

DESCRIPTION

TITLE OF INVENTION: TAPING APPARATUS

5 TECHNICAL FIELD

[0001]

The present invention relates to a taping apparatus configured to bond a cover tape to a carrier tape in which an electronic component is accommodated, so as to seal the electronic component.

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BACKGROUND ART

[0002]

The taping apparatus is an apparatus configured to bond a cover tape to a carrier tape in which pockets are arranged in a longitudinal direction thereof, so as to seal electronic components accommodated in the pockets. Specific examples of the taping apparatus are described, for example, in Patent Literatures 1 and 2.

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In the taping apparatus, in a case where the cover tape is bonded to the carrier tape by thermocompression bonding, transfer-moving and stopping of the carrier tape and the cover tape are repeated. When the carrier tape and the cover tape are stopped, a hot iron is pressed against the carrier tape or the cover tape. The carrier tape is maintained in a tensioned state by reels disposed respectively on upstream and downstream sides of the position where the hot iron is pressed.

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[0003]

In order to increase the number of electronic components sealed per unit time so as to increase productivity, however it is necessary to repeat the transfer-moving and stopping of the carrier tape and the cover tape in a short time. As a result, vibration may be generated in the carrier tape, and the electronic component may be turned over in the pocket, or the electronic component may jump out from the pocket before the cover tape is bonded.

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30 PRIOR ART DOCUMENTS

PATENT LITERATURES

[0004]

Patent Literature 1: JP-A-08-058877

Patent Literature 2: JP-A-2011-011748

SUMMARY OF INVENTION

5 [0005]

The present invention relates to a taping apparatus capable of suppressing occurrence of turning-over of an electronic component in a pocket and jumping out of an electronic component from a pocket.

[0006]

10 The taping apparatus transfers a carrier tape in which an electronic component is put in a pocket of the carrier tape at an insertion position. The taping apparatus guides the cover tape to an upper side of the carrier tape at a joining position on a downstream side of the insertion position. The taping apparatus causes the cover tape to be bonded to the carrier tape at a bonding position so as to seal the electronic component. The taping apparatus includes a
15 pressing member which is configured to press one of the carrier tape and the cover tape against the other at the bonding position so as to perform bonding, a transfer mechanism which is configured to transfer the carrier tape in a state where the carrier tape is provided with a tension region extending in a range from an upstream side of the joining position to a downstream side of the bonding position, an upper guide which is disposed above the tension region, and a push-
20 up mechanism which is configured to press the tension region entirely or partially against the upper guide from below.

BRIEF DESCRIPTION OF DRAWINGS

[0007]

25 [FIG. 1] FIG. 1 is an illustrative diagram of a taping apparatus according to an embodiment of the present invention.

[FIG. 2] FIG. 2(a) and FIG. 2(b) are illustrative diagrams of a carrier tape and a cover tape.

[FIG. 3] FIG. 3 is an illustrative diagram showing how the carrier tape and the cover tape are fed.

30 [FIG. 4] FIG. 4(a) and FIG. 4(b) are illustrative diagrams showing a state where the electronic component is accommodated in a pocket of the carrier tape.

[FIG. 5] FIG. 5(a) and FIG. 5(b) are illustrative diagrams of a removal position.

[FIG. 6] FIG. 6(a) and FIG. 6(b) are illustrative diagrams of a joining position and a bonding position.

[FIG. 7] FIG. 7(a) is an illustrative diagram of a contact portion. FIG. 7(b) is a cross-sectional view taken along a line A-A of FIG. 7(a).

5 [FIG. 8] FIG. 8(a) and FIG. 8(b) are illustrative diagrams showing contact portions according to modifications respectively.

[FIG. 9] FIG. 9 is an illustrative diagram of an appearance inspection apparatus used together with the taping apparatus according to the embodiment of the present invention.

10 DESCRIPTION OF EMBODIMENTS

[0008]

Embodiments of the present invention will be described with reference to the attached drawings.

A taping apparatus 10 according to an embodiment of the present invention is shown
 15 in FIG. 1, FIG. 2(a), FIG. 2(b) and FIG. 3. In the taping apparatus 10, a carrier tape P in which electronic components W are put into pockets P1 at an insertion position I is transferred. A cover tape Q is guided to an upper side of the carrier tape P at a joining position J on a downstream side of the insertion position I. The cover tape Q is bonded to the carrier tape P from above at a bonding position T so as to seal the electronic components W. The taping
 20 apparatus 10 includes a pressing member 11 which presses the cover tape Q against the carrier tape P at the bonding position T so as to perform bonding, and a transfer mechanism 12 which transfers the carrier tape P.

[0009]

As shown in FIG. 2(a) and FIG. 2(b), the carrier tape P includes a plurality of pockets
 25 P1 at equal pitches in a longitudinal direction (a direction in which the carrier tape P is transferred). Flat portions P2, P3 are separately provided on both sides of the pocket P1 in a width direction of the carrier tape P. Hereinafter, a transfer direction of the carrier tape P is also referred to as “tape transfer direction D”.

The pocket P1 is open at a top thereof. The electronic component W is put into the
 30 pocket P1 from above. In the flat portion P3, feed holes P4 are formed at equal pitches along the longitudinal direction of the carrier tape P.

The cover tape Q is narrower than the carrier tape P in width. The cover tape Q is

fixed to the carrier tape P in a state of covering an entire pocket P1, most of the flat portion P2 and substantially half of the flat portion P3 from above. The electronic component W in the pocket P1 is sealed by fixing the cover tape Q to the carrier tape P.

[0010]

5 As shown in FIG. 1, the taping apparatus 10 includes a base unit 15, a pulley 16 and a guide mechanism 18. A free roller 13 which guides the carrier tape P and a long guide member 14 are attached to the base unit 15. The carrier tape P guided by the guide member 14 is stretched around the pulley 16. The guide mechanism 18 includes a plurality of guide rollers 17 and guides the cover tape Q.

10 The guide member 14 guides the carrier tape P to the pulley 16 by changing an advancing direction of the carrier tape P upward after advancing the carrier tape P horizontally.

[0011]

A servomotor 19 which provides a driving force to the pulley 16 is attached to the base unit 15. An output shaft of the servomotor 19 is connected to a shaft of the pulley 16.

15 Operation of the servomotor 19 rotationally drives the pulley 16. Protrusions (not shown) are provided on an outer periphery of the pulley 16. By inserting the protrusions into the feed holes P4 of the carrier tape P, the carrier tape P is hooked to the pulley 16. The pulley 16 is driven to rotate, and thus the carrier tape P is transferred.

[0012]

20 As shown in FIG. 1 and FIG. 3, above the base unit 15, a suction nozzle 20, a camera 21, and a pickup nozzle 22 are sequentially disposed in the tape transfer direction D. The suction nozzle 20 puts the electronic component W into the pocket P1 of the carrier tape P from above. The camera 21 takes an image of the electronic component W accommodated in the pocket P1 from above. The pickup nozzle 22 removes an abnormal electronic component W

25 from the pocket P1.

As shown in FIG. 4(a), the suction nozzle 20 causes the electronic component W suctioned by a vacuum pressure (negative pressure) to approach, from above, the pocket P1 of the carrier tape P which passes the pulley 16 and is disposed at the insertion position I, and releases the suction of the electronic component W by releasing to external air (without

30 applying a negative pressure or a positive pressure) so as to drop the electronic component W into the pocket P1. As shown in FIG. 4(b), the dropped electronic component W is accommodated in the pocket P1.

[0013]

An upper guide 23 which is long in the tape transfer direction D is provided on a downstream side (hereinafter, simply referred to as “downstream side”) of the insertion position I in the tape feeding direction D. The upper guide 23 is a plate which is long in the tape transfer direction D and is fixed horizontally to the base unit 15. As shown in FIG. 3, FIG. 5(a) and FIG. 5(b), a translucent glass plate 24 is attached to the upper guide 23 directly below the camera 21. Openings 24a, 24b and 24c are formed in the glass plate 24 along the tape transfer direction D.

[0014]

The camera 21 takes an image of the electronic component W through the glass plate 24.

The opening 24a is provided at a removal position R which is a position where the pickup nozzle 22 removes the electronic component W from the pocket P1. That is, the upper guide 23 is open at a portion located above the pocket P1 disposed at the removal position R.

A cover 25 is attached to the upper guide 23 so as to close the opening 24a and cover the pocket P1 disposed at the removal position R from an upper side. A sliding means 26, which causes the cover 25 to move away from the upper side of the pocket P1 disposed at the removal position R, is connected to the cover 25.

[0015]

The sliding means 26 causes the cover 25 to move horizontally from the upper side of the pocket P1, and thus the pickup nozzle 22 removes the electronic component W in the pocket P1 through the opening 24a.

In a case where an arrangement of the electronic component W in the pocket P1 imaged by the camera 21 is abnormal (for example, the electronic component W is disposed in the pocket P1 with a front and a back thereof inverted) or the electronic component W itself is abnormal (for example, crack), the cover 25 is moved away from the upper side of the pocket P1 at the timing when the pocket P1, in which the abnormal electronic component W is accommodated, is arranged at the removal position R, and the pickup nozzle 22 picks up and removes the electronic component W in the pocket P1. The electronic component W picked up by the pickup nozzle 22 is transferred to a container (not shown) disposed on an outlet side of the pickup nozzle 22.

[0016]

As shown in FIG. 1, FIG. 3, FIG. 6(a) and FIG. 6(b), the cover tape Q is guided by the plurality of guide rollers 17 of the guide mechanism 18, and advances from the upper side of the upper guide 23 through the opening 24b to the lower side of the upper guide 23 at the joining position J on the downstream side of the removal position R so as to contact the carrier tape P from the upper side. Therefore, the pickup nozzle 22 removes the abnormal electronic component W from the pocket P1 at the removal position R between the insertion position I and the joining position J.

[0017]

As shown in FIG. 1 and FIG. 3, the pressing member 11, a pulley 28, and free rollers 29, 30 are attached to the base unit 15. The pressing member 11 causes the cover tape Q to be bonded the carrier tape P at the bonding position T on the downstream side of the joining position J. The carrier tape P is hooked on the pulley 28 on the downstream side of the bonding position T. The free rollers 29, 30 guide the carrier tape P, to which the cover tape Q is bonded, on a downstream side of the pulley 28.

The pressing member 11 has a substantially rectangular parallelepiped shape. Above the upper guide 23, a base side of the pressing member 11 is rotatably attached to the base unit 15 via a support member 31. A heating unit 32 is provided on a front side of the pressing member 11.

[0018]

As shown in FIG. 3 and FIG. 6(b), the heating unit 32 is lowered from above the opening 24b to a position in contact with the cover tape Q disposed below the opening 24b by the rotation of the pressing member 11, so as to press the cover tape Q against the carrier tape P. A fixing block 33 is provided below the opening 24b. The cover tape Q and the carrier tape P are sandwiched from above and below by the heating unit 32 and the fixing block 33 in contact with the cover tape Q and the carrier tape P. The cover tape Q and the carrier tape P are made of resin. The cover tape Q is thermocompression-bonded (an example of bonding) to the carrier tape P by heat of the heating unit 32.

[0019]

The pulley 28 includes, on the outer periphery thereof, protrusions (not shown) to be inserted in the feed holes P4 of the carrier tape P. The pulley 28 is connected to an output shaft of a servomotor 33a. The pulley 28 and the servomotor 33a are attached to the base unit 15. The pulley 28 is rotationally driven by a rotational force from the servomotor 33a, and

applies a force to the held carrier tape P in the tape transfer direction D.

The servomotor 19 intermittently repeats a rotation state where the output shaft is rotationally driven at a predetermined angular velocity, and a braking state. The servomotor 33a intermittently repeats a rotation state where the output shaft is rotationally driven at a predetermined angular velocity and a constant torque state where a state is maintained in which a predetermined torque is applied to the output shaft. The servomotor 19 and the servomotor 33a are rotated at the same timing. The servomotor 19 and the servomotor 33a are in the brake state and the constant torque state, respectively, at the same timing.

[0020]

Thus, the pulleys 16, 28 intermittently feed the carrier tape P and the cover tape Q in a state where the carrier tape P is provided with a tension region S extending in a range between the pulleys 16, 28 (that is, a range from an upstream side of the joining position J to the downstream side of the bonding position T). Further, since the servomotors 19, 33a are in the brake state and the constant torque state respectively when the carrier tape P is stopped, the tension region S of the carrier tape P is in a state where a tension force of a predetermined magnitude is applied in the tape transfer direction D.

[0021]

In the present embodiment, the transfer mechanism 12 which transfers the carrier tape P in a state where the tension region S is provided on the carrier tape P is mainly configured by the pulley 16, the servomotor 19, the pulley 28 and the servomotor 33a. The upper guide 23 is disposed above the tension region S of the carrier tape P.

The suction nozzle 20 releases suction of the electronic component W and drops the electronic component W into the pocket P1 at the timing when the carrier tape P is stopped. The pressing member 11 contacts the cover tape Q and causes the cover tape Q to be bonded to the carrier tape P at the timing when the carrier tape P is stopped.

[0022]

As shown in FIG. 1 and FIG. 3, a push-up mechanism 34, which pushes and presses an upstream side of the joining position J in the tension region S of the carrier tape P (that is, partially push and press the tension region S) from below against the upper guide 23, is attached to the base unit 15. The push-up mechanism 34 includes a contact portion 35 which contacts the tension region S of the carrier tape P from below on the upstream side of the bonding position T, and spring members 36, 37 (an example of an elastic body) which provide an upward

force to the contact portion 35.

[0023]

As shown in FIG. 7(a) and 7(b), portions in the contact portion 35, which are located directly below the flat portions P2, P3 of the carrier tape P, project upward as compared to a region where the pocket P1 of the carrier tape P is formed. Therefore, the contact portion 35 contacts the flat portions P2, P3 of the carrier tape P (that is, both side regions in the width direction of the carrier tape P with the pocket P1 as a reference) without contacting the pocket P1. In the present embodiment, similarly with the contact portion 35, a portion of the fixing block 33, which is located directly below the flat portions P2, P3 of the carrier tape P, also projects upward as compared to a region where the pocket P1 of the carrier tape P is formed, and contacts the flat portions P2, P3 of the carrier tape P without contacting the pocket P1.

[0024]

As shown in FIG. 3, the contact portion 35 is long in the tape transfer direction D and is disposed horizontally. One end in the longitudinal direction of the contact portion 35 is located directly below an upstream end of the upper guide 23. The other end of the contact portion 35 is located at the joining position J. Therefore, the push-up mechanism 34 contacts the upper guide 23 in a range from directly below the upstream end of the upper guide 23 to the joining position J in the tension region S of the carrier tape P.

[0025]

As the heating unit 32 of the pressing member 11 is intermittently pressed against the cover tape Q, vibration may occur in the carrier tape P and the cover tape Q. However, since the tension region S of the carrier tape P is constantly in contact with the upper guide 23 due to the contact portion 35, vibration of the tension region S can be suppressed. When the carrier tape P and the cover tape Q are stopped, the tension region S of the carrier tape P is tensioned by a predetermined force, so that the vibration generated in the carrier tape P and the cover tape Q are also suppressed.

[0026]

As shown in FIG. 4(a) and FIG. 4(b), a taper portion 39 whose lower surface gradually rises toward the upstream is formed on an upstream end side of the upper guide 23. The taper portion 39 formed on the upper guide 23, 1) prevents the carrier tape P pressed against the upper guide 23 from being caught by the upper guide 23 in an advancing process, and 2) guides the electronic component W which is released from suction by the suction nozzle 20 and

is dropped into the pocket P1 so as to be stably accommodated in the pocket P1.

In the present embodiment, as shown in FIG. 4(a), the upper guide 23 covers one pocket P1 located on a downstream side of the pocket P1 disposed at the insertion position I from above.

5 [0027]

As shown in FIG. 8(a), instead of the contact portion 35, a contact portion 35a may be adopted which contacts the pocket P1 of the carrier tape P from below without contacting the flat portions P2, P3 of the carrier tape P. As shown in FIG. 8(b), instead of the contact portion 35, a contact portion 35b may be adopted which contacts the pocket P1 and the flat portions P2, P3 of the carrier tape P from below.

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[0028]

The vibration generated in the carrier tape P and the cover tape Q would cause the electronic component W to jump out from the pocket P1 on the upstream side of the bonding position T or causes the electronic component W to be turned over in the pocket P1. Therefore, by suppressing the occurrence of vibration in the carrier tape P and the cover tape Q, the electronic component W can be stably sealed in the pocket P1 in a predetermined arrangement.

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[0029]

In addition, in the present embodiment, as shown in FIG. 1 and FIG. 3, on a downstream side of the bonding position T, a lower guide 38 in contact with, from below, the carrier tape P to which the cover tape Q is bonded, is fixed to the base unit 15. The lower guide 38 is long in the tape transfer direction D and is disposed below the upper guide 23. The cover tape Q and the carrier tape P pass between the upper guide 23 and the lower guide 38 in a state of being in contact with the upper guide 23 and the lower guide 38.

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[0030]

As shown in FIG. 7(a), same as the contact portion 35, a portion in the lower guide 38 which is located directly below the flat portions P2, P3 of the carrier tape P, projects upward as compared to a region where the pocket P1 of the carrier tape P is formed. Therefore, the lower guide 38 contacts the flat portions P2, P3 of the carrier tape P from below without contacting the pocket P1.

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In order to suppress generation of flaw or the like on the carrier tape P, portions of the contact portion 35 and the lower guide 38 which are in contact with the carrier tape P are flat separately. Further, portions of the contact portion 35 and the lower guide 38 which are

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in contact with the carrier tape P are formed of metal separately. Therefore, abrasion of the portions of the contact portion 35 and the lower guide 38 which are in contact with the carrier tape P is suppressed as compared to those formed of resin. Instead of the lower guide 38, a lower guide may be adopted which is in contact with the pocket P1 of the carrier tape P.

5 [0031]

As shown in FIG. 1, a camera 41 which images the electronic component W sealed in the pocket P1 is provided above the opening 24c formed in the upper guide 23. Since the cover tape Q is translucent, the camera 41 can image the electronic component W in the pocket P1 through the cover tape Q. The image taken by the camera 41 is provided to an information
10 processing unit (not shown). The information processing unit determines whether the electronic component W is normal or not based on the image taken by the camera 41.

[0032]

A moving mechanism 42 which moves the base unit 15 forward and rearward is provided below the base unit 15. The moving mechanism 42, together with the base unit 15,
15 can move the members and mechanisms (for example, the pressing member 11, the transfer mechanism 12, the upper guide 23 and the push-up mechanism 34) attached to the base unit 15 as a whole, and can move the pocket P1 from which the electronic component W was removed by the pickup nozzle 22 at the removal position R, to the insertion position.

When the electronic component W is removed from the pocket P1 by the pickup
20 nozzle 22, the transfer of the cover tape Q and the carrier tape P is stopped, and the empty pocket P1 from which the electronic component W was removed is moved to the insertion position I by the moving mechanism 42. Further, the electronic component W is put into the empty pocket P1 by the suction nozzle 20.

[0033]

25 In the present embodiment, as shown in FIG. 9, the taping apparatus 10 is used together with an appearance inspection apparatus 48 which includes a disk-shaped rotation body 45 in which a plurality of support portions 44 for holding the electronic components W are attached to an outer periphery thereof at intervals, and cameras 46, 47 which image appearances of the electronic components W held by the support portions 44.

30 A center of the rotation body 45 is connected to a vertical shaft 49. The rotation body 45 intermittently rotates around the vertical shaft 49, and sends the electronic component W held by each support portion 44 to imaging positions of the cameras 46, 47.

[0034]

Further, the electronic component W which is determined not to have a flaw or the like in appearance is sent above the taping apparatus 10 by the rotation body 45, and is put into the pocket P1 of the carrier tape P mounted on the taping apparatus 10 by the support portion 44 (that is, the suction nozzle 20 of the taping apparatus 10). The electronic component W which is determined to have a flaw in appearance is supplied to a sorter 50 provided on a downstream side of a rotation direction of the rotation body 45 of the appearance inspection apparatus 48 and is discharged as a defective product.

[0035]

Although an embodiment of the present invention has been described above, the present invention is not limited to the above embodiment and all changes of condition or the like which do not departing from the intent are included in the scope of the present invention.

For example, a push-up mechanism may be adopted to press the tension region entirely against the upper guide from below. For example, a push-up mechanism may be adopted to press only a downstream side of the bonding position of the tension region against the upper guide from below.

For example, an opening through which the cover tape passes may be formed in the upper guide, separately from the opening through which the heating unit of the pressing member passes.

[0036]

Further, in the push-up mechanism, application of an upward force to the contact portion is not limited to the elastic body, and for example, a fluid cylinder may be used instead of the elastic body.

In the taping apparatus 10 according to the above embodiment, instead of the pressing member 11 which presses the cover tape Q against carrier tape P, a pressing member may be adopted which is in contact with the carrier tape P from below and presses the carrier tape P against the cover tape Q.

Further, the bonding of the carrier tape and the cover tape does not have to be the thermocompression bonding, and may be, for example, pressure bonding at normal temperature (pressure-sensitive type) in which bonding is applied under pressure in a normal temperature environment.

Further, the carrier tape and the cover tape is not necessarily made of resin, and may

be made of paper, for example.

[0037]

According to the embodiment of the present invention, the taping apparatus 10 transfers the carrier tape P in which the electronic component is inserted into the pocket P1 at the insertion position I. The taping apparatus 10 guides the cover tape Q to the upper side of the carrier tape P at the joining position J on the downstream side of the insertion position I. The taping apparatus 10 causes the cover tape Q to be bonded the carrier tape P at the bonding position T so as to seal the electronic component W. The taping apparatus 10 includes the pressing member 11 which is configured to press any one of the carrier tape P and the cover tape Q against the other at the bonding position T so as to perform bonding, the transfer mechanism 12 which is configured to transfer the carrier tape P in a state where the carrier tape P is provided with the tension region S extending in a range from the upstream side of the joining position J to the downstream side of the bonding position T, the upper guide 23 which is disposed above the tension region S and the push-up mechanism 34 which is configured to press the tension region S entirely or partially against the upper guide 23 from below.

[0038]

The push-up mechanism 34 may include the contact portions 35, 35a, 35b which contact the tension region S from below, and the elastic bodies 36, 37 which apply an upward force to the contact portions 35, 35a, 35b.

[0039]

Since the taping apparatus 10 includes the upper guide 23 which is disposed above the tension region S and the push-up mechanism 34 which is configured to press the tension region S entirely or partially against the upper guide 23 from below, occurrence of vibration in the carrier tape P can be suppressed, and the turning-over of the electronic component W in the pocket P1 and the jumping out of the electronic component W from the pocket P1 can be suppressed. As a result, a transfer speed of the carrier tape P can be increased to increase the number of electronic components W sealed per unit time.

Although the present invention has been described in detail with reference to specific embodiments, it is apparent to those skilled in the art that various changes and modifications can be made without departing from the intent and scope of the present invention.

[0040]

The present application is based on a Japanese Patent Application No. 2016-240455

filed on December 12, 2016 and a Japanese Patent Application No. 2017-132690 filed on July 6, 2017, contents of which are incorporated herein by reference.

REFERENCE SIGNS LIST

5	[0041]	
	10	taping apparatus
	11	pressing member
	12	transfer mechanism
	13	free roller
10	14	guide member
	15	base unit
	16	pulley
	17	guide roller
	18	guide mechanism
15	19	servomotor
	20	suction nozzle
	21	camera
	22	pickup nozzle
	23	upper guide
20	24	glass plate
	24a, 24b, 24c	opening
	25	cover
	26	sliding means
	28	pulley
25	29, 30	free roller
	31	support member
	32	heating unit
	33	fixing block
	33a	servomotor
30	34	push-up mechanism
	35, 35a, 35b	contact portion
	36, 37	spring member

	38	lower guide
	39	taper portion
	41	camera
	42	moving mechanism
5	44	support portion
	45	rotation body
	46, 47	camera
	48	appearance inspection apparatus
	49	vertical shaft
10	50	sorter
	D	tape transfer direction
	I	insertion position
	J	joining position
	P	carrier tape
15	P1	pocket
	P2, P3	flat portion
	P4	feed hole
	Q	cover tape
	R	removal position
20	S	tension region
	T	bonding position
	W	electronic component

CLAIMS

1. A taping apparatus configured to transfer a carrier tape in which an electronic component is put in a pocket at an insertion position, to guide a cover tape to an upper side of the carrier tape at a joining position on a downstream side of the insertion position, and to bond the cover tape to the carrier tape at a bonding position so as to seal the electronic component, the taping apparatus comprising:

a pressing member that presses one of the carrier tape and the cover tape against the other of the carrier tape and the cover tape at the bonding position so as to perform bonding;

a transfer mechanism that transfers the carrier tape in a state where the carrier tape is provided with a tension region along a range from an upstream side of the joining position to a downstream side of the bonding position;

an upper guide disposed above the tension region; and

a push-up mechanism that presses the tension region entirely or partially against the upper guide from below.

2. The taping apparatus according to claim 1, wherein the push-up mechanism includes a contact portion that contacts the tension region from below and an elastic body configured to apply an upward force to the contact portion.