

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte MICHAEL R. CONBOY, RUSSEL SHIRLEY  
and ELFIDO COSS, JR.

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Appeal No. 2003-0614  
Application 09/520,591

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ON BRIEF

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Before ABRAMS, MCQUADE, and BAHR, Administrative Patent Judges.  
MCQUADE, Administrative Patent Judge.

DECISION ON APPEAL

Michael R. Conboy et al. appeal from the final rejection of claims 1 through 26, all of the claims pending in the application.

THE INVENTION

The invention relates to "apparatus and systems for rotating and tracking the movement of wafers in a semiconductor processing plant" (specification, page 2). Representative claim 1 reads as follows:

1. An apparatus for wafers in a multiple stage wafer processing system, the apparatus comprising:

Appeal No. 2003-0614  
Application 09/520,591

means for determining an incoming angle of rotation on a wafer at a first stage of wafer processing;

means for rotating the wafer to an outgoing angle of rotation before moving into a second stage of wafer processing; and

a computer arrangement that records the angle of rotation and a corresponding wafer location in the wafer processing system as the wafer moves through each stage of the processing system.

#### THE PRIOR ART

The references relied on by the examiner to support the final rejection are:

Bacchi et al. (Bacchi)	5,511,934	Apr. 30, 1996
Tigelaar et al. (Tigelaar)	6,180,424	Jan. 30, 2001

#### THE REJECTIONS

Claims 1 through 26 stand rejected under 35 U.S.C. § 112, first paragraph, as being based on a specification which fails to comply with the enablement requirement.

Claims 1, 3, 16, 19 and 21 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Tigelaar.

Claim 18 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Tigelaar.

Claims 2, 4 through 15, 17, 20 and 22 through 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tigelaar in view of Bacchi.

Attention is directed to the appellants' main and reply briefs (Paper Nos. 8 and 12) and to the final rejection and

Appeal No. 2003-0614  
Application 09/520,591

examiner's answer (Paper Nos. 4 and 11) for the respective positions of the appellants and examiner regarding the merits of these rejections.<sup>1</sup>

## DISCUSSION

### I. Petitionable matter

In the reply brief, the appellants contend that the examiner improperly entered new grounds of rejection in the answer. As this question is not directly connected with the merits of issues involving the claim rejections, it is reviewable by petition to the Director rather than by appeal to this Board (see In re Hengehold, 440 F.2d 1395, 1403-04, 169 USPQ 473, 479 (CCPA 1971)), and hence will not be further addressed in this decision.

### II. The 35 U.S.C. § 112, first paragraph, rejection of claims 1 through 26

According to the examiner, the appellants' specification fails to adequately teach how to make and/or use the claimed invention, and thus is non-enabling, because

[c]laims 1 and 23 define a "means for determining an incoming angle". Claims 4 and 22 define a scanning device adapted to determine angles of rotation. Claims 4, 16 and 22 define a rotating device that rotates the wafer to an incoming angle of rotation. It is unclear from the descriptive portion of the specification what

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<sup>1</sup> In the answer, the examiner neglected to restate the 35 U.S.C. § 103(a) rejection of claim 18. The record indicates that this omission was inadvertent.

Appeal No. 2003-0614  
Application 09/520,591

these structures are and how they operate with the other claimed structure. That is, are these means or devices known types of apparatus and if so what are they and how do they relate to the other claimed elements. These are but examples of many of the terms or phrases in the claims that are not clearly defined in the descriptive portion of the specification as to what or how these means or devices operate. Further no flow diagrams have been provided as to how the claimed computer arrangement functions to perform its recited claimed functions [final rejection, page 3].

Insofar as the enablement requirement of § 112, ¶ 1, is concerned, the dispositive issue is whether the appellants' disclosure, considering the level of ordinary skill in the art as of the date of the application, would have enabled a person of such skill to make and use the claimed invention without undue experimentation. In re Strahilevitz, 668 F.2d 1229, 1232, 212 USPQ 561, 563-64 (CCPA 1982). In calling into question the enablement of the disclosure, the examiner has the initial burden of advancing acceptable reasoning inconsistent with enablement. Id.

In essence, the examiner's determination that the appellants' disclosure is non-enabling rests on the breadth with which the various means and devices set forth in the appealed claims are described. The accompanying criticism that the specification fails to convey how these means or devices relate to one another has no merit. The description of the means and

devices at issue, and their manner of operation, indicates that they are relatively simple and straightforward instruments. The examiner has not established or cogently explained, and it is not apparent, why the mere breadth with which these means and devices are described would have prevented a person of ordinary skill in the art from making and using the claimed invention without undue experimentation.

Accordingly, we shall not sustain the standing 35 U.S.C. § 112, first paragraph, rejection of claims 1 through 26.

III. The 35 U.S.C. § 102(e) rejection of claims 1, 3, 16, 19 and 21 as being anticipated by Tigelaar

Tigelaar discloses "a method of testing semiconductor wafers to locate problems resulting from the fabrication procedure" (column 1, lines 9 through 11). The reference describes this method, and the system for implementing it, as follows:

[r]eferring to the FIGURE, there is shown a host computer 1 which controls the testing operation in accordance with the present invention. Initially semiconductor wafers are loaded into a cassette 3 in standard manner for fabrication with the host computer 1 tracking the location 5 and rotational orientation 7 of each wafer initially placed within the cassette. After one or more processing steps, as determined by the host computer 1, the wafers are rearranged within the cassette 3 by a robot or the like 5 as is known in the art under control of the host computer with the host computer tracking the new location of each wafer within the cassette. Each wafer is also rotated within the cassette 1 by a rotating tool 7 under control of the host computer 1 after one or more processing steps,

such rotation being generally 90, 180 or 270 degrees for simplicity. Wafer rotation for each wafer at all steps in the fabrication procedure is tracked by the host computer 1 with such wafer rotation being either concurrent with wafer rearrangement or independent of wafer rearrangement by the robot 5. Wafer rearrangement and wafer rotation can take place independently after each processing step or periodically according to programs set up in the host computer 1 and can be concurrent and/or at different steps in the processing cycle. After all processing steps have been completed for wafer fabrication and the components on the wafer have been fabricated, one or more parameters of the fabricated components including components specifying spatial variation or a parameter measured with respect to the notch are tested in standard manner with a parameter measure system 9 with the test results being sent to the host computer on a wafer by wafer basis for correlation with the location and orientation of each wafer during processing to locate fluctuation of parameters from wafer to wafer (correlated to wafer location) or fluctuation of parameters across wafers (correlated to rotation) in the fabrication process and to determine process locations or operations which may require correction due to [this] analysis of such fluctuations on a rotational and rearranged wafer basis [column 2, line 65, through column 3, line 33].

Tigelaar also teaches that the robot and rotating tool collectively constitute a sorter for rotating and rearranging the wafers in the cassette (see column 2, lines 16 through 23), and that it is known in the art to provide each wafer with a unique readable number or bar code and to periodically read the number to locate the wafer (see column 1, lines 36 through 42).

Appeal No. 2003-0614  
Application 09/520,591

Anticipation is established only when a single prior art reference discloses, expressly or under principles of inherency, each and every element of a claimed invention. RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984). It is not necessary that the reference teach what the subject application teaches, but only that the claim read on something disclosed in the reference, i.e., that all of the limitations in the claim be found in or fully met by the reference. Kalman v. Kimberly Clark Corp., 713 F.2d 760, 772, 218 USPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984).

The appellants contend that the anticipation rejection of claims 1, 3, 16, 19 and 21 is unsound (see pages 9 and 10 in the main brief and page 4 in the reply brief) because Tigelaar fails to meet the limitation in independent claim 1 requiring "means for determining an incoming angle of rotation on a wafer at a first stage of wafer processing," and the limitations in independent claim 16 requiring "a sorting apparatus that identifies a wafer and places the wafer in a carrier slot" and "a rotating apparatus that rotates the wafer to an incoming angle of rotation as the wafer is presented to a first processing stage of wafer processing." As indicated above, Tigelaar's host computer

Appeal No. 2003-0614  
Application 09/520,591

tracks the rotational orientation of each wafer when initially placed within the cassette and also the rotation of each wafer imparted by the rotating tool after a selected processing step (and hence before the next processing step). Given these functions, the host computer necessarily embodies means for determining an incoming angle of rotation on a wafer at a first stage of wafer processing as recited in claim 1. Similarly, Tigelaar's robot arm and rotating tool, in conjunction with the host computer, respectively constitute a sorting apparatus that identifies a wafer and places the wafer in a carrier (cassette) slot and a rotating apparatus that rotates the wafer to an incoming angle of rotation as the wafer is presented to a first processing stage of wafer processing as recited in claim 16. Thus, the appellants' argument that the subject matter recited in independent claims 1 and 16, and dependent claims 3, 19 and 21, distinguishes over Tigelaar is not persuasive.

We shall therefore sustain the standing 35 U.S.C. § 102(e) rejection of claims 1, 3, 16, 19 and 21 as being anticipated by Tigelaar.

Appeal No. 2003-0614  
Application 09/520,591

IV. The 35 U.S.C. § 103(a) rejection of claim 18 as being unpatentable over Tigelaar

Claim 18 depends from claim 16 and recites "a control system coupled to the computer arrangement that shares wafer processing data generated from prior manufacturing runs, wherein the computer arrangement uses wafer processing data in making adjustments to the wafer processing system." Implicit in the examiner's obviousness rejection of this claim is an acknowledgment that Tigelaar does not teach such a system. Nonetheless, and irrespective of the appellants' arguments (see pages 19 through 21 in the main brief and page 6 in the reply brief), Tigelaar's disclosure of the host computer's role in controlling the overall process and in testing for process locations and operations which may require correction would have suggested a control system and computer arrangement as recited in claim 18 for the purpose of effecting necessary corrections.

We shall therefore sustain the standing 35 U.S.C. § 103(a) rejection of claim 18 as being unpatentable over Tigelaar.

V. The 35 U.S.C. § 103(a) rejection of claims 2, 4 through 15, 17, 20 and 22 through 26 as being unpatentable over Tigelaar in view of Bacchi

Bacchi discloses a prealigner 10 which "selectively aligns a semiconductor wafer 12 with a predetermined position and orientation preparatory to transferring wafer 12 to a

predetermined receiving station in an integrated circuit manufacturing facility" (column 3, lines 22 through 26). To this end, the prealigner includes an optical scanning assembly 36 which performs an edge scan of a wafer to compute its position and orientation and a second scan to read a bar code symbol 86 on the wafer (see column 4, lines 60 through 67). The periphery of the wafer may include a notch 82 which can be scanned to identify the orientation of the wafer (see column 4, lines 45 through 53)

In proposing to combine Tigelaar and Bacchi, the examiner concludes that

[t]o have a scanning device provide input to the host computer of Tigelaar et al and a means to provide identification of a wafer by way of an identification code on the wafer to the host computer so as to aid in the operation of the apparatus would be obvious in view of Bacchi et al [final rejection, pages 4 and 5].

Notwithstanding the appellants' hindsight arguments to the contrary (see pages 16 through 18 in the main brief), the combined teachings of Tigelaar and Bacchi would have suggested the use of a scanning device of the sort disclosed by Bacchi as a practical manner of implementing the wafer identification and tracking functions broadly disclosed by Tigelaar.

As so modified in view of Bacchi, the Tigelaar system would account for all of the limitations set forth in claims 2, 4, 7, 8, 13 and 22 through 26. To the extent that the appellants have

argued the limitations in independent claims 4, 22 and 23 which are similar to the argued limitations in independent claims 1 and 16 (see pages 10 through 12 in the main brief), such arguments are unconvincing for the reasons expressed above in connection with claims 1 and 16.

We shall therefore sustain the standing 35 U.S.C. § 103(a) rejection of claims 2, 4, 7, 8, 13 and 22 through 26 as being unpatentable over Tigelaar in view of Bacchi.

The combined teachings of Bacchi and Tigelaar do not account, however, for the recitations in claims 5 and 12 that the rotating device or sorting apparatus "randomly" rotates the wafer axially, the recitations in claims 6 and 17 that the rotating device is adapted to impart or rotate a translation angle, the recitation in claim 9 that the sorting apparatus is adapted to place multiple sets of wafers in a carrier and arrange each set in a different rotation angle with respect to the adjacent set of wafers, the recitation in claim 10 that the sorting apparatus is adapted to arrange all of the wafers in the carrier such that each has a distinct angle of rotation from any other wafer in the carrier, the recitation in claim 11, which depends from claim 10, that the sorting apparatus is adapted to verify that all of the wafers have a distinct angle of rotation before processing

Appeal No. 2003-0614  
Application 09/520,591

starts, the recitation in claim 14 that the rotating device is adapted to rotate the wafer axially to the exclusion of certain areas on the wafer, the recitation in claim 15 that the rotating device is adapted to rotate the wafer axially to the exclusion of a certain processing step in the system, and the recitation in claim 20 of a wafer carrier movement detector for determining the "rate" of rotation of the carrier moving through the wafer processing system. In short, the examiner has failed to proffer the evidentiary basis necessary to bridge these gaps.

Hence, we shall not sustain the standing 35 U.S.C. § 103(a) rejection of claims 5, 6, 9 through 12, 14, 15, 17 and 20 as being unpatentable over Tigelaar in view of Bacchi.

#### SUMMARY

The decision of the examiner to reject claims 1 through 26 is affirmed with respect to claims 1 through 4, 7, 8, 13, 16, 18, 19 and 21 through 26, and reversed with respect to claims 5, 6, 9 through 12, 14, 15, 17 and 20.

Appeal No. 2003-0614  
Application 09/520,591

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

AFFIRMED-IN-PART

NEAL E. ABRAMS	)	
Administrative Patent Judge	)	
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JOHN P. MCQUADE	)	
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JENNIFER D. BAHR	)	
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Appeal No. 2003-0614  
Application 09/520,591

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