

DESCRIPTION

TCP HANDLING APPARATUS

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TECHNICAL FIELD

The present invention relates to a TCP handling apparatus used for testing TCP (Tape Carrier Package) and COF (Chip On Film) as kinds of IC devices (hereinafter, devices produced by mounting techniques of TCP, COF and other TAB (Tape Automated Bonding) will be collectively referred to as "TCP").

BACKGROUND ART

In a production procedure of IC devices and other electronic devices, an electronic device testing apparatus is necessary for testing performance and functions of finally produced IC devices and devices in the middle of the procedure. In the case of a TCP, a TCP testing apparatus is used.

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The TCP testing apparatus generally comprises a tester body, a test head and a TCP handling device (hereinafter, also referred to as "a TCP handler"). The TCP handler has a function of conducting tests successively on a plurality of TCP by conveying a carrier tape, which is a tape (It includes a concept of a film.

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It will be the same below) with a plurality of TCP formed thereon, pressing the carrier tape against probes of a probe card electrically connected to the test head, and bringing external electrodes of TCP contact with the
5 probes.

The TCP handler as above is generally provided with a pusher body for pressing a carrier tape against probes and sprockets for supporting the carrier tape and feeding the carrier tape. The sprockets are a main sprocket for
10 driving the carrier tape on the latter stage side of the pusher body and an assist sprocket for assisting to feed the carrier tape on the former stage side of the pusher body. Normally, the main sprocket is connected to a stepping motor and the assist sprocket rotates in
15 synchronization with the main sprocket.

However, in the above configuration, a sufficient tension cannot be given to the carrier tape and the carrier tape flops while feeding the carrier tape, so that there have been problems that the carrier tape
20 cannot be fed at a high speed, slack arises on the carrier tape also when the carrier tape is stopped, and aligning of TCP with probes cannot be accurately attained.

Also, there is a method of inversely rotating the assist sprocket a little by compulsion to give a tension
25 to the carrier tape, however, there has been a

disadvantage that an excessive stress was imposed on the carrier tape in that case.

DISCLOSURE OF THE INVENTION

Embodiments of the present invention were made in consideration of the above circumstances and seek to provide a TCP handling apparatus capable of giving a suitable tension to the carrier tape, accurately aligning the carrier tape (TCP), and suppressing flopping of the running carrier tape.

In accordance with a first aspect of the present invention, there is provided a TCP handling apparatus capable of conducting tests successively on a plurality of TCP while feeding a carrier tape, which is a tape with a plurality of TCP formed thereon, by a feeding device, by pressing against a contact portion electrically connected to a test head by a pusher, and connecting external terminals of the TCP to said contact portion, wherein said feeding device comprises a first sprocket on a former stage side and a second sprocket on a latter stage side of said pusher for supporting a carrier tape and feeding and stopping the carrier tape; said first sprocket is connected to a driving source capable of rotating said first sprocket; and said driving source is a torque motor and said torque motor is torque-controlled, so that a predetermined tension is given to

the carrier tape supported by said first sprocket and said second sprocket, and so that said first sprocket is not inversely rotated against said second sprocket. (embodiment 1)

In the above embodiment (embodiment 1), by controlling a driving source of the first sprocket, the carrier tape can be supported with a suitable tension without giving an excessive stress on the carrier tape. As a result, the carrier tape (TCP) can be accurately aligned when the carrier tape stops, and flopping of the running carrier tape can be suppressed when the carrier tape is fed to attain a high-speed feeding of the carrier tape and, furthermore, a processing speed of the TCP handling apparatus can be improved.

In the above embodiment (embodiment 1), preferably, a rotation force given to the first sprocket by the driving source is a rotation force in the backward direction of the rotation direction of the second sprocket (embodiment 2).

In the above embodiments (embodiments 1 and 2), preferably, a connection member capable of absorbing vibration is provided between the first sprocket and the driving source (embodiment 3).

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According to the above embodiment (3), even when vibration arises on the drive axis of the driving source of the first sprocket, a rotation force of the drive axis can be transferred to the first sprocket after absorbing

the vibration of the drive axis by a connection member (it does not mean that the vibration is always 100% absorbed. It is the same in the present specification.) As a result, vibration of the first sprocket can be reduced, and flopping of the carrier tape and deviating of the carrier tape (TCP) caused by the vibration can be effectively suppressed.

Also disclosed is a TCP handling apparatus capable of conducting tests successively on a plurality of TCP while feeding a carrier tape, which is a tape with a plurality of TCP formed thereon, by a feeding device, by pressing against a contact portion electrically connected to a test head by a pusher, and connecting external terminals of the TCP to the contact portion, wherein the feeding device comprises a sprocket provided on a former stage side of the pusher and capable of supporting a carrier tape, a driving source capable of giving to the sprocket a rotation force in a backward rotation direction of a running direction of the carrier tape, and a connection member provided between a drive axis of the driving source and a rotation axis of the sprocket and capable of absorbing vibration (embodiment 4).

According to the above embodiment (embodiment 4), even when vibration arises on the drive axis of the

driving source, a rotation force of the drive axis can be transferred to the rotation axis of the sprocket after absorbing the vibration of the drive axis by the connection member. As a result, vibration of the sprocket is reduced and flopping of the carrier tape and deviating of the carrier tape (TCP) caused by the vibration can be effectively suppressed.

In the above embodiment (embodiment 4), preferably, the connection member is a member having flexibility at least in the torsion direction (embodiment 5). According to the member, vibration on the drive axis can be effectively absorbed by a simple configuration. As the member, for example, an axis joint called a flexible coupling may be used, but the present invention is not limited to this.

In the above embodiments (embodiments 4 and 5), preferably, the connection member is a member having a bellows structure (embodiment 6). According to the member, vibration of the drive axis can be effectively absorbed by the bellows structure, and a rotation force of the drive axis can be effectively transferred to the rotation axis of the sprocket.

In the above embodiments (embodiments 4 to 6), preferably, the driving source is a torque motor (embodiment 7). According to the torque motor, it is easy

to control a tension to be given by the sprocket. Also, although vibration easily arises on the drive axis when the driving source is a torque motor, the vibration can be absorbed by the connection member.

In the above embodiments (embodiments 4 to 7), the sprocket is provided to a frame so as to support a carrier tape from above, and the frame is provided with a tape support member for supporting and guiding the carrier tape from below (embodiment 8).

According to the above embodiment (embodiment 8), the carrier tape can be supported from above and below by the sprockets and the tape support member, so that an unwanted behavior of the carrier tape is effectively prevented, higher speed feeding becomes possible, thus a processing speed of the TCP handling apparatus can be improved, and positional deviation of the carrier tape can be effectively suppressed.

Also disclosed is a TCP handling apparatus capable of conducting tests successively on a plurality of TCP while feeding a carrier tape, which is a tape with a plurality of TCP formed thereon, by a feeding device, by pressing against a contact portion electrically connected to a test head by a pusher, and connecting external terminals of the TCP to the contact portion, wherein the feeding device

comprises a sprocket for supporting the carrier tape from above and feeding the carrier tape on the former stage side and/or the latter stage side of the pusher, and a frame for supporting the sprocket; and the frame is provided with a tape support member for supporting and guiding the carrier tape from below (embodiment 9).

According to the above (embodiment 9), the carrier tape can be supported from above and below by the sprockets and the tape support member, so that an unwanted behavior of the carrier tape can be effectively prevented, higher speed feeding can be possible, a processing speed of the TCP handling apparatus can be improved, and positional deviation of the carrier tape caused by vibration of the sprockets, etc. can be effectively suppressed.

In the above embodiment (embodiment 9), a suction device capable of picking up and hold the carrier tape by suction may be furthermore provided (embodiment 10). The suction device may be capable of picking up and fixing the carrier tape, positional deviation of which is suppressed by the guides, consequently, aligning of TCP under tested can be easily attained.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a front view showing a TCP testing

apparatus using a TCP handler according to an embodiment of the present invention.

FIG. 2 is a front view of a pusher unit in the TCP handler according to the same embodiment.

5 FIG. 3 is a sectional view of a drive device of a tension sprocket in the TCP handler according to the same embodiment.

FIG. 4 is a perspective view of a connection member in the TCP handler according to the same embodiment.

10 FIG. 5 is a side view of a tape support member in the TCP handler according to the same embodiment.

FIG. 6 is a perspective view of the tape support member in the TCP handler according to the same embodiment.

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BEST MODE FOR CARRYING OUT THE INVENTION

Below, an embodiment of the present invention will be explained based on the drawings.

A TCP testing apparatus using a TCP handler
20 according to an embodiment of the present invention is shown in FIG. 1.

The TCP testing apparatus 1 comprises a not shown tester body, a test head 10 electrically connected to the tester body, and a TCP handler provided above the test
25 head 10.

The TCP handler 2 is for giving tests successively on a plurality of TCP formed on a carrier tape 5. In the present embodiment, it is assumed that TCP is tested one by one for simplifying the explanation. Note that the
5 present invention is not limited to this and a plurality of TCP arranged in the serial direction and/or parallel direction on the carrier tape 5 may be tested at a time.

The TCP handler 2 is provided with a feeding reel 21 and a winding reel 22, and the pre-test carrier tape 5
10 is wound in the feeding reel 21. The carrier tape 5 is fed from the feeding reel 21, subjected to a test, and rewound around the winding reel 22.

Between the feeding reel 21 and the winding reel 22, three spacer rolls 23a, 23b and 23c are provided for
15 feeding a protective tape 51 peeled from the carrier tape 5 from the feeding reel 21 to the winding reel 22. Each of the spacer rolls 23a, 23b and 23c can move up and down so as to be able to adjust tension of the protective tape 51.

20 Below the feeding reel 21, a tape guide 24a, a feeding limit roller 25a, an inner sub sprocket 25b and an inner guide roller 25c are provided. The carrier tape 5 fed from the feeding reel 21 is guided by the tape guide 24a to be conveyed to the pusher unit 3 through the
25 feeding limit roller 25a, inner sub sprocket 25b and

inner guide roller 25c.

Also, below the winding reel 22, a tape guide 24b,
a winding limit roller 25f, an outer sub sprocket 25e and
an outer guide roller 25d are provided. The carrier tape
5 5 after being tested is guided by the tape guide 24b and
runs through the outer guide roller 25d, the outer sub
sprocket 25e and the winding limit roller 25f to be
rewound by the winding reel 22.

Between the inner guide roller 25c and the outer
10 guide roller 25d, a pusher unit 3 is provided. A first
camera 6a is provided to the former stage side (left side
in FIG. 1) of the pusher unit 3, a second camera 6b is
provided below the pusher unit 3 (inside of a later
explained probe card stage 7), and a third camera 6c is
15 provided on the latter stage side (right side in FIG. 1)
of the pusher unit 3. Also, between the pusher unit 3 and
the third camera 6c, a mark punch 26a and a reject punch
26b are provided.

The mark punch 26a is for forming one or a
20 plurality of holes at predetermined positions of a
corresponding TCP, and the reject punch 26b is for
punching out a TCP determined to be defective based on
the test result.

The cameras 6a, 6b and 6c are connected to a not
25 shown image processing device. The first camera 6a and

the third camera 26c are for determining an existence of TCP on the carrier tape 5 and positions and number of holes to be formed by the mark punch 26a. The second camera 26b is for obtaining information on positional deviation of the TCP on the carrier tape 5 with respect to probes. Also, the second camera 6b in the present embodiment is capable of obtaining positional deviation information of a plurality of objects in its scope.

The second camera 6b is mounted on a camera stage 61 and movable in the longitudinal and transversal directions on the plan view (the X-axis and Y-axis directions) and vertical direction (Z-axis direction) by an actuator provided to the camera stage 61.

A servo motor 31 capable of rotating the ball screw 32 is attached via a bracket 361 to a body portion of the TCP handler 2, and the pusher body portion 33 with a ball screw screwed therein is also attached via two linear motion guides 37 in the Z-axis direction. As a result of driving the servo motor 31, the pusher body portion 33 is movable in the vertical direction (Z-axis direction) by being guided by the linear motion guides 37. Also, the pusher body portion 33 and the frame (pusher frame) 36 of the pusher unit 3 are connected by a not shown interaction mechanism and, when the pusher body portion 33 moves up and down as explained above, the pusher frame

36 also moves up and down together therewith.

At the lower end portion of the pusher body portion 33, a suction plate 34 capable of picking up and holding the carrier tape 5 by suctioning the air is provided.

5 On the former stage side (left side in FIG. 1) of the pusher body portion 33 in the pusher frame 36, a tension sprocket 35a is provided, and a main sprocket 35b is provided on the latter stage side (right side in FIG. 1) of the pusher body portion 33. Hereinafter, the
10 tension sprocket 35a and the main sprocket 35b are also collectively referred to as pusher sprockets 35a and 35b.

The pusher unit 3 is connected to a not shown pusher stage. The pusher stage is connected to a servo motor via a plurality of ball screws (illustration
15 thereof is omitted). The pusher unit 3 can be moved in the horizontal direction (XY plane direction) and rotated around a vertical axis (around Z-axis) by driving the servo motor.

Below the pusher unit 3 and above the test head 10,
20 a probe card stage 7 loaded with a probe card 8 is provided. The probe card stage 7 is connected to a servo motor via a plurality of ball screws (illustration thereof is omitted). The probe card 8 can be moved in the horizontal direction (the XY-plane direction) and rotated
25 around the vertical axis (around the Z-axis) by driving

the servo motor.

The probe card 8 provided with a plurality of probes 81 is detachably attached to a card ring of the probe card stage 7 by pins (illustration thereof is omitted). Note that each of the probes 81 of the probe card 8 is electrically connected to the tester body via the test head 10. The second camera 6b is positioned below the probe card 8 and inside of the probe card stage 8.

10 In the TCP testing apparatus 1, the carrier tape 5 is conveyed so as to pass through under the pusher unit 3, and the pusher unit 3 picks up by suction and supports the carrier tape 5 to press the same against the probe card 8 on the test head 10. Then, TCP on the carrier tape 15 5 contacts with the probes 81 of the probe card 8, a test signal is applied to the TCP, and a response signal read from the TCP is sent to the tester body through the test head 10. As a result, performance and functions, etc. of the TCP are tested.

20 Such a test is conducted on all TCP on the carrier tape 5 successively as a result that the carrier tape 5 is conveyed. Then, based on the test results, the mark punch 26a or the reject punch 26b is driven.

[Pusher Unit]

25 FIG. 2 is a front view of a pusher unit of the TCP

handler shown in FIG. 1.

As explained above, a tension sprocket 35a is provided on the former stage side and a main sprocket 35b is provided on the latter stage side of the pusher body portion 33 in the pusher frame 36 of the pusher unit 3.

The main sprocket 35b is driven by a main driving source capable of rotating forward and backward, generally by a stepping motor, and feeds the carrier tape 5 at predetermined intervals. On the other hand, the tension sprocket 35a gives a predetermined tension to the carrier tape 5 by imposing a load in the running direction of the carrier tape 5 by a later explained drive device. Driving of the sprockets 35a and 35b is controlled by a control unit (illustration thereof is omitted) of the TCP handler 2.

As explained above, the tension sprocket 35a and the main sprocket 35b strain the carrier tape straight from both sides of the pusher body 33 to improve position accuracy of the carrier tape 5.

When testing TCP, the carrier tape 5 is picked up and held by suction by the suction plate 34 on the lower end portion of the pusher body portion 33 and, while supporting the carrier tape 5 by the tension sprocket 35a and the main sprocket 35b, the pusher unit 3 moves downward to press the carrier tape 5 against the probe

card 8, and TCP on the carrier tape 5 is brought to contact with the probes 81.

[Drive Device of Tension Sprocket]

FIG. 3 is a side view of a drive device of the tension sprocket in the pusher unit shown in FIG. 2. FIG. 4 is a perspective view of a connection member in the drive device shown in FIG. 3.

The drive device 4 of the tension sprocket 35a comprises a driving source 41, a brake member 42, a connection member 43, a chassis 44 and a rotation axis 45.

The driving source 41 is a torque motor for giving a rotation force (torque) in the backward direction of the feeding direction of the carrier tape 5 to the drive axis 411. Magnitude of the torque given to the drive axis 411 can be controlled by a voltage, etc. to be given to the driving source 41. The driving source 41 is arranged, so that the drive axis 411 is inserted into the chassis 44 from the back surface side of the pusher frame 36, and the drive axis 411 is connected to the rotation axis 45 via mid-gears 46 and 47.

The brake member 42 in the present embodiment is attached to the rotation axis 45 on the back surface side of the pusher frame 36 and capable of gripping the rotation axis 45 when a current is not applied so as to keep a stop position of the rotation axis 45 and

releasing the grip when a current is applied.

The driving source 41 and the brake member 42 are connected by a control unit (illustration thereof is omitted) of the TCP handler 2, and the control unit
5 controls driving.

On the other hand, as a result that a rotation axis 351 is inserted to a bearing 352 in the chassis 44 from the front surface side of the pusher frame 36, the tension sprocket 35a is supported to be freely rotatable
10 by the bearing 352.

Here, the rotation axis 45 on the driving source side 41 and the rotation axis 351 of the tension sprocket 35a are connected via the connection member 43. The connection member 43 has a function of absorbing
15 vibration and, for example, a member having flexibility in the torsion direction (so called flexible coupling) is used. In the present embodiment, a bellows coupling as shown in FIG. 3 and FIG. 4 is used. Note that the connection member 43 is not limited to this and, for
20 example, an elastic member, viscous member and other vibration absorbing member may be used.

When the carrier tape 5 is in a stopped state, the main sprocket 35b keeps the carrier tape 5 supported by the main sprocket 35b to be in the stop state. On the
25 other hand, since the driving source 41 gives to the

drive axis 411 torque in the backward direction of the feeding direction of the carrier tape 5, the tension sprocket 35a pulls the carrier tape 5 in the backward direction of the feeding direction via the mid-gears 46 and 47, the connection member 43 and the rotation axis 351 (it is in a stop state visually). Here, torque given to the drive axis 411 can be controlled to be desired magnitude by controlling a voltage, etc. supplied to the driving source 41. As a result, a predetermined tension is given to the carrier tape 5, so that positional deviation of the carrier tape 5 can be prevented and TCP can be aligned easily.

When feeding the carrier tape 5, the main sprocket 35b moves the carrier tape 5 supported by the main sprocket 35b to the feeding direction (to the right direction in FIG. 1 and FIG. 2) by the main driving source. Due to feeding of the carrier tape 5, a force in the forward rotation direction is given to the tension sprocket 35a supporting the carrier tape 5 with the main sprocket 35b. On the other hand, the driving source 41 gives to the drive axis 411 torque in the backward direction of the feeding direction of the carrier tape 5. Note that magnitude of the torque in the backward direction is smaller than that of the torque of driving the main sprocket 35b by the main driving source of the

main sprocket 35b, so that by feeding the carrier tape 5, the rotation axis 351 of the tension sprocket 35a, the connection member 43, the mid-gears 46 and 47 and the drive axis 411 of the driving source 41 rotate in the forward rotation direction in a state of being given torque by the driving source 41. As a result, a predetermined tension is given to the carrier tape 5 and flopping of the carrier tape 5 can be suppressed, the carrier tape 5 can be fed at a high speed, furthermore, a processing speed of the TCP handler 2 can be improved.

As explained above, according to the tension sprocket 35a and the main sprocket 35b, a predetermined tension can be given to the carrier tape 5 when feeding the carrier tape 5 and in a stopped state. Suitable magnitude of the tension on the carrier tape 5 differs according to a thickness, width and strength, etc. of the carrier tape 5, weight and size, etc. of the TCP, and a feeding speed, etc. A tension on the carrier tape 5 can be adjusted by controlling a voltage, etc. given to the driving source 41 of the tension sprocket 35a. As a result, the carrier tape 5 can be supported with a suitable tension without giving an excessive stress to the sprocket holes on the carrier tape 5. Note that a voltage, etc. given to the driving source 41 may be controlled to be suitably changed according to changes of

a feeding condition such as feeding speed, start of feeding and stop feeding, considering inertia moment of the carrier tape 5 and a drive system.

Here, depending on magnitude, etc. of the torque
5 given to the drive axis 411 of the driving source 41, vibration may arise at the drive axis 411 and the vibration is transferred to the rotation axis 45 via the mid gears 46 and 47. When such vibration is transferred via the tension sprocket 35a to the running carrier tape
10 5, flopping and positional deviating of the carrier tape 5 are caused.

However, in the present embodiment, since the connection member 43 capable of absorbing vibration is provided between the rotation axis 45 and the rotation
15 axis 351 of the tension sprocket 35a, a rotation force of the rotation axis 45 is transferred to the rotation axis 351 of the tension sprocket 35a after the vibration is absorbed by the connection member 43.

In the present embodiment, a bellows coupling is
20 used as the connection member 43, so that vibration of the rotation axis 45 can be effectively absorbed and a rotation force of the rotation axis 45 is transferred effectively to the rotation axis 351 of the tension sprocket 35a.

25 As explained above, even when vibration arises at

the drive axis 411 of the driving source 41, transfer of the vibration to the tension sprocket 35a is suppressed, so that flopping and positional deviating of the carrier tape 5 caused by vibration of the tension sprocket 35a are effectively suppressed.

Note that, in the TCP handler 2 of the present embodiment, the connection member 43 of the drive device 4 is a bellows coupling, and the configuration is preferable in a point that vibration of the rotation axis 45 is effectively absorbed when transferring a rotation force from the rotation axis 45 to the tension sprocket 35a. However, the present invention is not limited to this, and a material, shape and configuration of the connection member 43 may be freely selected within the knowledge of person skilled in the art. Specifically, it is sufficient if the connection member 43 is capable of absorbing vibration of the rotation axis 45 by deforming by a torsion load, etc. For example, the connection member 43 may be a simple columnar shaped member made by a rubber material, an accordion-fold member made by a resin based material, or a coil-shaped member made by a metal material (illustration thereof is omitted).

[Tape Support Member of Pusher Unit]

FIG. 5 and FIG. 6 are a side view (FIG. 5) and a perspective view (FIG. 6) of a tape support member of the

pusher unit shown in FIG. 2.

In the TCP handler 2 of the present embodiment, as shown in FIG. 2, a pair of tape support members 39a and 39b are provided between the pusher body 33 of the
5 tension sprocket 35a and between the pusher body 33 and the main sprocket 35b in the pusher frame 36 of the pusher unit 3. The tape support members 39a and 39b support the carrier tape 5 from below.

Each of the tape support members 39a and 39b has an
10 approximate L shape when seen from the side and arranged by fixing a vertical portion thereof to a wall of the pusher frame 36, so that a horizontal portion thereof protrudes to the front side (Y-axis direction) of the pusher frame 36 (refer to FIG. 5 and FIG. 6).

15 Furthermore, on upper surface sides of the horizontal portions of the tape support members 39a and 39b, grooves 391 are formed, so that external terminals of TCP formed on the carrier tape do not contact the tape support members 39a and 39b. The tape support members 39a
20 and 39b have a function of supporting and guiding the running carrier tape 5 from below.

In the TCP handler 2, the carrier tape 5 is put over the tape support members 39a and 39b and supported from below (refer to FIG. 2) and supported from above by
25 the pusher sprockets 35a and 35b on the former stage side

and latter stage side of the tape support members 39a and 39b. In this way, the carrier tape 5 is supported from above and below near the pusher unit 3, so that an unwanted behavior of the carrier tape 5 can be prevented, feeding at a higher speed becomes possible, and a processing speed of the TCP handler 2 can be improved. Also, if vibration from the driving source 41 of the tension sprocket 35a as explained above is transferred to the tension sprocket 35a, flopping and positional deviating of the carrier tape 5 can be effectively suppressed.

Furthermore, a suction plate 34 of the pusher body 33 fixes the carrier tape 5 by picking up and holding the carrier tape 5 by suction at the time of testing TCP to make the TCP under tested easily aligned, however, suction cannot be stably attained in a state where flopping of the carrier tape 5 arises.

However, the carrier tape 5 is supported from above and below by the pusher sprockets 35a and 35b and the tape support members 39a and 39b and flopping thereof is suppressed, so that suction of the carrier tape 5 by the suction plate 34 becomes stable and positional deviation can be effectively suppressed. As a result, TCP under tested can be accurately aligned.

Note that, in the TCP handler 2 of the present

embodiment, a pair of tape support members 39a and 39b are provided and the carrier tape 5 is supported by the tape support members 39a and 39b, so that the carrier tape 5 is supported stably comparing with the configuration of providing only one tape support member 39. As a result, flopping and positional deviating of the carrier tape 5 are more effectively suppressed.

Note that the present invention is not limited to this, and only one tape support member 39 may be provided or a larger number of tape support members 39 may be provided. Also, a shape of the tape support member 3 is not limited to an approximate L shape when seen from the side.

15 INDUSTRIAL APPLICABILITY

As explained above, according to the TCP handling apparatus according to the present invention, a suitable tension is given to the carrier tape, the carrier tape (TCP) can be accurately aligned, and flopping of the running carrier tape can be suppressed, so that tests on the TCP can be conducted accurately at a high processing speed.

CLAIMS

1. A TCP handling apparatus capable of conducting tests successively on a plurality of TCP while feeding a carrier tape, which is a tape with a plurality of TCP formed thereon, by a feeding device, by pressing against a contact portion electrically connected to a test head by a pusher, and connecting external terminals of the TCP to said contact portion, wherein:

said feeding device comprises a first sprocket on a former stage side and a second sprocket on a latter stage side of said pusher for supporting a carrier tape and feeding and stopping the carrier tape;

said first sprocket is connected to a driving source capable of rotating said first sprocket; and

said driving source is a torque motor, and said torque motor is torque-controlled so that a predetermined tension is given to the carrier tape supported by said first sprocket and said second sprocket, and so that said first sprocket is not inversely rotated against said second sprocket.

2. The TCP handling apparatus as set forth in claim 1, wherein a connection member capable of

absorbing vibration is provided between said first sprocket and said driving source.

3. The TCP handling apparatus as set forth in claim 2, wherein said connection member is a member having flexibility at least in the torsion direction.

4. The TCP handling apparatus as set forth in claim 2, wherein said connection member is a member having a bellows structure.

5. The TCP handling apparatus as set forth in claim 1, wherein at least said first sprocket is provided to a frame so as to support a carrier tape from above, and said frame is provided with a tape support member for supporting and guiding the carrier tape from below.

ABSTRACT

A TCP handler 2 capable of conducting tests successively on a plurality of TCP while supporting a carrier tape 5, which is a tape with a plurality of TCP formed thereon, by a pusher unit 3, pressing against a probe card 8 electrically connected to a test head by a pusher unit 3, and connecting external terminals of the TCP to probes 81: wherein a pusher unit 3 is provided with a torque motor 41 and a tension sprocket 35a capable of giving a predetermined tension to the carrier tape 5 by driving of the torque motor 41; and a connection member (flexible coupling) 43 capable of absorbing vibration is provided between a drive axis 411 of the torque motor 41 and a rotation axis 351 of the tension sprocket 35a.