Paper No. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TIEN-EN HSIAO

Appeal No. 2003-1884
Application No. 09/837,943

ON BRIEF

Before KIMLIN, GARRIS and WALTZ, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-25, all the claims in the present application. Claim 1 is illustrative:

1. A cooling system for supplying a reaction chamber with coolant during a semiconductor fabrication process; said cooling system comprising:

coolant supply circuitry which controls supply of said coolant;

a coolant flow controller having a setpoint control to set a flow of said coolant by transmitting a voltage signal to said circuitry; and

a filter for removing noise from said voltage signal to stabilize said flow of said coolant.

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

Tsubone et al. (Tsubone) Hei 5-49904 Mar. 02, 1993
(Japanese Kokai Patent Application)

Nakagawa Hei 7-161696 Jun. 23, 1995
(Japanese Kokai Patent Application)

Matsumura Hei 11-284016 Oct. 15, 1999
(Japanese Kokai Patent Application)[1]

Ralph J. Smith, Circuits, Devices, and Systems- A First Course in Electrical Engineering 158-61, 511-13 (3d ed., John Wiley & Sons, Inc., New York 1966)

MKS Product Announcement (May 25, 1999)

Appellant's claimed invention is directed to a cooling system for a reaction chamber used in a semiconductor fabrication process. The system comprises a coolant flow controller having a setpoint control to set a flow of the coolant by transmitting a voltage signal to coolant supply circuitry. The system also comprises a filter for removing noise from the voltage signal. The removal of noise by the filter allows for a stable flow of coolant which results in uniform contact between a semiconductor wafer and its supporting chuck.

[1] We rely upon full English translations of Tsubone, Nakagawa, and Matsumura, all previously made of record.

Appealed claims 1-13, 15-17, 20-23 and 25 stand rejected under 35 U.S.C. § 103 as being unpatentable over Tsubone in view of Smith and MKS. Claims 14 and 24 stand rejected under 35 U.S.C. § 103 as being unpatentable over the stated combination of references further in view of Nakagawa. Also, claims 18 and 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over the stated combination of references further in view of Matsumura.

We have thoroughly reviewed the respective positions advanced by appellant and the examiner. In so doing, we find ourselves in agreement with appellant that the examiner has not established a prima facie case of obviousness for the claimed subject matter. Accordingly, we will not sustain the examiner's rejection.

Appellant agrees with the examiner that one of ordinary skill in the art would have known to use a filter for removing noise from an electronic circuit. It is appellant's contention that the present invention resides in the discovery that "the fluctuating mass coolant flow problem results from the spiking voltage signal at setpoint control 102 [whereas] [p]rior to the invention, ordinarily skilled artisans did not recognize that the problem was the spiking voltage control noise" (page 7 of

principal brief, second paragraph). According to the present specification,

> Those of ordinary skill in the relevant art have heretofore concluded that noise 12' and 14' is due to the RF power of the apparatus and the magnetic field surrounding the cables 134,136 adjacent to the FLOW terminal 104 and the PRESSURE terminal 106 (Fig. 2). According to applicant's study, however, neither RF power nor magnetic influence is the root cause of the spike problem. Applicant has insulated cables 134,136 with a mass of lead, for example, to prevent interference by any electrical or magnetic field, but such measures failed to improve the spike problem [page 11, first paragraph.

According to the examiner:

> As control signals may acquire noise specially [sic, especially] if routed across several pieces of active components, as admitted by the applicant (Specification page 5 line 11-130 [sic, lines 11-13]), it would have been obvious to one having ordinary skill in the art at the time the invention was made to reduce noise by using a simple RC filter connected between the output of the coolant controller and the input of the flow controller.

Page 5 of Answer, first paragraph. The examiner further explains that "[o]nce the noise-affected part of the system is identified, it would have been a simple matter to reduce noise by using filtering" (page 7 of Answer, last paragraph).

The flaw in the examiner's reasoning is that although it may have been a simple matter for one of ordinary skill in the art to reduce noise by using filtering, the examiner has not established that one of ordinary skill in the art would have reasonably

expected that the problem of fluctuating coolant flow is caused by noise in the voltage signal at the setpoint control. On the other hand, appellant makes the following compelling argument at page 3 of the Reply Brief:

> Cooling systems involve hydromechanics, electronics, and mechanics. The reasons for the coolant mass flow spike problem might include, but not limited to, coolant characteristics, imperfection of control circuit design, imperfection of the coolant transfer parts, malfunction of the control circuit, miscommunication between the control circuit and the coolant transfer parts, static electricity, magnetic field, RF power, temperature, dust, etc. As described in the present application, at the time the invention was made, ordinarily skilled artisans linked the coolant mass flow spike problem to control circuit malfunction, the magnetic field surrounding cables 134 and 136, and RF power [paragraph three].

In our view, while appellant's solution to the problem may have been obvious to one of ordinary skill in the art, the examiner has not demonstrated that appellant's recognition of the problem would have been obvious to one of ordinary skill in the art. It is well settled that invention may reside in the discovery of a problem even when its solution becomes readily apparent once the problem is identified.

In conclusion, based on the foregoing, the examiner's decision rejecting the appealed claims is reversed.

REVERSED

EDWARD C. KIMLIN Administrative Patent Judge	)	
BRADLEY R. GARRIS Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
THOMAS A. WALTZ Administrative Patent Judge	)	

ECK:clm

Applied Materials, Inc.
2881 Scott Blvd., M/S 2061
Santa Clara, CA 95050