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(54) **THIN-PLATE SUPPORTING CONTAINER**

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(57) **ABSTRACT**

When a thin-plate supporting container is placed on a placement table, a displacement is corrected and the thin-plate supporting container is precisely positioned. The thin-plate supporting container includes a container body **22** for housing therein a semiconductor wafer and the like and positioning means **23** provided to the container body **22** for positioning the container body at a set position on a placement table to place the container body on the placement table and take in and out the semiconductor wafer and the like. The positioning means **23** includes an engagement groove **24** for engaging an engagement protrusion provided on the placement table, and an inclined plane **25** to be in contact with the engagement protrusion in a state the engagement groove engages with the engagement protrusion. The inclined plane is treated so as to reduce a contact area with the engagement protrusion to decrease the friction resistance by embossing.

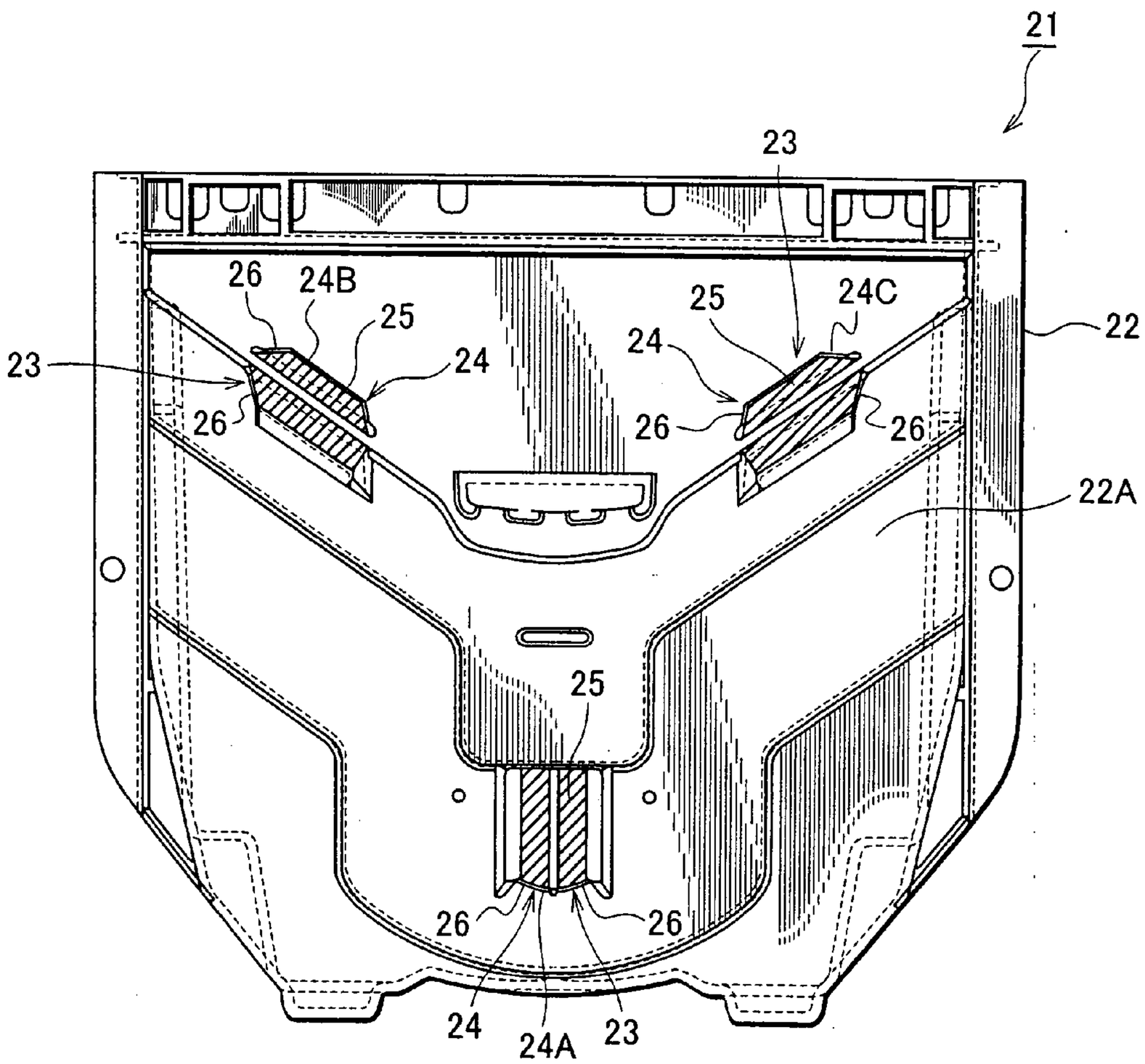


Fig.1

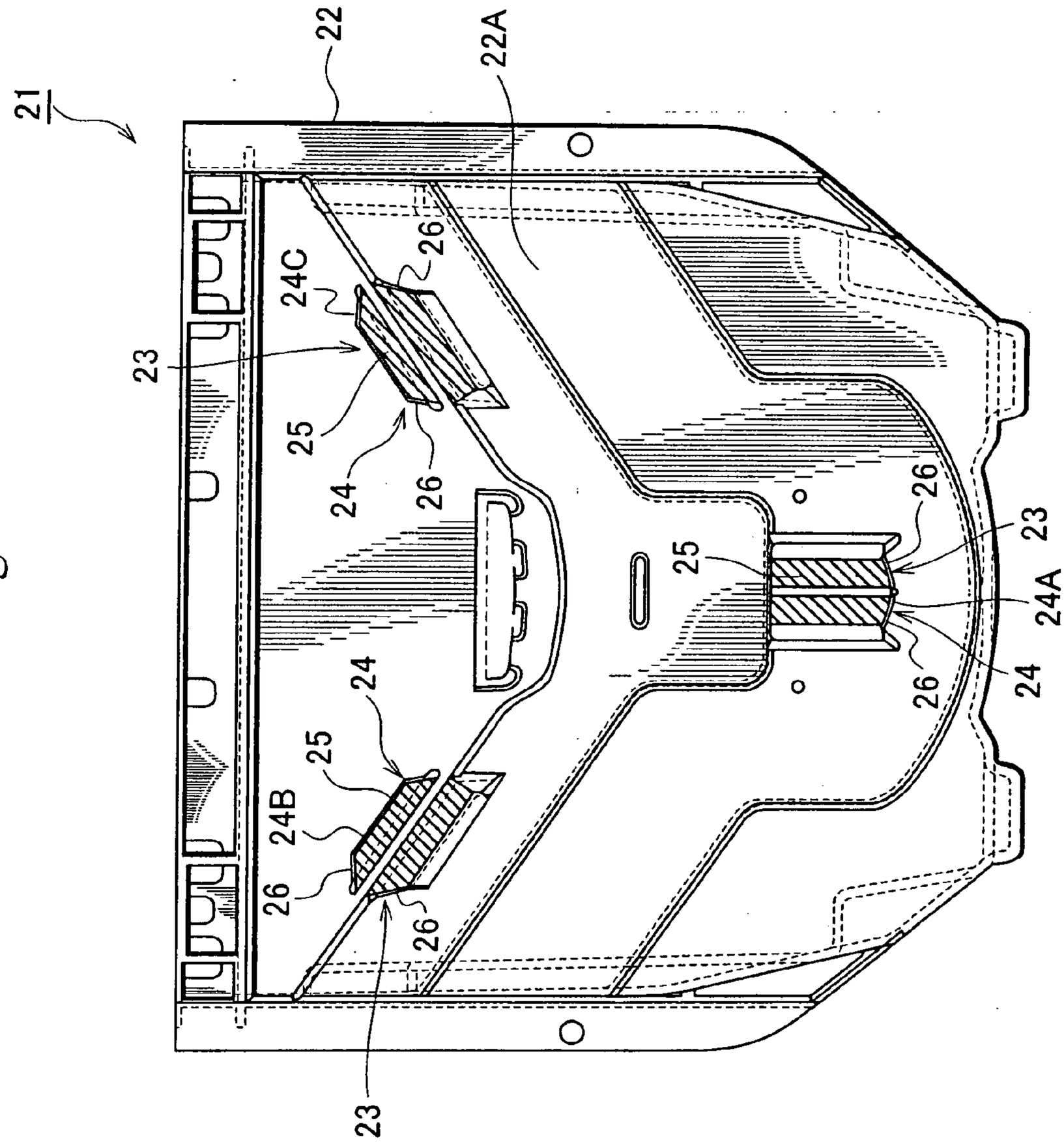


Fig.2

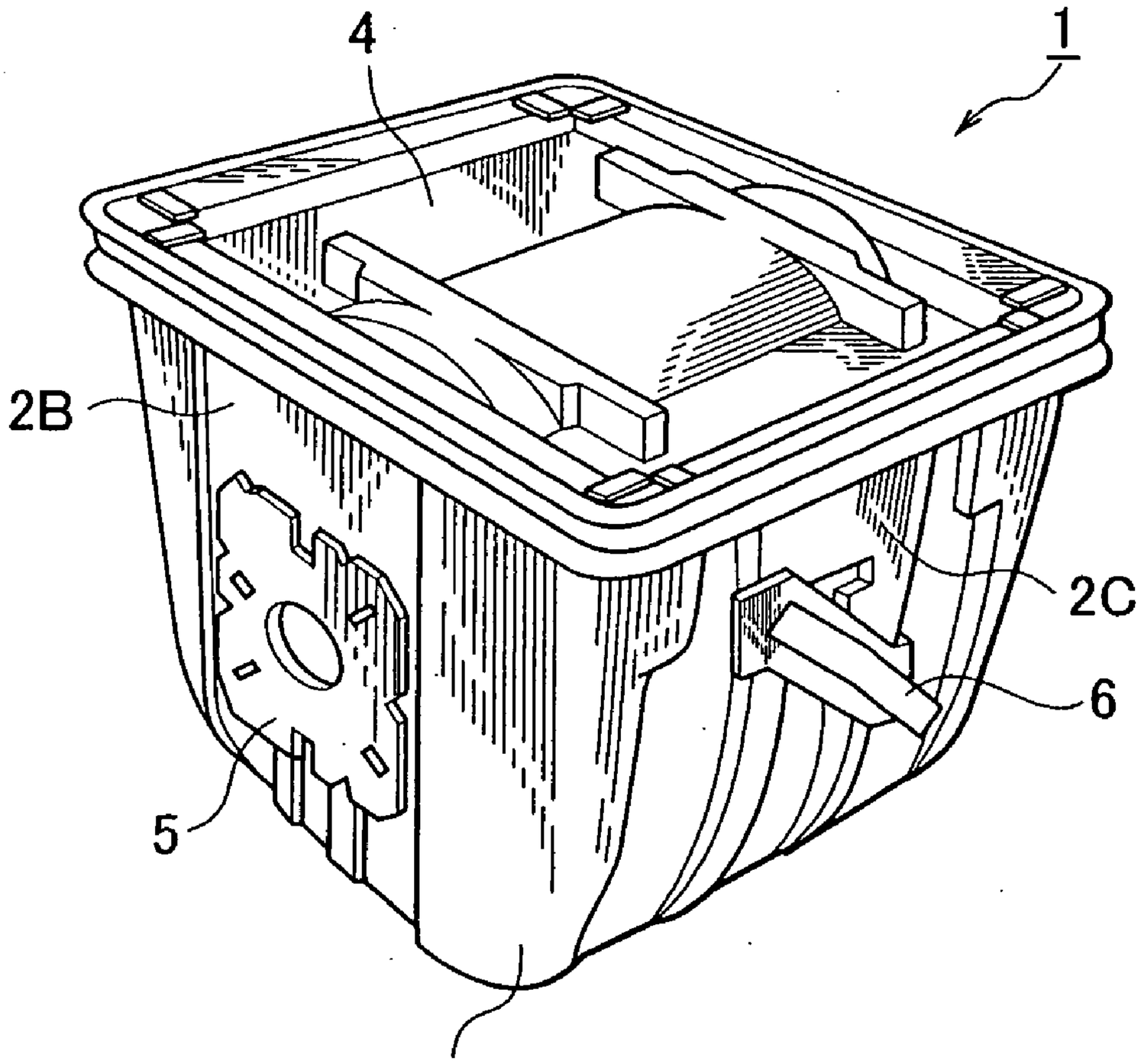


Fig.3

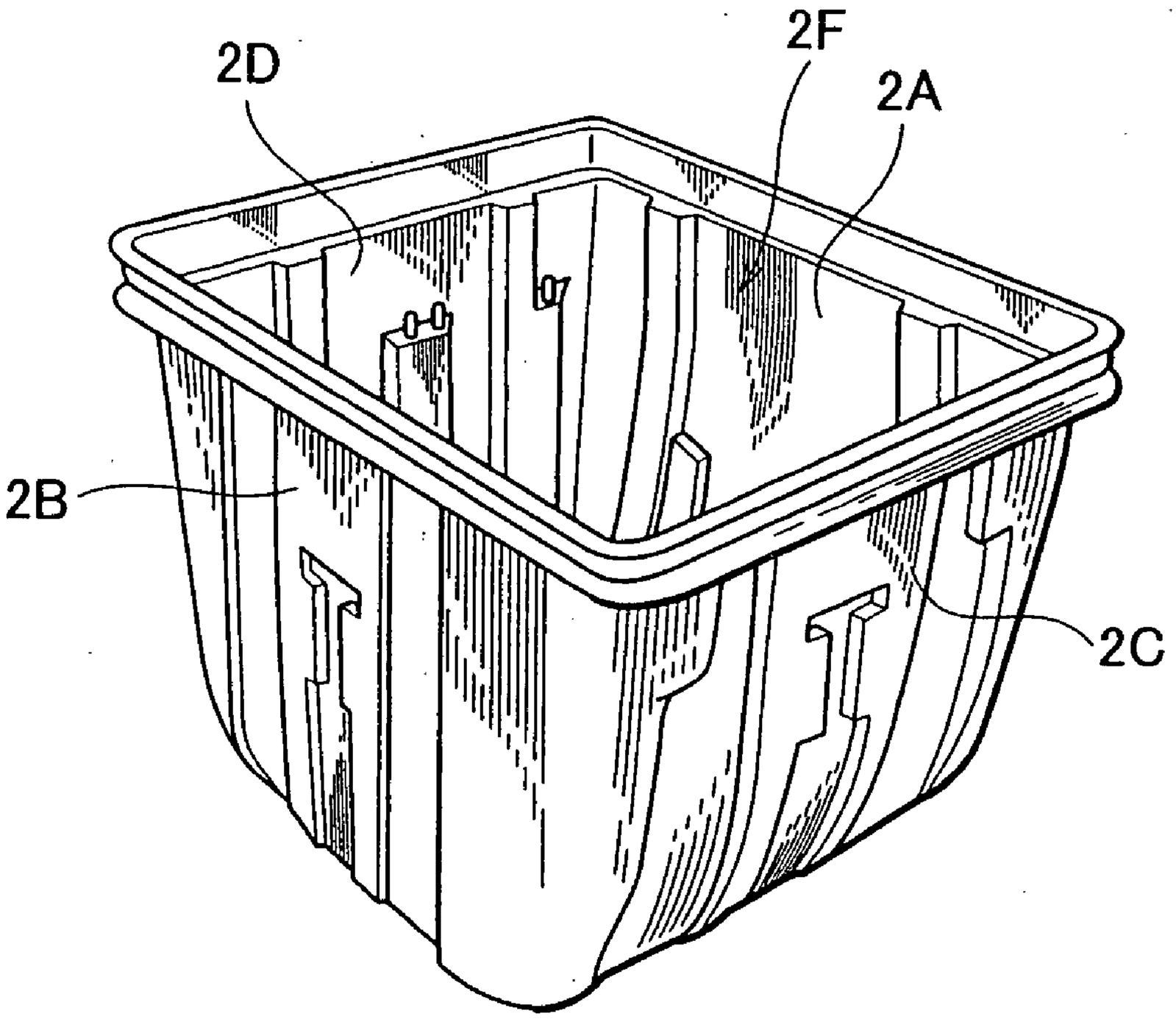
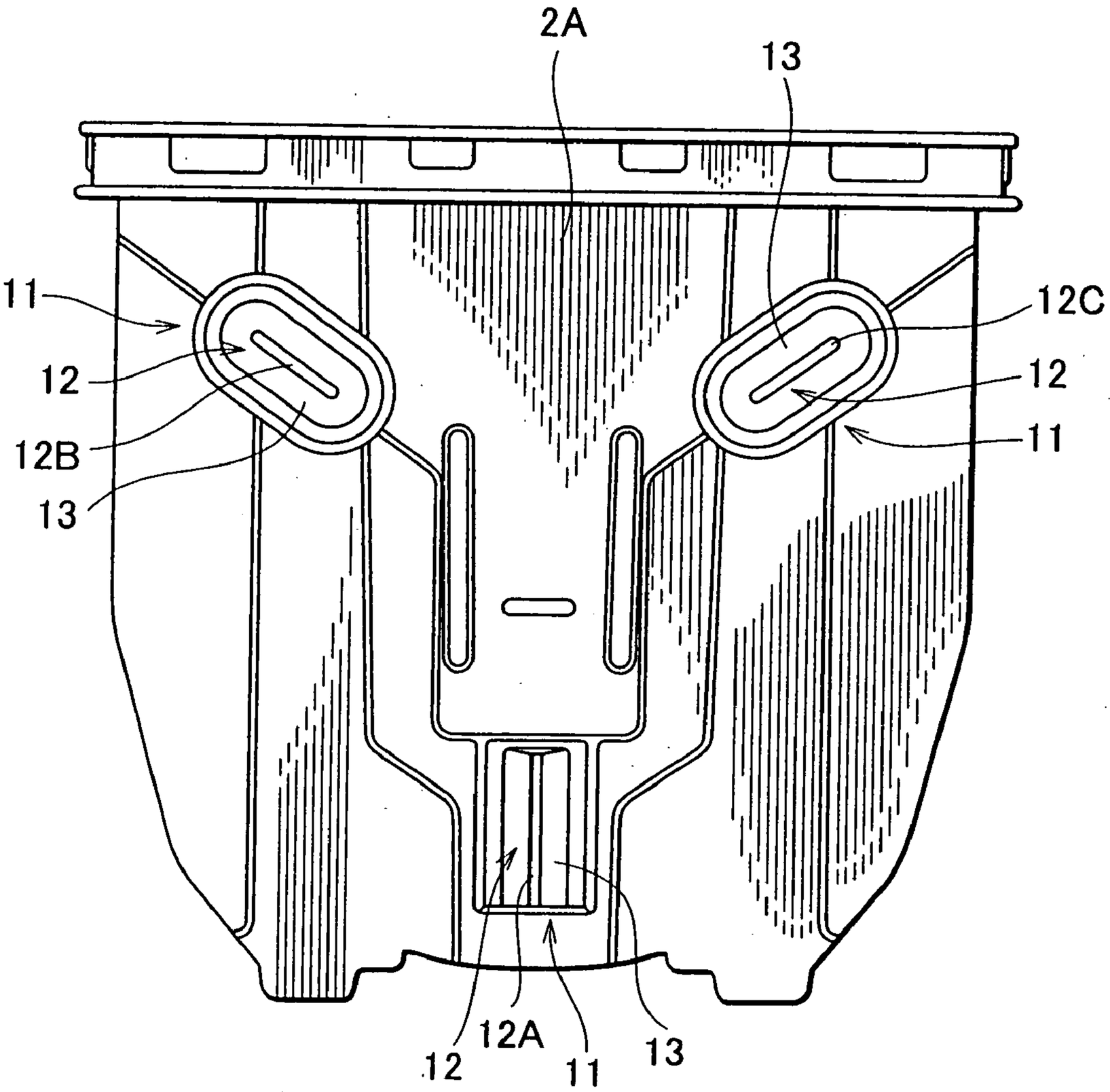


Fig.4



THIN-PLATE SUPPORTING CONTAINER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims, under 35 USC 119, priority of Japanese Application No. 2005-172441 filed Jun. 13, 2005.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a thin-plate supporting container which has positioning means for positioning a placement table to a set position in order to take in and out thin plates.

[0004] 2. Description of the Related Art

[0005] A thin-plate supporting container used for automatically taking in and out an internal semiconductor wafer and the like is generally known. In such thin-plate supporting container, in order to align a position of an arm of a transfer device and a position of a semiconductor wafer and the like, positioning means is provided. As an example of the thin-plate supporting container equipped with the positioning means, a thin-plate supporting container disclosed in WO 99/39994 is known. With reference to FIGS. **2** to **4**, the thin-plate supporting container will be described.

[0006] A thin-plate supporting container **1** shown in the drawings has a container body **2** which houses therein a plurality of semiconductor wafers (not shown), two thin-plate supporting parts (not shown) each provided on opposing side walls of the container body **2** respectively for supporting the semiconductor wafers housed in the container body **2** from the both sides of the wafers, a lid **4** for covering an opening **2**F of the container body **2**, a top flange **5** which is supported by an arm of a transfer device (not shown) if necessary, and a carrying handle **6** which is gripped by an operator when he carries the thin-plate supporting container **1** by hand.

[0007] The container body **2** is formed substantially in the shape of a cube as a whole. The container body is, in an upright position (in the state shown in FIGS. **2** to **4**), composed of four side walls **2**A, **2**B, **2**C, and **2**D to be circumferential walls, and a bottom part (not shown), and the opening **2**F is provided on top of the container body **2**. The container body **2** is placed in a horizontal position when the container body **2** is placed opposite to a wafer transferring robot (not shown) in a semiconductor wafer manufacturing line or the like. In the horizontal state, positioning means **11** which positions the thin-plate supporting container **1** is provided to the outside of the side wall **2**A which functions as a bottom part. The top flange **5** is detachably mounted to the outside of the side wall **2**B which functions as a top part in the horizontal state. The carrying handle **6** is detachably mounted to the outside of the side walls **2**C and **2**D which function as side parts in the horizontal state.

[0008] The positioning means **11** is provided to the side wall **2**A. The positioning means **11** is composed mainly of three engagement grooves **12**. Each of the engagement grooves **12** has a first engagement groove **12**A which aligns with the vertical direction of the container body **2**, and a second groove **12**B and a third groove **12**C both of which are inclined at the same angle (approximately 60 degrees) to the vertical direction of the container body **2**. These three engagement grooves **12** are finished at high precision to meet their standard. Each of the engagement grooves **12**A, **12**B, and **12**C has an inclined plane **13** as an inner wall, and the inner wall **13** is configured to be directly in contact with an engagement protrusion (not shown) of a placement table side. By each of the engagement grooves **12**A, **12**B, and **12**C engaging with each of engagement protrusion of the placement table side, the inclined plane **13** is in contact with the engagement protrusion and slides, and each central position of each of the engagement grooves **12**A, **12**B, and **12**C aligns at the central position of the each engagement protrusion. With the alignment of the central position of each of the engagement grooves **12**A, **12**B, and **12**C with each central position of engagement protrusion, the thin-plate supporting container **1** is set at an exact location, an arm part of the wafer transferring robot supports a semiconductor wafer and takes the semiconductor wafer in and out.

[0009] In the thin-plate supporting container, each inclined plane **13** of each of the engagement grooves **12**A, **12**B, and **12**C is formed in a flat plane. Accordingly, a contact area between the inclined plane **13** and the engagement protrusion of the placement table side becomes large.

[0010] Meanwhile, some construction materials of the thin-plate supporting container, such as polycarbonate, have a large friction resistance. Accordingly, as the contact area between the inclined plane **13** and the engagement protrusion of the placement table side becomes large, the friction resistance becomes larger. As a result, the inclined plane **13** and the engagement protrusion of the placement table side become hard to slide, sometimes it is hard to readily position the thin-plate supporting container.

SUMMARY OF THE INVENTION

[0011] The present invention has been made to solve the above drawbacks. It is an object of the present invention to provide a thin-plate supporting container capable of readily and precisely perform positioning.

[0012] It is another aspect of the present invention to provide a thin-plate supporting container having a container body for housing therein a thin-plate, and positioning means provided to the container body for positioning the container body at a set position on a placement table to place the container body on the placement table and take in and out the internal thin-plate plate. The positioning means includes an engagement groove for engaging an engagement protrusion provided on the placement table, and a inclined plane to be in contact with the engagement protrusion in a state the engagement groove engages with the engagement protrusion, and the inclined plane is treated so that friction resistance is reduced.

[0013] Preferably, the inclined plane of the engagement groove in the positioning means is subjected to embossing formed by shot peening and sandblasting and the like, so as to reduce a contact area of the inclined plane and the engagement protrusion to reduce the friction resistance.

[0014] Since the inclined plane of the engagement groove in the positioning means is treated so as to reduce the friction resistance by embossing, and the like, if the engagement groove in the positioning means is fit to the engagement

protrusion, the inclined plane of the engagement groove in the positioning means smoothly slide against the engagement protrusion and the precise positioning of the thin-plate supporting container is enabled.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] **FIG. 1** is an elevational view of a thin-plate supporting container according to an embodiment of the present invention;

[0016] **FIG. 2** is a perspective view showing a conventional thin-plate supporting container;

[0017] **FIG. 3** is a perspective view showing the conventional thin-plate supporting container in a state in which the lid is removed; and

[0018] **FIG. 4** is an elevational view of the conventional thin-plate supporting container.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] Hereinafter, a thin-plate supporting container according to embodiments of the present invention will be described with reference to the attached drawings.

[0020] The thin-plate supporting container according to embodiments of the present invention is preferably used as a container for housing, storing, and transporting a thin-plate such as a semiconductor wafer, a storage disk, a liquid crystal glass substrate, and the like. In this embodiment, a thin-plate supporting container for housing a semiconductor wafer will be described. The overall structure of the thin-plate supporting container according to this embodiment is substantially similar to that of the above-described conventional thin-plate supporting container. Hereinafter, the description will be schematically made.

[0021] As shown in **FIG. 1**, a thin-plate supporting container **21** according to this embodiment mainly includes a container body **22** for housing therein a plurality of semiconductor wafers (not shown), two thin-plate supporting parts (not shown) provided in the container body **22** each provided opposite to each other for supporting the semiconductor wafers, and a lid (not shown) for covering the container body **22**.

[0022] The container body **22** is structured substantially similar in the overall shape to the container body **2** of the conventional thin-plate supporting container **1**. To the outside of a side wall **22**A which functions as a bottom part in a horizontally-placed state, positioning means **23** of the thin-plate supporting container **21** is provided.

[0023] The positioning means **23** is provided to the side wall **22**A. The positioning means **23** is composed mainly of three engagement grooves **24**. The engagement grooves **24** have a first engagement groove **24**A which aligns with the vertical direction of the container body **22**, and a second groove **24**B and a third groove **24**C both of which are inclined at the same angle (approximately 60 degrees) to the vertical direction of the container body **22**. The three engagement grooves **24**A, **24**B and **24**C are finished at high precision to meet their standard. Each engagement grooves **24**A, **24**B and **24**C is configured to engage with an engagement protrusion (not shown) of the placement table side, and has an inclined plane **25** as an inner wall. The inclined plane **25** is configured to be directly in contact with the engagement protrusion of the placement table. Each engagement grove **24** has an inclined plate **26** which is integrally provided on the surface of the side wall part **22**A. By placing two inclined plates **26** so as to opposite each other, each engagement groove **24** and each inclined plane **25** is structured. The inclined plate **26** has elasticity, and sags in some degree by being contact with the engagement protrusion of the placement table.

[0024] The surface of the inclined plane **25** is treated in order to reduce the contact area so that the friction resistance is reduced. In particular, the surface of the inclined plane **25** is subject to embossing in order to reduce the friction resistance. It can also be possible to drawn the surface of the inclined plane **25** to be in a concave-convex state such as a stain finished surface, or form numerous fine grooves. In the case in which the numerous fine grooves are formed, the grooves should be formed in a direction that the engagement groove displaces along the inclined plane **25**. Further, on the surface of the inclined plane **25**, fine grooves which are vertical in the ridge line direction and have a cross section of arc shape, triangular shape, or trapezoidal shape, can be regularly or irregularly formed. Further, protrusions of hemispheric shape, cone shape, or truncated trapezoidal shape, can be regularly or irregularly formed. Further, grooves and protrusions of each shape can be appropriately combined.

Operation

[0025] Thus structured thin-plate supporting container **21** is used as described below.

[0026] When a semiconductor wafer is automatically taken in and out to the thin-plate supporting container **21**, the thin-plate supporting container **21** is placed on the placement table. Then, the positioning means **23** of the container body **22** is fit to the engagement protrusion on the placement table. In particular, the engagement groove **24** is fit to the engagement protrusion and the inclined plane **25** is in contact with the engagement protrusion.

[0027] Then, when the thin-plate supporting container **21** is placed in a state displaced from a set position, the engagement protrusion is displaced against the inclined plane **25**. And when the thin-plate supporting container **21** is placed on the placement table in the displaced state, due to the weight of the thin-plate supporting container **21**, the inclined plane **25** smoothly slides against the engagement protrusion and corrects the displacement, and displaces the engagement groove **24** to the precise position. Then, the inclined plate **26** is elastically sagged, preventing the friction resistance from increasing too much due to the pressure increased more than necessary at the contact portion of the inclined plane **25** and the engagement protrusion, and a smooth slide against the engagement protrusion of the inclined plane **25** is ensured. Thus, the slide of the inclined plane **25** against the engagement protrusion occurs at the three engagement grooves **24**A, **24**B, and **24**C respectively, and the thin-plate supporting container **21** is precisely positioned.

[0028] Then, an arm part of the wafer transferring robot supports the semiconductor wafer and takes in and out the semiconductor wafer to the thin-plate supporting container **21**.

Advantages

[0029] As described above, the inclined plane **25** of the engagement groove **24** in the positioning means **23** is treated so as to reduce the friction resistance by embossing, and the like, when the inclined plane **25** of the engagement groove **24** is fit to the engagement protrusion of the placement table, the inclined plane **25** and the engagement protrusion smoothly slide and the precise and easy positioning of the thin-plate supporting container is enabled.

[0030] Further, since the inclined plane **25** is composed of the inclined plate **26** which can be elastically sagged, even if the pressure increases more than necessary at the contact portion of the inclined plane **25** and the engagement protrusion, the inclined plate **26** is elastically sagged. Accordingly, the friction resistance is prevented from increasing too much, and the smooth slide against the engagement protrusion of the inclined plane **25** is ensured. As a result, it is possible to precisely position the thin-plate supporting container.

What is claimed is:

1. A thin-plate supporting container comprising:

a container body for housing therein a thin-plate; and

positioning means provided to the container body for positioning the container body at a set position on a placement table to place the container body on the placement table and take in and out the internal thin-plate;

wherein the positioning means includes an engagement groove for engaging an engagement protrusion provided on the placement table, and a inclined plane to be in contact with the engagement protrusion in a state the engagement groove engages with the engagement protrusion, and the inclined plane is treated so that friction resistance is reduced.

2. The thin-plate supporting container according to claim 1, wherein the inclined plane of the engagement groove in the positioning means is treated so as to reduce a contact area of the inclined plane and the engagement protrusion to decrease the friction resistance.

3. The thin-plate supporting container according to claim 1, wherein the inclined plane of the engagement groove in the positioning means is treated so as to reduce the friction resistance by embossing.

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