

**FEEDING DEVICE FOR FEEDING AN ELECTRONIC COMPONENT
PACKAGED IN A CARRIER TAPE ASSEMBLY**

FIELD

The disclosure relates to a feeding device, and more particularly to a feeding device for feeding an electronic component packaged in a carrier tape assembly.

BACKGROUND

Electronic components are generally of a wide variety of types. Two or more electronic components are bonded together as needed, e.g., a component such as a flexible substrate, a passive component, etc. is attached to a flexible substrate or a flexible print circuit by a laminating process. Methods for attaching a component to a flexible substrate are disclosed in Taiwanese Patent No. I546234 entitled "Element Transporting Method and Device for Electronic Component Laminating Process" and Taiwanese Patent No. I567011 entitled "Component Transporting Method and Device for Laminating Process", in which a first element and a second element are respectively placed on two different disk carriers that are transported respectively in two transporting paths, and the first element on one disk carrier is moved to the other disk carrier for laminating the first element onto the second element. However, the above-mentioned method and device can be used only when the first and second elements are respectively placed on the disk carriers, and cannot be used for transporting elements that are not

suitable to be placed on the disk carriers, such as electronic components that are packaged in a carrier tape assembly. Therefore, it is proposed to provide a feeding device for feeding an electronic component that is packaged
5 in a carrier tape assembly to be incorporated in an automatic laminating process for enhancing production efficiency.

SUMMARY

Therefore, an object of the disclosure is to provide a feeding device that can alleviate at least one of the
10 drawbacks of the prior art.

According to the disclosure, the feeding device is provided for feeding an electronic component which is packaged in a carrier tape assembly. The carrier tape assembly is reeled on a reel, and includes a carrier tape
15 for the electronic component peelably attached thereto, and a cover tape peelably attached to the carrier tape and the electronic component to cooperate with the carrier tape to cover the electronic component. The feeding device includes a reel support, a reel mechanism and a guiding
20 mechanism. The reel mechanism is disposed on the reel support, and includes a rolling shaft which is driven to be rotated relative to the reel support and on which the reel is sleeved, a first reel shaft which is rotatable relative to the reel support and on which a first blank
25 reel is sleeved for reeling the cover tape that is peeled from the carrier tape, and a second reel shaft which is rotatable relative to the reel support and on which a second

blank reel is sleeved for reeling the carrier tape that has the cover tape and the electronic component peeled. The guiding mechanism includes a guiding seat which is disposed on the reel support and which defines a transporting channel for passage of the carrier tape that is pulled out from the reel sleeved on the rolling shaft. The carrier tape from which the cover tape is peeled is drawn to pass through the transporting channel along a feeding route that terminates at a pick-up area. When the carrier tape is moved in the pick-up area, the electronic component is picked up from the carrier tape, and the carrier tape from which the cover tape and the electronic component are peeled is moved away from the feeding route to be reeled on the second blank reel.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the disclosure will become apparent in the following detailed description of the embodiment with reference to the accompanying drawings, of which:

FIG. 1 is a perspective view illustrating a carrier tape assembly packaged with electronic components;

FIG. 2 is a perspective view illustrating an electronic component;

FIG. 3 is a fragmentary perspective view illustrating an embodiment of a feeding device according to the disclosure;

FIG. 4 is a fragmentary perspective view of the

embodiment viewed from another angle;

FIG. 5 is a schematic front view of the embodiment;

FIG. 6 is a partly-exploded perspective view illustrating a guiding mechanism of the feeding device according to the embodiment;

FIG. 7 is a bottom perspective view of the guiding mechanism; and

FIG. 8 is a fragmentary schematic view illustrating a pick-up area of the guiding mechanism.

DETAILED DESCRIPTION

Referring to FIGS. 1 and 2, an embodiment of a feeding device according to the disclosure is used to feed electronic components 10 packaged in a carrier tape assembly 11. Each electronic component 10 has a film layer 101 and an adhesive layer 102 peelably attached to an underside of the film layer 101 and of an Optical Clear Adhesive (OCA), for example. The carrier tape assembly 11 is reeled on a reel 14. The reel 14 has a core 143 defining an axial hole 141, and two opposite reel side walls 142 disposed at two opposite ends of the core 143. The carrier tape assembly 11 is wound around the core 143 between the reel side walls 142, and includes a flexible flat carrier tape 111 on which the electronic components 10 are peelably attached, and a flexible flat cover tape 112 peelably attached to the carrier tape 111 and the electronic components 10 to cooperate with the carrier tape 111 to cover the electronic components 10. The cover tape 112

is attached to the carrier tape 111 by electrostatic force, and each electronic component 10 is adhesively and peelably attached to the upper surface of the carrier tape 111 through the adhesive layer 102. When the carrier tape assembly 11 is extended from the reel 14, the cover tape 112 is peeled from the carrier tape 111 to expose the electronic components 10. The electronic components 10 are arranged linearly and along a lengthwise direction of the carrier tape assembly 11.

With reference to FIGS. 3 to 5, the feeding device of this embodiment includes a base support 201 disposed on a machine base (T), and a reel support 202 movably disposed at a side of the base support 201. The base support 201 has two sliding rails 203 spaced apart from and parallel to each other and each extending in a direction (Y), a slider 204 slidably mounted on the sliding rails 203 and connected with the reel support 202, and a driver 205 securely disposed to drive a reciprocating movement of the slider 204 in the direction (Y) relative to the base support 201. The feeding device further includes an air ejecting mechanism 206 disposed on the base support 201 to remove dust.

The feeding device further includes a reel mechanism 21 disposed on the reel support 202. The reel mechanism 21 includes a rolling shaft 211 driven to be rotated relative to the reel support 202, a first reel shaft 214, a second reel shaft 215, a belt 213 trained around the first and

second reel shafts 214, 215, and a driver 212 disposed to drive movement of the belt 213 to rotate the first and second reel shafts 214, 215 in the same rotational direction. The rolling shaft 211 has a portion which projects from
5 a side of the reel support 202 and on which the reel 14 is sleeved. The carrier tape assembly 11 packaged with the electronic component 10 (see FIG. 1) is wound on the reel 14. The first reel shaft 214 has a portion which projects from the side of the reel support 202 and on which a first
10 blank reel 15 is sleeved for reeling the cover tape 112 (see FIG. 1) that is peeled from the carrier tape 111 of the carrier tape assembly 11. The second reel shaft 215 has a portion which projects from the side of the reel support 202 and on which a second blank reel 16 is sleeved
15 for reeling the carrier tape 111 from that the cover tape 112 and the electronic component 10 are peeled (see FIG. 1).

With reference to FIGS. 3, 5 and 6, the feeding device further includes a guiding mechanism 22 disposed at a front
20 side of the reel support 202 and below the reel mechanism 21. The guiding mechanism 22 includes a guiding seat 222 which is disposed on the reel support 202 and which defines a transporting channel 221 extending in the direction (Y) for passage of the carrier tape 111, a collecting groove
25 224 disposed below the transporting channel 221, and a plurality of suction holes 225 disposed to be in communication with the transporting channel 221 and arrayed

in the direction (Y) at two sides of the transporting channel 221 to serve as an entrance of a negative-pressure air for attachment of the carrier tape 111 on an upper surface of the transporting channel 221 during movement of the carrier tape 111 along the transporting channel 221. The collecting groove 224 is disposed to block foreign articles undesirably attached to a lower surface of the carrier tape 111 during the movement of the carrier tape 111, and to collect the articles.

The guiding mechanism 22 further includes a cover plate 223 disposed to cover the transporting channel 221 of the guiding seat 222, and four insert pins 226 projecting from an upper surface of the guiding seat 222 and laterally of the suction holes 225. The cover plate 223 has four pinholes 227 which are respectively engaged with the insert pins 226 to retain the cover plate 223 on the guiding seat 222. The cover plate 223 further has a longitudinal groove 228 aligned and in communication with the transporting channel 221 for movably accommodating the electronic component 10 projecting from the carrier tape 111 during the movement of the carrier tape 111 along the transporting channel 221.

Referring to FIGS. 6 to 8, the guiding mechanism 22 further includes a carrying seat 229 disposed forwardly of and operatively movable relative to the guiding seat 222, and a driver 230 disposed to drive a reciprocating movement of the carrying seat 229. The carrying seat 229

has a slope surface 231 facing a front end of the guiding seat 222 to facilitate movement of the electronic component 10 from the guiding seat 222 to the carrying seat 229, and an attachment diminishing portion 232 disposed on an upper surface thereof and having a plurality of parallel recesses. The carrying seat 229 cooperates with the front end of the guiding seat 222 to define therebetween a gap 233 at a feeding route for passage of the carrier tape 111 and a pick-up area 237 above the gap 233. The guiding mechanism 22 further includes a positioning member 234 disposed below the gap 233 and driven by the driver 230 to make a reciprocating movement with the carrying seat 229, and a sensing member 235 and a blowing member 236 which are disposed on the positioning member 234 to be registered with the gap 233.

The carrier tape 111 from which the cover tape 112 is peeled is drawn and transported to pass through an upper surface of the transporting channel 221 along the feeding route to the pick-up area 237, and is deviated downwardly from the feeding route through the gap 233 to be separated from the electronic component 10. When the electronic component 10 is sensed by the sensing member 235, the blowing member 236 is activated to blow air for facilitating separation of the electronic component 10 from the carrier tape 111. The electronic component 10 is transported forwardly over the gap 233 to pass through the upper surface of the attachment diminishing portion 232 for facilitating

picking up of the electronic component 10 by a suction head (C) of a carrier mechanism (not shown) in the pick-up area 237.

Referring to FIGS. 3, 5 and 6, the feeding device further includes a pinching mechanism 24 disposed on the reel support 202 and rearwardly of the guiding mechanism 22. The pinching mechanism 24 includes a stationary first pinch member 241, a movable second pinch member 242 movable relative to the first pinch member 241, a stationary third pinch member 243 and a stationary fourth pinch member 244. Each of the pinch members 241, 242, 243, 244 has two jaws operatively opened and closed.

The first and third pinch members 241, 243 are aligned with each other uprightly to grip the carrier tape 111. The first pinch member 241 is disposed at a moving path of the carrier tape 111 and between the guiding seat 222 and the rolling shaft 211 on which the reel 14 is sleeved. The pinching mechanism 24 further includes a sensing member 25 disposed at an inlet side of the first pinch member 241, and a first pulley 26 disposed at the moving path of the carrier tape 111 and between the first pinch member 241 and the rolling shaft 211. The third pinch member 243 is disposed at the moving path of the carrier tape 111 from which the electronic component 10 is peeled, and is disposed between the guiding seat 222 and the second reel shaft 215 on which the second blank reel 16 is sleeved. The pinching mechanism 24 further includes a second pulley

27 disposed at the moving path and between the third pinch member 243 and the guiding seat 222.

The fourth pinch member 244 is disposed at a moving path of the cover tape 112 and between the rolling shaft 211 and the first reel shaft 214 to pinch and hold the cover tape 112. The pinching mechanism 24 further includes a sensing member 28 disposed at an inlet side of the fourth pinch member 244, and two third pulleys 29 disposed at the moving path of the cover tape 112. One of the third pulleys 29 is disposed between the fourth pinch member 244 and the roller shaft 211, and the other one of the third pulleys 29 is disposed between the fourth pinch member 244 and the first reel shaft 214.

The second pinch member 242 is disposed at the moving path of the carrier tape 111 and between the third pinch member 243 and the second reel shaft 215 to pinch and hold the carrier tape 112 from which the cover tape 112 and the electronic component 10 are peeled. The second pinch member 242 is disposed in a notched space 30 defined in the reel support 202, and is connected with a front end of the slider 204 to be moved with the slider 204 in a reciprocating course in the direction (Y) by the driver 205 for in turn clamping, drawing and releasing the carrier tape 111. The pinching mechanism 24 further includes a fourth pulley 32 disposed at the moving path of the carrier tape 111 and between the second pinch member 242 and the second reel shaft 215.

As illustrated, with the reel mechanism 21 where the reel 14 with a carrier tape assembly 11 wound thereon, the first blank reel 15 with the cover tape 112 wound thereon, and the second blank reel 16 with the carrier tape 111 wound thereon are rotatably sleeved on the rolling shaft 211, the first reel shaft 214 and the second reel shaft 215, respectively, and with the guiding seat 222 having the transporting channel 221 for passage of the carrier tape 111, the feeding device according to the disclosure can be used to feed an electronic component 10 which is packaged in a carrier tape assembly 11, and the electronic component 10 can be picked up from the carrier tape assembly 11 during the feeding operation so as to facilitate automated production and enhancement of production efficiency.

While the disclosure has been described in connection with what is considered the exemplary embodiment, it is understood that this disclosure is not limited to the disclosed embodiment but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation so as to encompass all such modifications and equivalent arrangements.

CLAIMS:

1. A feeding device for feeding an electronic component which is packaged in a carrier tape assembly, the carrier tape assembly being reeled on a reel, and including
5 a carrier tape on which the electronic component is peelably attached, and a cover tape which is peelably attached to the carrier tape and the electronic component to cooperate with the carrier tape to cover the electronic component, said feeding device
10 comprising:
 a reel support;
 a reel mechanism disposed on said reel support, and including a rolling shaft which is driven to be rotated relative to said reel support and on which the reel
15 is sleeved, a first reel shaft which is rotatable relative to said reel support and on which a first blank reel is sleeved for reeling the cover tape that is peeled from the carrier tape, and a second reel shaft which is rotatable relative to said reel support and on which
20 a second blank reel is sleeved for reeling the carrier tape that has the cover tape and the electronic component peeled; and
 a guiding mechanism including a guiding seat which is disposed on said reel support and which defines a
25 transporting channel for passage of the carrier tape that is pulled out from the reel sleeved on said rolling shaft such that the carrier tape from which the cover

tape is peeled is drawn to pass through said transporting channel along a feeding route that terminates at a pick-up area, and such that when the carrier tape is moved in said pick-up area, the electronic component is picked up from the carrier tape, and the carrier tape from which the cover tape and the electronic component are peeled is moved away from the feeding route to be reeled on the second blank reel.

2. The feeding device as claimed in Claim 1, further comprising a base support disposed on a machine base, said base support having two sliding rails spaced apart from and parallel to each other, a slider slidably mounted on said sliding rails and connected with said reel support, and a driver disposed to drive a reciprocating movement of said slider relative to said base support.
3. The feeding device as claimed in Claim 1, wherein said guiding mechanism further includes a cover plate disposed to cover said transporting channel of said guiding seat, and a plurality of insert pins projecting from an upper surface of said guiding seat, said cover plate having a plurality of pin holes which are respectively engaged with said insert pins to retain said cover plate on said guiding seat.
4. The feeding device as claimed in Claim 3, wherein said cover plate further has a longitudinal groove aligned and in communication with said transporting channel

for movably accommodating the electronic component projecting from the carrier tape during movement of the carrier tape along said transporting channel.

- 5 5. The feeding device as claimed in Claim 1, wherein said guiding seat has a collecting groove which is disposed below said transporting channel to block foreign articles attached to a lower surface of the carrier tape during movement of the carrier tape along said transporting channel and to collect the articles.
- 10 6. The feeding device as claimed in Claim 1, wherein said guiding seat has a plurality of suction holes which are disposed to be in communication with said transporting channel to serve as an entrance of a negative-pressure air for attachment of the carrier tape on an upper surface of said transporting channel during movement of the carrier tape along said transporting channel.
- 15 7. The feeding device as claimed in Claim 1, wherein said guiding mechanism further includes a carrying seat disposed forwardly of and operatively movable relative to said guiding seat, said carrying seat cooperating with a front end of said guiding seat to define therebetween a gap at the feeding route for passage of the carrier tape, said gap being formed under said pick-up area such that the carrier tape being fed along said transporting channel and is deviated downwardly from the feeding route through said gap to be reeled
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on the second blank reel.

8. The feeding device as claimed in Claim 7, wherein said carrying seat has a slope surface facing said front end of said guiding seat to facilitate movement of the electronic component from said guiding seat to said carrying seat, and an attachment diminishing portion disposed on an upper surface thereof and having a plurality of parallel recesses.
9. The feeding device as claimed in Claim 7, wherein said guiding mechanism further includes at least one of a sensing member and a blowing member which are disposed below said gap and operatively movable relative to said guiding seat to be registered with said gap.
10. The feeding device as claimed in Claim 2, further comprising a pinching mechanism disposed on said reel support, and including a stationary first pinch member and a movable second pinch member movable relative to said first pinch member.
11. The feeding device as claimed in Claim 10, wherein said pinching mechanism further includes a stationary third pinch member which is disposed downwardly of said first pinch member for pinching the carrier tape, said first pinch member being disposed at a moving path of the carrier tape and between said guiding seat and said rolling shaft, said pinching mechanism further including a sensing member disposed at an inlet side of said first pinch member.

12. The feeding device as claimed in Claim 10, wherein said
pinching mechanism further includes a stationary
fourth pinch member disposed at a moving path of the
cover tape and between said rolling shaft and said first
5 reel shaft to pinch and hold the cover tape, and a sensing
member disposed at an inlet side of said fourth pinch
member.

13. The feeding device as claimed in Claim 10, wherein said
second pinch member is disposed at a moving path of
10 the carrier tape and between said guiding seat and said
second reel shaft to pinch and hold the carrier tape
from which the cover tape and the electronic component
are peeled.

14. The feeding device as claimed in Claim 10, wherein said
15 second pinch member is disposed in a notched space
defined in said reel support and is connected with a
front end of said slider to be moved with said slider
in a reciprocating course for clamping, drawing and
releasing the carrier tape.