

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LAM RESEARCH CORP.,
Petitioner,

v.

DANIEL L. FLAMM,
Patent Owner.

Case IPR2015-01767
Patent 6,017,221

Held: October 4, 2016

BEFORE: CHRISTOPHER L. CRUMBLEY, JO-ANNE M.
KOKOSKI, and KIMBERLY McGRAW, Administrative Patent
Judges.

The above-entitled matter came on for hearing on Tuesday,
October 11, 2016, commencing at 1:00 p.m., at the U.S. Patent
and Trademark Office, 600 Dulany Street, Alexandria, Virginia.

APPEARANCES:

ON BEHALF OF THE PETITIONER:

MORGAN CHU, ESQUIRE
SAMUEL K. LU, ESQUIRE
MICHAEL R. FLEMING, ESQUIRE
Irell & Manella, LLP
1800 Avenue of the Stars, Suite 900
Los Angeles, California 90067-4276

ON BEHALF OF PATENT OWNER:

GEORGE C. SUMMERFIELD, ESQUIRE
Stadheim & Grear
400 North Michigan Avenue
Suite 2200
Chicago, Illinois 60611

and

CHRISTOPHER FRERKING
University of New Hampshire School of Law
Two White Street
Concord, New Hampshire 03301

1 (This partial transcript is extracted from the transcript of the
2 Oral Hearing held in IPR2015-01764 and IPR2015-01768, from
3 which testimony regarding IPR2016-01767 was incorporated).

4 P R O C E E D I N G S

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6 JUDGE CRUMBLEY: Despite my earlier mistake, this
7 is 1767. Mr. Fleming, would you like to reserve any time?

8 MR. FLEMING: I would like to reserve 12 minutes out
9 of the 30.

10 JUDGE CRUMBLEY: You may begin when ready.

11 MR. FLEMING: Good afternoon, Your Honor. I'm
12 Mike Fleming. I represent the petitioner, Lam Research. And
13 today we have before us eight grounds. In the first grounds, 1
14 through 4, Dr. Flamm does not dispute the dependent claims.

1 So claim 1 is before us. And for grounds 5 through 8, next slide,
2 please, slide 3, Flamm does not make any arguments for these
3 grounds.

4 So if we could move to slide 4, please, I'm going to talk
5 about the purported invention in the '221 and also talk about the
6 claim language. I'm also going to talk about how the prior art
7 anticipates claim 1. And then if I have time, I want to talk about
8 what prior art renders claim 1 obvious.

9 So if we could go to slide 5, please. So the technology
10 that is before you today relates to a plasma processing using an
11 inductive discharge tube. If you look on Lieberman Figure 25A,
12 this shows the well-known process. And here, if I can hold it
13 there, right there is the discharge tube. And in that discharge tube
14 is a reacted gas. And also in that discharge tube toward the
15 bottom is a chuck, and on top of that chuck is a semiconductor
16 wafer. There is a coil that's wrapped around the outside of the
17 discharge tube. That is energized with an RF voltage, radio
18 frequency voltage. That induces an inductive current which has
19 charged the reactive gas to become an ion plasma. That ion
20 plasma is attracted to the chuck and reacts on the surface of the
21 semiconductor wafer, therefore, doing the manufacturing step.

22 If I could have slide 8, please. Here is the '221
23 Figure 2A. This shows the tube, the discharge tube 52. It also
24 shows the coil that's wrapped around the tube. It also shows that
25 the generator 61 charges up that coil with that voltage. And what

1 it also shows is that that produces a standing wave in the coil. It's
2 not a traveling wave. It's a standing wave. And so what is
3 important about a standing wave is the center point right there,
4 which is the AC voltage, that is fixed by position because it's a
5 standing wave.

6 The other aspect that's important is you see that C and
7 A, those two there -- it's hard to control this thing.

8 JUDGE CRUMBLEY: You know, we used to have an
9 actual screen up there and you could see the laser much better.

10 MR. FLEMING: In any event, C and A are the
11 maximum voltages. They are fixed too by a position. So that
12 means that that's what the maximum voltage that's going to be
13 seen by the discharge tube. That's important.

14 So if I could have slide 6, please. So the problem is
15 these leakage currents. They are due to capacitive currents. And
16 the problem is that these leakage currents cause problems. They
17 cause a nonuniformity of the ion flux, and as a result, it's hard to
18 control the flux so that it goes to where we want it to go on the
19 wafer. So that is a problem.

20 So if we could go to slide 7, please. So the way '221
21 solves this problem is by selectively balancing the phased portion
22 and the anti-phased portion of the capacitive currents with the
23 wave adjustment circuit. So if we go to slide 9, please, so here is
24 what's going on. By placing the standing waves virtual ground in
25 the center of the coil, you are able to balance the phase and

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