likewise, Appellant is incorrect in believing dependent claims 9, 10, and 12 to be nonobvious. Both Landau (col. 9, ll. 65-66) and Wang (col. 16, ll. 41-42) teach that their vibrating devices are capable of producing vibration frequencies within the audio frequency range (i.e., 10-20 KHz; Specification 28, last full para.) as required by dependent claim 9, thereby evincing obviousness with respect to this claim feature. Disposing the induction coil outside the tank section as required by dependent claim 10 would have been obvious since this disposition for a vibrating device is expressly taught by Landau (see vibrational agitation member 82 in Fig. 2) and Wang (see vibration inducing device 702 in Fig. 3B). Finally, the capability of varying amplitude and frequency required dependent claim 12 would have been obvious because variation across a range of amplitudes and frequencies is taught by both Landau (col. 9, l. 62-col. 10, l. 18; col. 16, ll. 53-60) as well as Wang (col. 15, ll. 36-37).

We hereby sustain, therefore, the Section 103 rejections of all appealed claims as being unpatentable over either Landau or Wang in view of Ikeda.

The decision of the Examiner is affirmed.

Appeal 2007-2179
Application 10/247,825

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(vi).

AFFIRMED

cam

NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203