

TAPE ROLL AND TAPE MOUNTER

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a tape mouter for adhering a tape to a workpiece to which the tape is to be adhered, and a tape roll in which a belt-shaped adhesive tape is rolled.

Description of the Related Art

A tape to be adhered to a workpiece is generally formed in a belt shape, and is widely distributed in the form of a roll (tape roll) in which the belt-shaped tape is rolled around a core (core tube). In use, the tape roll is set on a tape mouter by inserting a feeding-out roller, which is for rotating the tape roll, in the core of the tape roll (see, for example, Japanese Patent Laid-open No. 2015-082642).

SUMMARY OF THE INVENTION

However, a new tape roll is heavy in weight, and a lot of labor is required for lifting up the tape roll to the height of the feeding-out roller and further inserting the feeding-out roller into the core of the tape roll to set the tape roll onto the tape mouter.

Therefore, there is a need for an improvement such that the tape roll can be set on the tape mounter more easily. In addition, the tape roll has been increased in size as the silicon wafer as an example of the workpiece to which the tape is to be adhered has been increased in diameter. Accordingly, the just-mentioned improvement has become an important problem.

It is therefore an object of the present invention to provide a tape roll which can be easily mounted to a tape mounter.

It is another object of the present invention to provide a tape mounter to which a tape roll can be easily mounted while lightening the burden on an operator.

In accordance with an aspect of the present invention, there is provided a tape roll including a core and a belt-shaped tape rolled around the core. The core is longer than the width of the belt-shaped tape, and the tape roll has a projecting portion where the core projects from at least one end in regard of the width direction of the belt-shaped tape.

Preferably, the tape roll further includes a bottom plate disposed at an end of the projecting portion and extending in a direction orthogonal to an extending direction of the core.

In accordance with another aspect of the present invention, there is provided a tape mounter including a tape feeding section to which a tape roll obtained by rolling a belt-shaped tape around a core is mounted, an adhesion roller by which the belt-shaped tape fed out by the tape feeding section is adhered to a workpiece to which the belt-shaped tape is to be adhered, and a cutter by which the belt-shaped tape adhered to the workpiece is cut to a predetermined size corresponding to the workpiece. The core is longer than the width of the belt-shaped tape, and the tape roll has a projecting portion where the core projects from at least one end in regard of the width direction of the belt-shaped tape. The tape feeding section includes a first driven pulley having a first contact portion that makes contact with the projecting portion of the core, a second driven pulley having a second contact portion that makes contact with the projecting portion of the core, a driving pulley mounted to an output shaft of a motor, and an endless belt wrapped around the driving pulley and the first driven pulley and the second driven pulley.

In the tape roll according to the present invention, the core is longer than the width of the belt-shaped tape, and the tape roll has the projecting portion where the

core projects from at least one end in regard of the width direction of the belt-shaped tape. Therefore, after the operator mounts the tape roll on the tape mounter in such a manner as to clamp the projecting portion between the driven pulleys of the tape mounter, the belt-shaped tape can be fed out toward the workpiece to which the belt-shaped tape is to be adhered, by rotating the core by rotational power generated by the motor, through the driven pulleys. Accordingly, unlike in the case of a conventional tape mounter, it is unnecessary for the operator to set the tape roll by inserting a feeding-out roller into the core of the tape roll, and it is sufficient to mount the tape roll on the driven pulleys. For this reason, the tape roll can be easily mounted to the tape mounter, and the burden on the operator can be reduced.

In the case where a tape roll is laid on its side such that the extending direction of the core is parallel to a surface on which the tape roll is placed, at the time of carrying or storing a tape roll, a large area is needed, and the glue layer of the tape may be locally deformed under its own weight, possibly making it impossible to achieve uniform adhesion of the belt-shaped tape to the workpiece at the time of using the tape roll.

In view of this, in the tape roll according to the present invention, there is provided the bottom plate disposed at an end of the projecting portion and extending in the direction orthogonal to the extending direction of the core. This ensures that the tape roll can be stably placed in an erect state on a mounting surface, and the belt-shaped tape can be prevented from being deformed.

According to the tape mounter of the present invention, after the operator mounts the tape roll on the tape mounter such as to clamp the projecting portion of the tape roll between the first contact portion of the first driven pulley and the second contact portion of the second driven pulley, the belt-shaped tape can be fed out toward the workpiece to which the belt-shaped tape is to be adhered, by rotating the core by the rotational power generated by the motor, through the first driven pulley and the second driven pulley. Therefore, unlike in the case of a conventional tape mounter, it is unnecessary for the operator to set the tape roll by inserting a feeding-out roller into the core of the tape roll, and it is sufficient to mount the tape roll on the first contact portion of the first driven pulley and the second contact portion of the second driven pulley. Accordingly, the

tape roll can be easily mounted to the tape mounter while reducing the burden on the operator, and, thereafter, the belt-shaped tape can be adhered to the workpiece.

The above and other objects, features and advantages of the present invention and the manner of realizing them will become more apparent, and the invention itself will best be understood from a study of the following description and appended claims with reference to the attached drawings showing a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view depicting an example of a tape mounter in a state in which a tape roll is set thereon;

FIG. 2 is a perspective view depicting a state in which the tape roll is being mounted to a tape feeding section of the tape mounter;

FIG. 3 is a side view for explaining a state in which after part of a belt-shaped tape fed out by the tape feeding section is adhered to a workpiece to which the belt-shaped tape is to be adhered and an annular frame, the remaining belt-shaped tape is taken up by a belt-shaped tape take-up roller;

FIG. 4A is a perspective view depicting a state in which a bottom plate is being mounted to an end of a projecting portion of the tape roll; and

FIG. 4B is a perspective view depicting a state in which the bottom plate has been mounted to the end of the projecting portion of the tape roll.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A tape mounter 1 according to the present invention depicted in FIG. 1 has a base 10 on which components of the tape mounter 1 are disposed, and an upper surface of the base 10 is a horizontal surface. On a rear side (+X direction side) of the base 10, there is disposed a tape feeding section 3 to which a tape roll 2 is mounted. In addition, an intermediate portion of the upper surface of the base 10 is a region where a workpiece W to which a tape is to be adhered and an annular frame F are mounted.

The tape roll 2 fed out toward a -X direction side by the tape feeding section 3 includes a core 20, and a belt-shaped tape 21 rolled around the core 20. The belt-shaped tape 21 includes a flexible resin-made film-shaped base layer, and a glue layer provided on one side of the film-shaped base layer, and is rolled in a state in which a release sheet 213 is adhered to an adhesive surface

formed of the glue layer. The release sheet 213 is peeled off before the belt-shaped tape 21 is adhered to the workpiece W and the annular frame F. The adhesive surface of the belt-shaped tape 21 before adhesion is protected by the release sheet 213. Note that the width of the belt-shaped tape 21 is configured to be greater than the diameter of the annular frame F such that the belt-shaped tape 21 can be adhered to the whole part of a surface to which the belt-shaped tape 21 is to be adhered of the annular frame F.

The core 20, which is cylindrical in shape and is formed from a plastic such as acrylic or polycarbonate plastic, extends in a Y-axis direction in FIG. 1, and its length is greater than the width of the belt-shaped tape 21. Projecting portions 200 (in FIG. 1, only one of them is depicted) are formed where the core 20 projects by a predetermined length (for example, approximately 15 mm) from both ends in regard of the width direction (Y-axis direction) of the belt-shaped tape 21. Note that the projecting portion 200 may be formed at only one end in regard of the width direction of the belt-shaped tape 21.

The workpiece W to which the belt-shaped tape 21 is to be adhered, depicted in FIG. 1, is, for example, a circular disk-shaped semiconductor wafer formed from

silicon as a base material, and is in the state of being placed on an intermediate portion of the upper surface of the base 10. In addition, the annular frame F to be used, for example, to facilitate handling of the workpiece W is also placed on the upper surface of the base 10. The workpiece W is positioned in an opening of the annular frame F, with the center of the opening of the annular frame F and the center of the workpiece W being substantially coincident with each other.

The tape feeding section 3 includes a first driven pulley 31 having a first contact portion 31a that makes contact with the projecting portion 200 of the core 20, a second driven pulley 32 having a second contact portion 32a that makes contact with the projecting portion 200 of the core 20, a driving pulley 34 mounted to an output shaft of a motor 33, and an endless belt 35 wrapped around the driving pulley 34 and the first driven pulley 31 and the second driven pulley 32.

The first driven pulley 31 (the second driven pulley 32) formed from a metal, for example, stainless steel includes a pulley-shaped wrapped portion 31b (32b) on which the endless belt 35 being flat is wrapped, and the first contact portion 31a (second contact portion 32a) which is cylindrical in shape and extends from the

wrapped portion 31b (32b) in the +Y direction. An outer surface of the first contact portion 31a (second contact portion 32a) may be satin finished or be formed with minute projections and recesses (be minutely rugged), for preventing slipping between itself and the projecting portion 200 of the core 20 with which it makes contact.

The first driven pulley 31 and the second driven pulley 32 are disposed at positions which are spaced by a distance at least shorter than the diameter of the core 20 in the X-axis direction and which are at the same height.

The driving pulley 34 is disposed below the first driven pulley 31 and the second driven pulley 32, for example, such that its distance from the first driven pulley 31 and its distance from the second driven pulley 32 are equal. The motor 33 for rotating the driving pulley 34 is, for example, a servo motor, and the tape feeding section 3 controls a feeding quantity of the belt-shaped tape 21 by torque control.

For example, as depicted in FIG. 2, a casing 8 for covering part or the whole part of an upper side of the base 10 of the tape mounter 1 can be attached to and detached from the base 10. Note that only part of the casing 8 and the base 10 is illustrated in FIG. 2. The

casing 8 includes a casing main body 80 mounted onto the base 10, and a cover section 81 that opens and closes an upper portion of the casing main body 80.

The casing main body 80 includes a side plate 80b, a side plate 80c, and a top plate 80a facing an upper surface of the base 10. An end side of the upper portion of the casing main body 80 is cut out, for example, in a rectangular parallelepiped shape, and the cut-out portion can be opened and closed by the cover section 81.

The cover section 81 formed according to the cut-out portion of the casing main body 80 can be opened and closed by 180 degrees, through a hinge disposed at a part of connection between the cover section 81 and the casing main body 80. In addition, a pair of round rod-shaped rollers 83 each having an axis in the Y-axis direction are disposed inside the cover section 81.

A support member 31c and a support member 32c are disposed at the side plate 80b of the casing main body 80 such as to protrude to the inside of the casing main body 80, the first driven pulley 31 is fixed to a tip of the support member 31c, and the second driven pulley 32 is fixed to a tip of the support member 32c. Besides, the motor 33 is fixed to the side plate 80b through a bracket (not depicted).

A pair of cylindrical support members 45 that support the projecting portion 200 projecting from an end on the +Y direction side of the belt-shaped tape 21 are disposed at the side plate 80c facing the side plate 80b. Each of the support members 45 has a flange-shaped restriction section 45a extending radially outward, and the restriction section 45a restricts the tape roll 2 from moving in the Y-axis direction when the projecting portion 200 is mounted on the support members 45.

A case of mounting the tape roll 2 onto the tape feeding section 3 of the tape munter 1 will be described below. First, as depicted in FIG. 2, the casing 8 is mounted onto the base 10 of the tape munter 1, whereby the tape feeding section 3 is set into a state in which the tape roll 2 can be set thereon. In addition, a state is obtained in which the cover section 81 of the casing 8 is opened, and the tape feeding section 3 is exposed from the inside of the casing 8 to the upper side.

An operator lifts up the tape roll 2 above the height position of the tape feeding section 3, and mounts it in such a manner that one of the projecting portions 200 of the tape roll 2 is clamped between the first contact portion 31a of the first driven pulley 31 and the second contact portion 32a of the second driven pulley 32

and that the other of the projecting portions 200 is clamped between the pair of support members 45. Further, the cover section 81 is closed, whereby the rollers 83 disposed inside the cover section 81 are put into contact with the projecting portion 200 on one side of the tape roll 2 and the projecting portion 200 on the other side, respectively, from above, as illustrated in FIG. 1. Note that the casing 8 is omitted in FIG. 1.

In this way, in the tape roll 2 according to the present invention, the core 20 is longer than the width of the belt-shaped tape 21, and the tape roll 2 has the projecting portion or portions 200 where the core 20 projects from at least one end in regard of the width direction of the belt-shaped tape 21. Therefore, when the operator mounts the tape roll 2 onto the tape mounter 1 in such a manner that the projecting portion 200 is clamped between the first contact portion 31a of the first driven pulley 31 and the second contact portion 32a of the second driven pulley 32, the belt-shaped tape 21 can thereby be fed out toward the workpiece W to which the belt-shaped tape 21 is to be adhered. Accordingly, unlike in the case of a conventional tape mounter, it is unnecessary for the operator to set a feeding-out roller by inserting it in the core of the tape roll, so that the

tape roll 2 can be mounted to the tape mounter 1 more easily, and the burden on the operator is lightened.

After the tape roll 2 is mounted onto the tape feeding section 3, first, one end of the belt-shaped tape 21 is led by the operator to a belt-shaped tape take-up roller 47 through peel-off rollers 41, clamping rollers 43 and anti-slack rollers 44 depicted in FIGS. 1 and 3 and described later. Thereafter, the motor 33 of the tape feeding section 3 rotationally drives the driving pulley 34, for example, clockwise as viewed from the -Y direction side (in FIG. 3, the viewer's side of the paper surface), whereby the endless belt 35 is turned attendant on the rotation of the driving pulley 34. With the endless belt 35 turned, the first driven pulley 31 and the second driven pulley 32 are rotated clockwise as viewed from the -Y direction side. With the first driven pulley 31 and the second driven pulley 32 rotated, the core 20 is rotated counterclockwise as viewed from the -Y direction side, and the belt-shaped tape 21 with the release sheet 213 adhered to the adhesive surface thereof is fed out. In addition, vertical vibration of the tape roll 2 being rotated is restrained by the rollers 83.

As illustrated in FIGS. 1 and 3, the peel-off rollers 41 for peeling the release sheet 213 from the

belt-shaped tape 21 and a release sheet take-up roller 42 for taking up the release sheet 213 peeled off the belt-shaped tape 21 are disposed under the tape feeding section 3. The belt-shaped tape 21 is fed out from the tape feeding section 3 toward the peel-off rollers 41, with the adhesive surface side (the release sheet 213 side) faced down.

The peel-off rollers 41 include two rollers 41a and 41b disposed such as to contact each other in the vertical direction. The belt-shaped tape 21 with the release sheet 213 adhered to the adhesive surface thereof which is fed out from the tape feeding section 3 is inserted and passed between the two rollers 41a and 41b, and the belt-shaped tape 21 and the release sheet 213 are clamped from the upper and lower sides by the two rollers 41a and 41b.

The belt-shaped tape 21 from which the release sheet 213 has been peeled at the peel-off rollers 41 is fed to the lower side of the peel-off rollers 41. On the other hand, the release sheet 213 peeled off the belt-shaped tape 21 is fed in the +X direction, to be taken up by the release sheet take-up roller 42 rotated around an axis in the Y-axis direction by a driving mechanism such as a motor positioned at substantially the same height as

the peel-off rollers 41.

As depicted in FIGS. 1 and 3, the clamping rollers 43 extending in the Y-axis direction are disposed under the peel-off rollers 41. The clamping rollers 43 include two rollers 43a and 43b disposed at positions at the same height such as to contact each other in the X-axis direction, and the two rollers 43a and 43b are each rotated about an axis in the Y-axis direction. The belt-shaped tape 21 which is fed out from the peel-off rollers 41 and from which the release sheet 213 has been peeled is inserted and passed between the two rollers 43a and 43b, and the belt-shaped tape 21 is clamped from both sides in regard of the X-axis direction by the two rollers 43a and 43b. The clamping rollers 43 feed out the belt-shaped tape 21, fed out from the peel-off rollers 41, in such a manner that the belt-shaped tape 21 will not slack, at a position slightly above the upper surfaces of the workpiece W and the annular frame F mounted on the base 10.

At a position spaced from the clamping rollers 43 in the X-axis direction by a distance of at least not less than the diameter of the annular frame F, the anti-slack rollers 44 extending in the Y-axis direction are disposed, for example, at the same height as the clamping

rollers 43. The anti-slack rollers 44 include two rollers 44a and 44b disposed at positions at the same height such as to contact each other in the X-axis direction, and the two rollers 44a and 44b are each rotated around an axis in the Y-axis direction. The belt-shaped tape 21 fed out from the clamping rollers 43 horizontally is inserted and passed between the two rollers 44a and 44b, and the belt-shaped tape 21 is clamped from both sides in regard of the X-axis direction by the anti-slack rollers 44. The anti-slack rollers 44 feed out the belt-shaped tape 21, fed out from the clamping rollers 43, toward a belt-shaped tape take-up roller 47 (described later) while applying a tension to the belt-shaped tape 21 such that the belt-shaped tape 21 will not slack on the upper side of the workpiece W and the annular frame F mounted on the base 10.

On the upper side of an intermediate portion of the upper surface of the base 10, there is disposed cutter means 71 configured to cut the belt-shaped tape 21, adhered to the workpiece W, to a predetermined size corresponding to the workpiece W. The cutter means 71 has an arm 711 extending in a horizontal direction, and a mounting section 712 to which a cutter 710 is detachably mounted is disposed on a lower surface of a tip of the

arm 711. The cutter 710 mounted to the mounting section 712 extends in a Z-axis direction while having a sharp cutting edge at a lower end thereof. A rotating shaft 713 for rotating the arm 711 in a horizontal direction around an axis in the Z-axis direction is connected to an upper surface of a rear end of the arm 711. In addition, vertical moving means (not depicted) configured to move the arm 711 vertically is connected to the rotating shaft 713.

With the arm 711 rotated with the rotating shaft 713 as a center, the cutter 710 is moved such as to draw a circle on the base 10. By the cutter 710, the belt-shaped tape 21 adhered to the workpiece W and the annular frame F can be cut along the annular frame F. Note that the position of attaching the cutter 710 to the arm 711 is controlled according to the diameter of the workpiece W and the diameter of the annular frame F.

An adhesion roller 70 for adhering the belt-shaped tape 21, fed out toward the -X direction side by the tape feeding section 3, to the workpiece W is disposed on the upper side of the base 10. The adhesion roller 70 having a length of not less than the width of the belt-shaped tape 21 is disposed, for example, such as to cross the belt-shaped tape 21 in the Y-axis direction, and can be

moved in the vertical direction and the X-axis direction by moving means (not depicted). With the adhesion roller 70 moved in the X-axis direction while pressing the upper surface (the surface opposite to the adhesive surface) of the belt-shaped tape 21 from above by the adhesion roller 70, the belt-shaped tape 21 is adhered to the workpiece W and the annular frame F.

On the upper side of the anti-slack rollers 44, there is disposed the belt-shaped tape take-up roller 47 for taking up the belt-shaped tape 21, fed from the anti-slack rollers 44, by being rotated around an axis in the Y-axis direction by a driving mechanism such as a motor. The belt-shaped tape 21, remaining after a circular portion adhered to the workpiece W and the annular frame F is cut out therefrom, is taken up by the belt-shaped tape take-up roller 47.

The tape mounter 1 according to the present invention includes at least: the tape feeding section 3 to which the tape roll 2 having the belt-shaped tape 21 rolled around the core 20 is mounted; the adhesion roller 70 for adhering the belt-shaped tape 21 fed out by the tape feeding section 3 to the workpiece W; and the cutter means 71 configured to cut the belt-shaped tape 21 adhered to the workpiece W to the predetermined size

corresponding to the workpiece W. The core 20 is longer than the width of the belt-shaped tape 21, the tape roll 2 has the projecting portion or portions 200 where the core 20 projects from at least one end in regard of the width direction of the belt-shaped tape 21. The tape feeding section 3 includes the first driven pulley 31 having the first contact portion 31a that makes contact with the projecting portion 200 of the core 20, the second driven pulley 32 having the second contact portion 32a that makes contact with the projecting portion 200 of the core 20, the driving pulley 34 mounted to the output shaft of the motor 33, and the endless belt 35 wrapped around the driving pulley 34 and the first driven pulley 31 and the second driven pulley 32. Therefore, after the operator mounts the projecting portion 200 of the tape roll 2 such as to clamp it between the first contact portion 31a of the first driven pulley 31 and the second contact portion 32a of the second driven pulley 32, the core 20 is rotated by the rotational power generated by the motor 33 through the first driven pulley 31 and the second driven pulley 32, whereby the belt-shaped tape 21 can be fed out toward the workpiece W. Accordingly, unlike in the case of a conventional tape mounter, it is unnecessary for the operator to set the feeding-out

roller by inserting it in the core of the tape roll, and it is sufficient to place the tape roll 2 on the first contact portion 31a of the first driven pulley 31 and the second contact portion 32a of the second driven pulley 32. For this reason, the tape roll 2 can be mounted to the tape mounter 1 more easily, while reducing the burden on the operator, and, thereafter, the belt-shaped tape 21 can be adhered to the workpiece W.

A case of storing the tape roll 2 will be described below. As depicted in FIG. 4A, for example, the tape roll 2 has bottom plates 6 which are disposed at ends of the projecting portions 200 and which extend in directions (horizontal directions) orthogonal to the extending direction of the core 20 (in FIG. 4A, the Z-axis direction). While the bottom plates 6 are rectangular in external shape in the example depicted in FIG. 4A, this is not restrictive; the bottom plates 6 may be circular in shape, or in a shape obtained by cutting out part of the circumference of a circular plate into a flat shape. With the bottom plates 6 in a rectangular shape or in a shape obtained by cutting part of the circumference of a circular plate into a flat shape, the tape roll 2 provided with the bottom plates 6 can be laid on its side on a mounting surface, while preventing the tape roll 2

from rolling on the mounting surface.

The thickness of the bottom plate 6 is, for example, substantially equal to the length of the projecting portion 200, and the bottom plate 6 is formed in its central region with a fitting hole 60 which penetrates the bottom plate 6 in the thickness direction and into which the projecting portion 200 is to be fitted. With the fitting holes 60 of the bottom plates 6 fitted from above to one of the projecting portions 200 and the other of the projecting portions 200 of the tape roll 2, the upper end surface (lower end surface) of the projecting portion 200 is put into a state of being substantially flush with the upper surface (lower surface) of the bottom plate 6. Then, as depicted in FIG. 4B, the tape roll 2 can be placed in an erect state on a mounting surface B. Note that a configuration may be adopted in which the fitting hole 60 has such a depth as not to penetrate the bottom plate 6, whereby it is ensured that when the fitting holes 60 of the bottom plates 6 are fitted to the projecting portions 200 of the tape roll 2, the ends of the belt-shaped tape 21 are slightly spaced from the bottom plates 6.

In the case where the tape roll 2 stored in the state depicted in FIG. 4B is mounted to the tape mounter

1 as above-mentioned, the tape roll 2 with the bottom plates 6 mounted thereto is carried to the tape mounter 1, then the bottom plates 6 are detached, and the tape roll 2 is set onto the tape mounter 1.

The present invention is not limited to the details of the above described preferred embodiment. The scope of the invention is defined by the appended claims and all changes and modifications as fall within the equivalence of the scope of the claims are therefore to be embraced by the invention.

WHAT IS CLAIMED IS:

1. A tape mounter comprising:

a tape feeding section to which a tape roll obtained by rolling a belt-shaped tape around a core is mounted;

an adhesion roller by which the belt-shaped tape fed out by the tape feeding section is adhered to a workpiece to which the belt-shaped tape is to be adhered; and

a cutter by which the belt-shaped tape adhered to the workpiece is cut to a predetermined size corresponding to the workpiece,

wherein the core is longer than the width of the belt-shaped tape, and the tape roll has a projecting portion where the core projects from at least one end in regard of a width direction of the belt-shaped tape, and

the tape feeding section includes a first driven pulley having a first contact portion that makes contact with the projecting portion of the core, a second driven pulley having a second contact portion that makes contact with the projecting portion of the core, a driving pulley mounted to an output shaft of a motor, and an endless belt wrapped around the driving pulley and the first driven pulley and the second driven pulley.

2. The tape roll for the tape mounter according to claim 1, comprising:

the core; and

the belt-shaped tape rolled around the core,

wherein the core is longer than the width of the belt-shaped tape, and the tape roll has the projecting portion where the core projects from at least one end in regard of the width direction of the belt-shaped tape.

3. The tape roll according to claim 2, further comprising:

a bottom plate disposed at an end of the projecting portion and extending in a direction orthogonal to an extending direction of the core.