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WAFER FRAME POSITIONING STAGE

Abstract

A wafer frame positioning stage can hold a wafer frame and has a main body. The main body has a first plane, a first fixed resisting unit, a first movable resisting unit, a driver and an elastic unit. The first plane is horizontally mounted on the main body. The first fixed resisting unit and the first movable resisting unit are respectively located on two opposite ends of the main body and are mounted on the first plane. The driver drives the first movable resisting unit toward or away from the first fixed resisting unit and can clamp the wafer frame. The elastic unit tends to move the first movable resisting unit away from the first fixed resisting unit.

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Background/Summary

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a wafer frame positioning stage.

2. Description of the Prior Arts

[0002] When performing wafer cutting, grinding and other processing in the semiconductor industry, a film will be attached to a wafer frame, and then the wafer will be placed on the film of the wafer frame to prevent the wafer from sliding during the processing. After processing, the wafer frame can be cleaned and reused. In other words, during the processing process, the wafer is securely mounted on the wafer frame and moves integrally with the wafer frame.

[0003] A wafer frame positioning stage is provided in the processing station of the wafer production line, and is configured to clamp and fix the wafer frame, such that the wafer frame and the wafer can be located in the correct processing position, and prevent the wafer from being displaced during processing. When the wafer and the wafer frame move between the wafer frame positioning stages of the processing station, a robotic arm picks up the wafer frame from one wafer frame positioning stage, and then clamps the wafer frame into another wafer frame positioning stage.

[0004] However, components configured to hold the wafer frame of the conventional wafer frame positioning stage are securely mounted on a base, and said components holding the wafer frame cannot move on the base. In other words, the wafer frame positioning stage cannot adjust the clamping strength and range. The wafer frame positioning stage even requires the elastic deformation of the wafer frame to disassemble and install the wafer frame. Therefore, the wafer frame is prone to deform, which affects the processing of the wafer and makes the wafer frame non-reusable.

[0005] To overcome the shortcomings, the present invention provides a wafer frame positioning stage to mitigate or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

[0006] The main objective of the present invention is to provide a wafer frame positioning stage that is configured to clamp and fix a wafer frame. The wafer frame positioning stage can prevent the wafer frame from deforming under excessive force during clamping and fixing the wafer frame.

[0007] The wafer frame positioning stage has a base and a main body. The main body is securely mounted on the base and configured to hold the wafer frame. The main body has a first plane, a first fixed resisting unit, a first movable resisting unit, a second plane, a second fixed resisting unit, a second movable resisting unit, a driver, and an elastic unit.

[0008] The first plane is horizontally formed on the main body. The first fixed resisting unit is securely mounted on the first plane and located on a first end of the main body. The first movable resisting unit is movably mounted on a second end of the main body. The first movable resisting unit and the first fixed resisting unit are located opposite each other.

[0009] The second plane is horizontally formed on the main body, and a height of the second plane is higher than a height of the first plane. The second fixed resisting unit is securely mounted on the second plane. The second fixed resisting unit and the first fixed resisting unit are located on the first end of the main body. The second movable resisting unit is movably mounted on the second end of the main body. The second movable resisting unit and the second fixed resisting unit are located opposite each other.

[0010] The driver is connected to the first movable resisting unit and drives the first movable resisting unit to move toward or away from the first fixed resisting unit. The elastic unit is connected to the first movable resisting unit and tends to move the first movable resisting unit

away from the first fixed resisting unit.
[0011] The advantage of the present invention is that the wafer frame positioning stage comprises the elastic unit and the driver. Therefore, when clamping and fixing the wafer frame, the distance and the clamping force between the first fixed resisting unit and the first movable resisting unit can better meet the needs of the wafer frame, and prevent the wafer frame from being deformed. In addition, the wafer frame positioning stage has two clamping positions: the first fixed resisting unit and the first movable resisting unit, and the second fixed resisting unit and the second movable resisting unit. Therefore, the wafer frame positioning stage can hold wafer frames of two different sizes.
[0012] Other objectives, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0013] FIG. **1** is a perspective view of a wafer frame positioning stage in accordance with the present invention;
[0014] FIG. **2** is a perspective view of the wafer frame positioning stage in FIG. **1**, shown with a wafer frame;
[0015] FIG. **3** is a perspective view of the wafer frame positioning stage in FIG. **1**, shown with another wafer frame;
[0016] FIG. **4** is a top view of the wafer frame positioning stage in FIG. **1**;
[0017] FIG. **5** is a sectional view of the wafer frame positioning stage across line **5**-**5** in FIG. **4**; and
[0018] FIG. **6** is an enlarged view of the wafer frame positioning stage in FIG. **4**.
DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS
[0019] With reference to FIG. **1** to FIG. **3**, a wafer frame positioning stage in accordance with the present invention is configured to hold wafer frames **90** of two different sizes. The wafer frame positioning stage comprises a base **10**, a main body **20**, multiple supporting units **30**, and a surface **40**. The surface **40** is a part of the wafer frame positioning stage that contacts the wafer frame **90**, and the surface **40** comprises an antistatic coating.
[0020] With reference to FIG. **2** to FIG. **6**, the base **10** is configured to be securely mounted on a processing station of a production line. The main body **20** is securely mounted on the base **10**. The main body **20** comprises a first plane **21**, a second plane **22**, a fixing assembly **23**, a moving assembly **24**, a driver **25**, an elastic unit **26**, and a sensor assembly **27**. The first plane **21** and the second plane **22** are horizontally formed on the main body **20**, and a height of the second plane **22** is higher than a height of the first plane **21**. The wafer frame **90** is placed on the first plane **21** or the second plane **22**.
[0021] With reference to FIG. **2** to FIG. **4**, the fixing assembly **23** can comprise a first fixed resisting unit **231** and a second fixed resisting unit **232**, and the moving assembly **24** can comprise a first movable resisting unit **241** and a second movable resisting unit **242**. The first fixed resisting unit **231** and the first movable resisting unit **241** are respectively located on two opposite ends of the main body **20** and are mounted on the first plane **21**. The first fixed resisting unit **231** is located on a first end **28**, and the first movable resisting unit **241** is located on a second end **29**. The first movable resisting unit **241** can move toward or away from the first fixed resisting unit **231** on the first plane **21**. Therefore, when the first fixed resisting unit **231** and the first movable resisting unit **241** are close to each other, the first fixed resisting unit **231** and the first movable resisting unit **241** can clamp the wafer frame **90** of one size.
[0022] Similarly, the second fixed resisting unit **232** and the second movable resisting unit **242** are

respectively located on the two opposite ends of the main body **20** and are mounted on the second plane **22**. The second fixed resisting unit **232** is located on the first end **28**, and the second movable resisting unit **242** is located on the second end **29**. The second movable resisting unit **242** can move toward or away from the second fixed resisting unit **232** on the second plane **22**. Therefore, when the second fixed resisting unit **232** and the second movable resisting unit **242** are close to each other, the second fixed resisting unit **232** and the second movable resisting unit **242** can clamp the wafer frame **90** of another size. In this embodiment, a distance between the first fixed resisting unit **231** and the first movable resisting unit **241** is smaller than a distance between the second fixed resisting unit **232** and the second movable resisting unit **242**.

[0023] In this embodiment, the first fixed resisting unit **231** and the second fixed resisting unit **232** are located on the first end **28** of the main body **20**, and the first movable resisting unit **241** and the second movable resisting unit **242** are located on the second end **29** of the main body **20**. In another embodiment, the first fixed resisting unit **231** and the second movable resisting unit **242** can be located on one of the two ends of the main body **20**, and the first movable resisting unit **241** and the second fixed resisting unit **232** can be located on another one of the two ends of the main body **20**. Alternatively, a connection line between the first fixed resisting unit **231** and the first movable resisting unit **241** intersects a connection line between the second fixed resisting unit **232** and the second movable resisting unit **242**, but it is not limited thereto.

[0024] With reference to FIG. **4** to FIG. **6**, the driver **25** is connected to the moving assembly **24** and can drive the moving assembly **24** to move toward or away from the fixing assembly **23**. In this embodiment, the driver **25** is connected to the first movable resisting unit **241** and the second movable resisting unit **242** at the same time, and drives the first movable resisting unit **241** and the second movable resisting unit **242** to move together. In another embodiment, the main body **20** can comprise two drivers **25**, one of the drivers **25** is connected to the first movable resisting unit **241**, another one of the drivers **25** is connected to the second movable resisting unit **242**, but it is not limited thereto.

[0025] The elastic unit **26** is connected to the moving assembly **24** and tends to move the moving assembly **24** away from the fixing assembly **23**. In other words, when the first fixed resisting unit **231** and the first movable resisting unit **241** clamp the wafer frame **90**, the elastic unit **26** can help the wafer frame **90** resist a clamping force between the first fixed resisting unit **231** and the first movable resisting unit **241**. Similarly, when the second fixed resisting unit **232** and the second movable resisting unit **242** clamp the wafer frame **90**, the elastic unit **26** can help the wafer frame **90** resist a clamping force between the second fixed resisting unit **232** and the second movable resisting unit **242**. Therefore, this can prevent the wafer frame **90** from being deformed under excessive extrusion.

[0026] The sensor assembly **27** is signally connected to the driver **25**. The sensor assembly **27** is configured to detect a position of the moving assembly **24**, such that the driver **25** can drive the moving assembly **24**. In this embodiment, the main body **20** comprises two sensor assemblies **27**, which are the first sensor assembly **27**A and the second sensor assembly **27**B. The two sensor assemblies **27** are optical sensors and are respectively mounted on two sides of the moving assembly **24**. Each one of the sensor assemblies **27** comprises a first part **271** and a second part **272**. The first part **271** can emit and sense an optical signal. The second part **272** is securely mounted on the moving assembly **24**, and the second part **272** can move with the moving assembly **24** and selectively block the optical signal emitted by the first part **271**.

[0027] When the moving assembly **24** moves away from the fixing assembly **23**, the second part **272**A of the first sensor assembly **27**A blocks the optical signal emitted by the first part **271**A, and the second part **272**B of the second sensor assembly **27**B does not block the optical signal emitted by the first part **271**B. As shown in FIG. **6**, when the moving assembly **24** moves toward the fixing assembly **23**, the second part **272**A of the first sensor assembly **27**A does not block the optical signal emitted by the first part **271**A, and the second part **272**B of the second sensor assembly **27**B

blocks the optical signal emitted by the first part **271**B. The position of the moving assembly **24** can be determined by whether the optical signal of each one of the sensor assemblies **27** is blocked.
[0028] With reference to FIG. **2** to FIG. **4**, the supporting units **30** are securely mounted on the base **10** and are separately mounted on two sides of the main body **20**. A top of each one of the supporting units **30** comprises a first surface **31** and a second surface **32**. The first surface **31** and the second surface **32** are two horizontal surfaces. A height of the first surface **31** is same to the height of the first plane **21**, and a height of the second surface **32** is same to the height of the second plane **22**. The wafer frame **90** of one size can be placed on the first plane **21** and the first surface **31**, and the wafer frame **90** of another size can be placed on the second plane **22** and the second surface **32**. However, only one wafer frame **90** can be placed on the wafer frame positioning stage at a given time. In this embodiment, the wafer frame positioning stage comprises four supporting units **30**. Two of the four supporting units **30** are located on one side of the main body **20**, and the other two of the four supporting units **30** are located on another side of the main body **20**. In another embodiment, an amount of the supporting units **30** is not limited thereto, as long as the supporting units **30** can stably hold the wafer frame **90**.
[0029] Before the wafer frame **90** is placed on the wafer frame positioning stage, the driver **25** drives the moving assembly **24** to move away from the fixing assembly **23**, until the second part **272**A of the first sensor assembly **27**A blocks the optical signal emitted by the first part **271**A, and the second part **272**B of the second sensor assembly **27**B does not block the optical signal emitted by the first part **271**B. When the wafer frame **90** is placed on the wafer frame positioning stage, the driver **25** drives the moving assembly **24** to move toward the fixing assembly **23**, until the second part **272**A of the first sensor assembly **27**A does not block the optical signal emitted by the first part **271**A, and the second part **272**B of the second sensor assembly **27**B blocks the optical signal emitted by the first part **271**B. Therefore, the moving assembly **24** and the fixing assembly **23** can clamp the wafer frame **90**. At this time, if the size of the wafer frame **90** s slightly larger than a distance between the moving assembly **24** and the fixing assembly **23**, the elastic unit **26** can help the wafer frame **90** resist the clamping force of the moving assembly **24** and the fixing assembly **23**.
[0030] The advantage of the present invention is that the wafer frame positioning stage comprises the elastic unit **26** and the driver **25**. Therefore, when clamping and fixing the wafer frame **90**, the distance and the clamping force between the first fixed resisting unit **231** and the first movable resisting unit **241** can better meet the needs of the wafer frame **90**, and prevent the wafer frame **90** from being deformed. In addition, the wafer frame positioning stage has two clamping positions: the first fixed resisting unit **231** and the first movable resisting unit **241**, and the second fixed resisting unit **232** and the second movable resisting unit **242**. Therefore, the wafer frame positioning stage can hold the wafer frames **90** of two different sizes.
[0031] Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and features of the invention, the disclosure is illustrative only. Changes may be made in the details, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

Claims

1. A wafer frame positioning stage configured to hold a wafer frame; the wafer frame positioning stage comprising: a base; a main body securely mounted on the base and configured to hold the wafer frame; the main body comprising: a first plane horizontally formed on the main body; a first fixed resisting unit securely mounted on the first plane and located on a first end of the main body; a first movable resisting unit movably mounted on a second end of the main body; the first

movable resisting unit and the first fixed resisting unit located opposite each other; a second plane horizontally formed on the main body; a height of the second plane being higher than a height of the first plane; a second fixed resisting unit securely mounted on the second plane and located on the first end of the main body; a second movable resisting unit movably mounted on the second end of the main body; the second movable resisting unit and the second fixed resisting unit located opposite each other; a driver connected to the first movable resisting unit and driving the first movable resisting unit to move toward or away from the first fixed resisting unit; an elastic unit connected to the first movable resisting unit and tending to move the first movable resisting unit away from the first fixed resisting unit.

2. The wafer frame positioning stage as claimed in claim 1, wherein the wafer frame positioning stage comprises multiple supporting units; the supporting units are securely mounted on the base and separately mounted on two sides of the main body; a height of a top of each one of the supporting units is same to the height of the first plane.

3. The wafer frame positioning stage as claimed in claim 1, wherein the wafer frame positioning stage comprises: multiple supporting units securely mounted on the base; the supporting units separately mounted on two sides of the main body; a top of each one of the supporting units comprising: a first surface; a height of the first surface being same to the height of the first plane; a second surface; a height of the second surface being same to the height of the second plane.

4. The wafer frame positioning stage as claimed in claim 1, wherein the wafer frame positioning stage comprises a sensor assembly; the sensor assembly is configured to detect a position of the first movable resisting unit, such that the driver is capable of driving the first movable resisting unit according to the position of the first movable resisting unit.

5. The wafer frame positioning stage as claimed in claim 2, wherein the wafer frame positioning stage comprises a sensor assembly; the sensor assembly is configured to detect a position of the first movable resisting unit, such that the driver is capable of driving the first movable resisting unit according to the position of the first movable resisting unit.

6. The wafer frame positioning stage as claimed in claim 3, wherein the wafer frame positioning stage comprises a sensor assembly; the sensor assembly is configured to detect a position of the first movable resisting unit, such that the driver is capable of driving the first movable resisting unit.

7. The wafer frame positioning stage as claimed in claim 4, wherein the sensor assembly is an optical sensor.

8. The wafer frame positioning stage as claimed in claim 5, wherein the sensor assembly is an optical sensor.

9. The wafer frame positioning stage as claimed in claim 6, wherein the sensor assembly is an optical sensor.

10. The wafer frame positioning stage as claimed in claim 1, wherein the wafer frame positioning stage comprises a surface; the surface is configured to contact the wafer frame, and the surface comprises an antistatic coating.

11. The wafer frame positioning stage as claimed in claim 8, wherein the wafer frame positioning stage comprises a surface; the surface is configured to contact the wafer frame, and the surface comprises an antistatic coating.

12. The wafer frame positioning stage as claimed in claim 9, wherein the wafer frame positioning stage comprises a surface; the surface is configured to contact the wafer frame, and the surface comprises an antistatic coating.