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H1K KMBX

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(54) Abstract Title
Equipment for semiconductor fabrication

(57) Equipment for semiconductor fabrication which uses a wafer container 50 having bar code wings 55, 60 projecting outward from at least one of the walls of the container, and a bar code 65 formed on the lower surface of the bar code wing. The equipment comprises a loader/unloader portion having a bar code reader 75 provided below the path of the container through the equipment. The beam 95 from the bar code reader is vertically projected to read the bar code.

FIG.5A

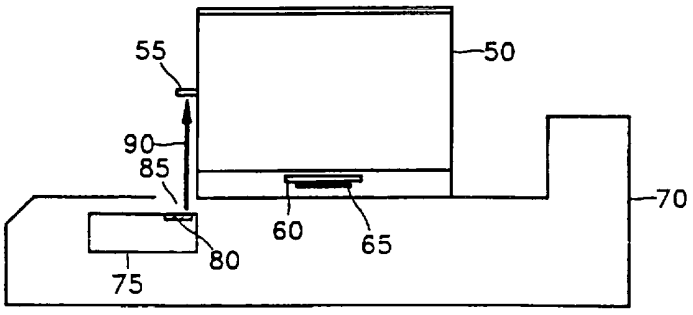

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FIG.1A
(PRIOR ART)

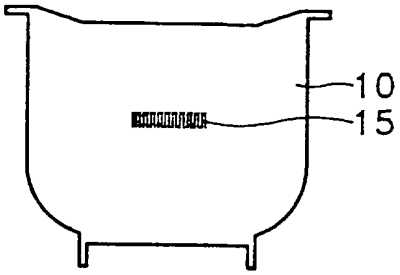

FIG.1B
(PRIOR ART)

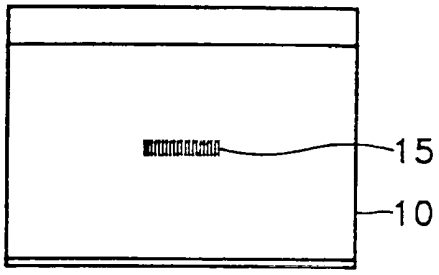

FIG.2A(PRIOR ART)

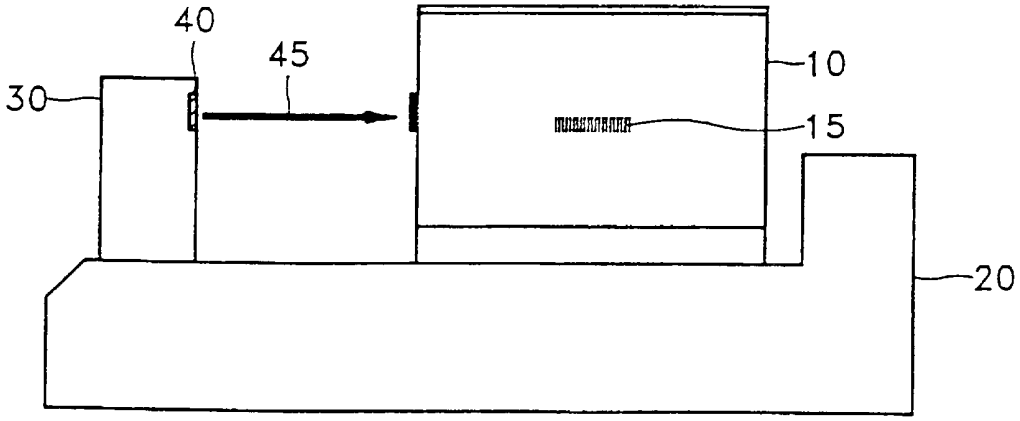

FIG.2B(PRIOR ART)

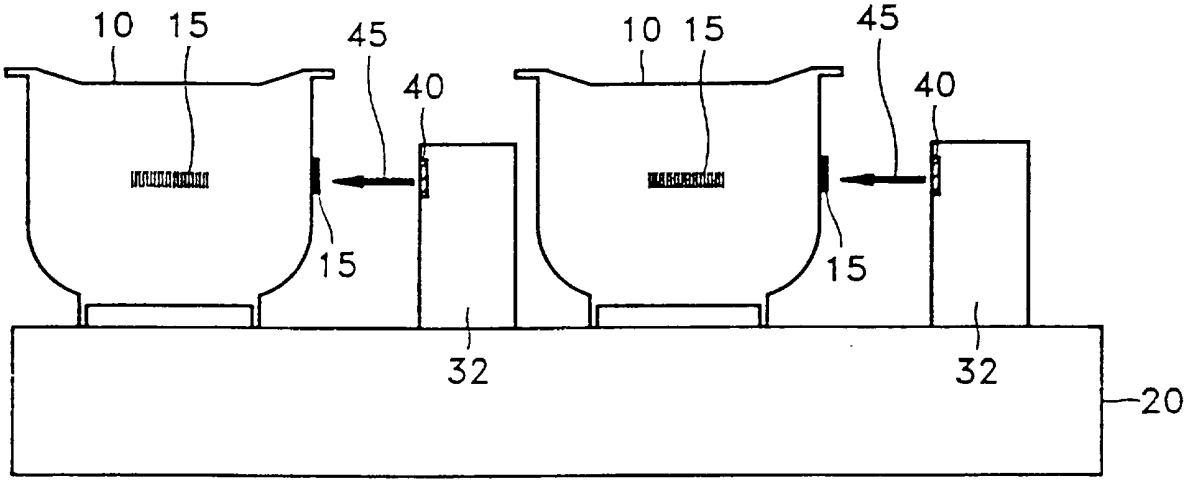

FIG.3

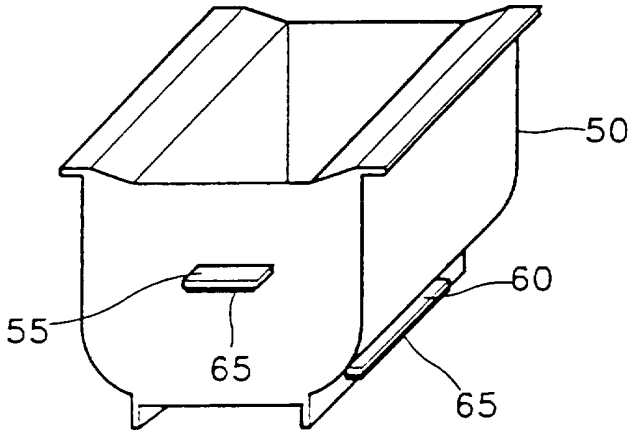

FIG.4A

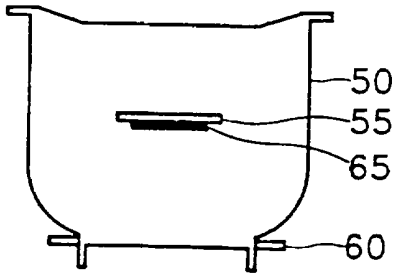

FIG.4B

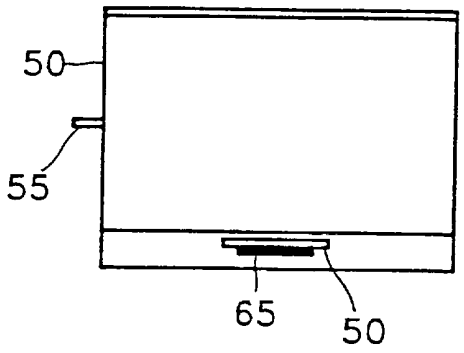

FIG.4C

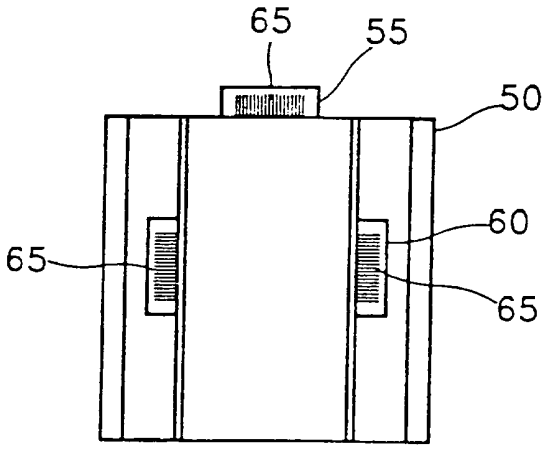

FIG.5A

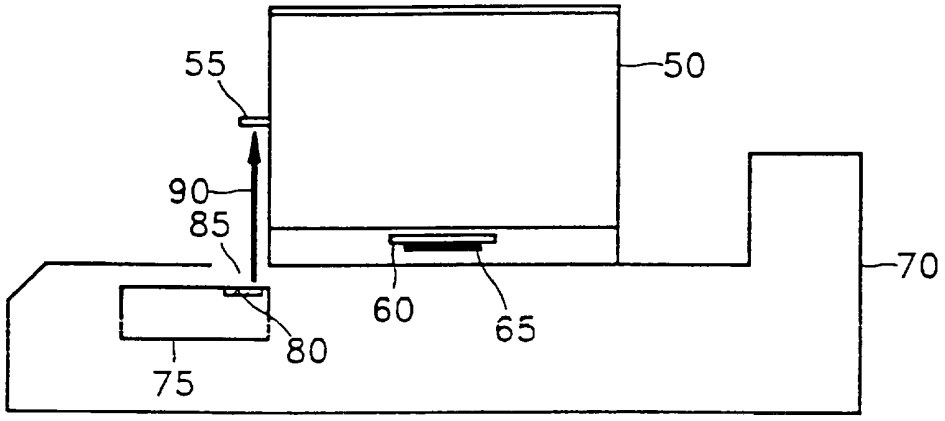
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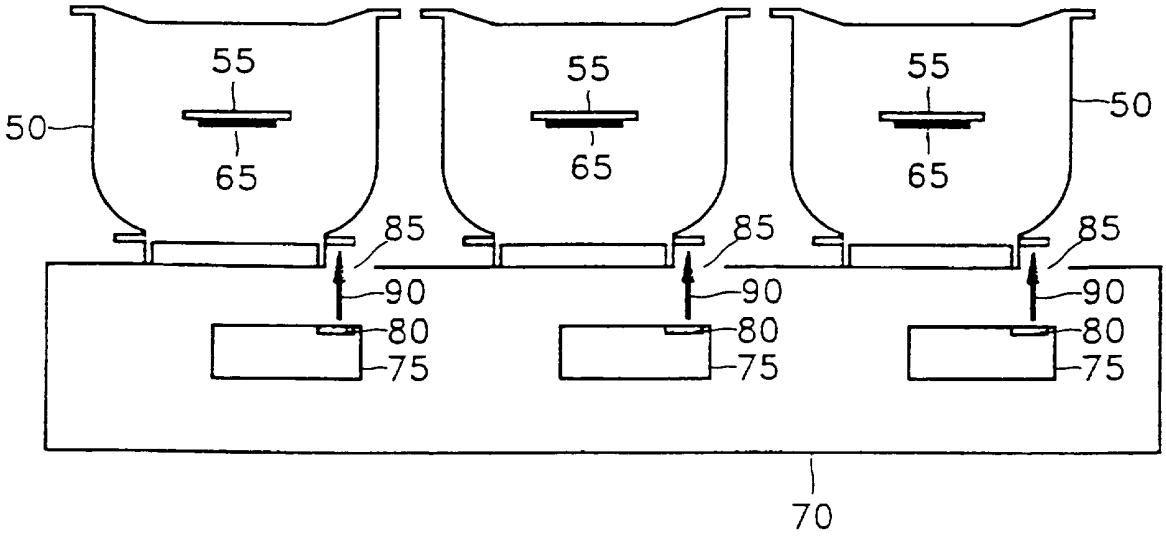
FIG.5B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EQUIPMENT FOR SEMICONDUCTOR FABRICATION

The present invention relates to a semiconductor apparatus and a method for manufacturing the same, and more particularly, to a wafer cassette for use in semiconductor manufacture and management, a method for manufacturing such a cassette, and equipment for semiconductor fabrication.

Currently, the automated manufacture of a semiconductor device includes three phases: a designation phase where process programs of equipment for the manufacture of the semiconductor device are designated by an automated system, a loading phase where a wafer cassette is loaded onto equipment by an operator or an auto-guided vehicle (AGV), and a process-performing phase. Here, in order to prevent errors in the process operation by the improper loading of the cassette onto the equipment by the operator or the AGV, a fixed bar code reader is situated on the equipment to read a bar code affixed to a cassette.

FIGS. 1A and 1B are front and side views, respectively, of a conventional cassette for semiconductor fabrication and management. Reference numeral 10 denotes a cassette and reference numeral 15 denotes a bar code.

The cassette 10, as a container for wafers, is generally used for carrying 25 wafers at a time, and the bar code 15 is used for the specific identification of the cassette 10 and is on the sidewalls as well as the front wall of the cassette 10. The bar code 15 is affixed to the center of the sidewalls of the

cassette 10, in parallel with the walls of the cassette 10.

FIGS. 2A and 2B illustrate a loader/unloader portion of conventional equipment for semiconductor fabrication having a cassette identifying apparatus for reading the bar codes on the front walls and side walls of the cassette 10, respectively. Here, in addition to the reference numerals used in connection with FIGS. 1A and 1B, reference numeral 20 denotes a loader/unloader portion of the equipment for semiconductor fabrication, reference numeral 30 denotes a bar code reader, reference numeral 40 denotes a beam window, and reference numeral 45 denotes a beam.

FIGS. 2A is a side view of the loader/unloader portion 20 for loading/unloading a cassette, showing how to read the front bar code. The bar code reader 30, i.e., a cassette identifying apparatus, is provided in the frontal part of the loader/unloader 20 (where an operator would be positioned).

FIG. 2B is a front view of the loader/unloader 20, showing how to read the side bar code. The bar code reader 30 is installed between cassettes loaded on the loader/unloader portion 20.

When an operator or AGV loads the cassette 10 containing wafers onto the loader/unloader portion 20, the bar code reader 30 reads the bar code of the cassette 10 to ensure the proper sequence of manufacturing steps, by proceeding only after determining whether the identified bar code of a cassette is correct. The cassette 10 whose bar code 15 is verified by the bar code reader 30 is moved from the loader/unloader portion 20 for subsequent processing.

When the cassette 10 is loaded for placement of wafers contained therein perpendicularly to the upper plane of the loader/unloader portion 20, i.e., when the base plane of the cassette 10 is in contact with the upper plane of the loader/unloader portion 20, the bar code reader 30 reads the bar code inscribed on the front wall or sidewalls of the cassette 10.

On the other hand, when the cassette 10 is loaded for placement of wafers contained therein in parallel with the upper plane of the loader/unloader portion 20, i.e., when the rear plane of the cassette 10 is in contact with the upper plane of the loader/unloader portion 20, the bar code reader 30 reads only the bar code inscribed on sidewalls of the cassette 10 and that on the front wall of the cassette 10 is not read.

According to the above conventional wafer cassette and equipment for semiconductor fabrication having a cassette identifying apparatus, a change in the step sequence of a semiconductor manufacturing process is prevented by the identification of the cassettes using a bar code reader. Certain disadvantages, however, are present.

Firstly, when the bar code reader 30 is positioned in the front part of loader/unloader portion 20 (see FIG. 2A), it is difficult for an operator or AGV to load the cassette 10 onto the loader/unloader portion 20. Since the bar code reader 30 is installed on the loader/unloader portion 20, when loading/unloading a cassette, the operator or AGV needs to lift the cassette at least higher than the bar code reader.

Secondly, there is a significant likelihood that the wafers will become damaged by cracking. That is, when the operator or

AGV performs the loading/unloading operation, there is the potential for the cassette 10 and the bar code reader 30 to collide with each other.

Thirdly, the number of cassettes to be loaded on the loader/unloader portion 20 is limited by the bar code reader 30, thus lowering productivity. That is, since a finite amount of space must be secured for the bar coder reader 30 and the beam 45 generated therefrom, the number of the cassettes which can be loaded on the loader/unloader portion 20 is restricted, which in turn reduces the total number of wafers which can be prepared per unit process.

An object of the present invention is to provide equipment for semiconductor fabrication, which can allow an efficient loading/unloading operation of the cassette onto the loader/unloader portion, reduce damage to wafers, and improve the productivity of a semiconductor device.

According to the present invention, there is provided equipment for semiconductor fabrication, wherein a cassette identifying apparatus is provided below the upper plane of an loader/unloader portion of the equipment for semiconductor fabrication.

It is preferred in the equipment for semiconductor fabrication, the cassette identifying apparatus is provided with a beam window from which a beam for identifying a cassette is projected.

The equipment for semiconductor fabrication further comprises a transparent window for transmitting the beam, provided at the upper plane of the loader/unloader portion of the

equipment.

Accordingly, the present invention can provide for an efficient loading/unloading operation of the cassette onto/from a loader/unloader portion, can reduce damage to wafers, and can improve the productivity of a semiconductor device.

Specific embodiments of the present invention are described in detail below, by way of example, with reference to the attached drawings, in which:

FIGS. 1A and 1B are respectively a front view and a side view of a conventional cassette for semiconductor manufacture and management;

FIGS. 2A and 2B illustrate a loader/unloader portion of conventional equipment for semiconductor fabrication having a cassette identifying apparatus;

FIG. 3 is a perspective view of a cassette for use in the equipment of the present invention;

FIGS. 4A, 4B and 4C are respectively a front view, a side view and a base plan of the cassette; and

FIGS. 5A and 5B illustrate a loader/unloader portion of equipment of the invention for semiconductor fabrication.

FIG. 3 is a perspective view of a cassette for use in semiconductor fabrication equipment of the invention, and FIGS. 4A, 4B and 4C are front, side and bottom views thereof, respectively. Here, reference numeral 50 denotes a container, reference numeral 55 denotes a front bar-code wing, and reference numeral 60 denotes a side bar-code wing.

The front and side bar-code wings 55 and 60 project outward from the middle part of the front wall and the lower or middle

parts of the sidewalls of the container 50, respectively. The container 50 is used for containing wafers and the bar-code wings 55 and 60 are used to carry a bar code 65 printed or otherwise affixed onto the lower surface of the bar-code wings. The bar-code wings 55 and 60 preferably project perpendicularly from the sidewalls of the container 50, but may be at some other angle. A bar code is also printed or affixed on the rear of the container 50, so as to be positioned on the left and/or right thereof (not shown).

There are generally two methods for manufacturing the above-described cassette: a first method in which the cassette is manufactured after preparing molds; and a second method in which the bar-code wings are attached after fabricating a container.

The first method includes the steps of preparing molds for a container to contain wafers and bar-code wings projecting from the sidewalls of the container, manufacturing a wafer cassette having the projected bar-code wings, using the molds, and forming bar codes onto the bar-code wings. Here, the step of forming bar codes may be performed by one of two ways: by printing the bar codes on the bar-code wings using a laser marking method, or by coating sheets having the bar codes printed thereon and then affixing the coated sheets to the bar-code wings with an adhesive.

The second method includes the steps of preparing a container, attaching bar-code wings to the sidewalls of the container, and forming bar codes onto the bar-code wings. Here, the bar-code wings are attached by welding and can be detached from the container, and the formation of the bar codes is

performed in the same manner as in the first method.

FIGS. 5A and 5B illustrate the loader/unloader portion of equipment for semiconductor fabrication of the invention having a cassette identifying apparatus for reading the bar codes of the front and side bar-code wings 55 and 60, respectively. Here, in addition to the reference numerals used in connection with FIGS. 3 and 4A-4C, reference numeral 70 denotes a loader/unloader portion, reference numeral 75 denotes a bar code reader, reference numeral 80 denotes a beam window, reference numeral 85 denotes a transparent window, and reference numeral 90 denotes a beam.

The bar code reader 75 is installed below the upper plane of the loader/unloader portion 70 and provided with the beam window 80. Also, the transparent window 85 is formed on the upper plane of the loader/unloader portion 70, to be larger than the beam window 80, and positioned so that the beam 95 generated from beam window 80 is vertically projected to bar code 65.

When the cassette 50 is loaded to place wafers contained therein perpendicularly with respect to the upper plane of the loader/unloader portion 70, the cassette 50 with the bar-code wing 55 is loaded on the loader/unloader portion 70 having the bar code reader 75 below the upper plane thereof. Here, the bar-code wing 55 should be positioned so that the beam 90 of the beam window 80 transmitted through the transparent window 85 is vertically projected thereto. The beam 90 generated from the beam window 80 is projected through the transparent window 85 to the front bar-code wing 55 and/or the side-bar wing code 60, and reads the bar codes 65 affixed to the bar-code wings 55 and 60

(see FIGS. 5A and 5B).

When the cassette is loaded to place wafers contained therein in parallel with the upper plane of the loader/unloader portion (not shown), the cassette is loaded in such a way that the rear plane of the container is in contact with the upper plane of the loader/unloader portion having the bar code reader below the upper plane thereof. Here, a bar code (not shown) printed or affixed to the rear plane of the container should be positioned so that the beam of the beam window transmitted through the transparent window is vertically projected thereto.

Accordingly, by providing a cassette identifying apparatus below the upper plane of an loader/unloader portion, the present invention has distinct advantages: (1) an efficient cassette loading/unloading operation can be performed since an operator or AGV need not lift a cassette as high as a bar code reader; (2) damage to wafers can be reduced since there can be no collision of the bar code reader and cassette; and (3) the productivity of a semiconductor device can be improved since the space between the bar code reader and cassette, as well as that occupied by the bar code reader itself, can be utilized for loading the cassette.

The present invention is not restricted to the above embodiments, and it is clearly understood that numerous variations to the embodiments described may be made within the scope of the present invention by those skilled in the art.

CLAIMS:

1. Equipment for semiconductor fabrication, wherein a cassette identifying apparatus is provided below the upper plane of an loader/unloader portion of said equipment for semiconductor fabrication.

2. Equipment for semiconductor fabrication as claimed in claim 1, wherein said cassette identifying apparatus is provided with a beam window from which a beam for identifying a cassette is projected.

3. Equipment for semiconductor fabrication as claimed in claim 2, further comprising a transparent window for transmission of said beam therethrough, provided at the upper plane of said loader/unloader portion of said equipment.

4. Equipment for semiconductor fabrication substantially as described herein with reference to Figures 5A and 5B.

Patent Office

10

INVESTOR IN PEOPLE

Application No: GB 9918878.1 **Examiner:** Miss E.L.Rendle
Claims searched: 1-4 **Date of search:** 6 September 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): H1K (KMBX)

Int Cl (Ed.6): H01L 21/00

Other: EPOQUE: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0 582 016 A1 (IBM) see whole document, especially page 31 lines 31-37, page 32 line 48-page 33 line 6 and figures 1 and 19.	1 at least
X	WPI Abstract Accession No.96-198582 & JP08070027 (CANON) see abstract.	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.