SEMICONDUCTOR PACKAGE SAWING APPARATUS

BACKGROUND OF THE INVENTION

Field of the Invention

[01] The present invention relates to a semiconductor package sawing apparatus. More specifically, the present invention relates to a semiconductor package sawing apparatus that an assembly of semiconductor packages can be fed from a tray or a cassette.

Background of the Related Art

[02] Generally, Semiconductor device packages provide environmental protection to one or more integrated circuit devices, referred to as semiconductor dies, encased within the package. The semiconductor dies have input/output pads electrically interconnected to inner lead portions of a leadframe or an interposer by wire bonds, tape bonds, solder ball bonds (flip-chip bonds) or the like. Opposing outer lead portions of the leadframe or interposer are electrically interconnected to circuits on a printed circuit board, flex circuit or other external circuitry. A polymer molding resin encases the semiconductor die and at least the inner lead portion of the leadframe or interposer.

[03] An assembly of semiconductor packages manufactured as described above is aligned by a vision inspection device and transferred to a sawing unit while being seated on a chuck table, and the assembly of semiconductor packages is separated into a plurality of assemblies of semiconductor packages.

[04] An assembly having a plurality of semiconductor packages can be divided into semiconductor packages through a singulation process after performing a molding process.

[05] An assembly of semiconductor packages may be supplied from a tray having accommodating grooves for accommodating individual assemblies, rather than from a conventional cassette magazine or the like.

[06] However, if different semiconductor package sawing apparatuses are provided according to feeding types (e.g., a cassette magazine feeding or a tray feeding), this could be a waste of space and money, thus increasing semiconductor manufacturing costs.

SUMMARY OF THE INVENTION

[07] Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a semiconductor package sawing apparatus with improved utilization and efficiency, in which although a

means for supplying a sawing target assembly of semiconductor packages is changed, a sawing process can be performed by adding a simple conversion unit to the semiconductor package sawing apparatus.

[08] In accordance with an aspect of the present invention, the above and other objects can be accomplished by the provision of a semiconductor package sawing apparatus comprising a a pickup part having at least one pickup units for picking up an assembly of semiconductor packages, a transfer part for transferring the pickup part in a predetermined direction, a material supply part including at least one feeders for transferring a tray in a direction perpendicular to a transfer direction of the pickup part, to supply the assembly of semiconductor packages to the pickup part and a sawing part including at least one chuck tables for holding semiconductor packages supplied from the material supply part and at least one sawing units.

[09] The material supply part may include a tray supply unit for stacking trays in which assemblies of semiconductor packages are accommodated and a tray discharge unit for stacking empty trays, and the feeder includes a first feeder for transferring the tray from the tray supply unit to a pickup position of the pickup part and a second feeder for transferring the tray from which the assemblies of semiconductor packages are picked up by the pickup unit to the tray discharge unit.

[10] The material supply part may include first guide rails and second guide rails arranged in a direction perpendicular to the transfer direction of the pickup part to support the tray so that the tray may be supplied from the tray supply unit or discharged to the tray discharge unit by the first or second feeder.

[11] The material supply part further may include a tray pickup unit for picking up a tray from the first guide rails and seating the tray on the second guide rails.

[12] A seating part, on which a material accommodating groove may be formed, provided between the material supply part and the chuck table of the sawing part, and the pickup part transfers the semiconductor material picked up from the material supply part to the chuck table by way of the seating part.

[13] The seating part may include a driving means for driving the seating part in a direction perpendicular to the transfer direction of the pickup part transferred by the transfer part.

[14] The number of material holding grooves formed on the chuck table to rest the assemblies of semiconductor packages and the number of the material accommodating grooves of the seating part may be respectively a divisor of the number of material accommodating grooves of the tray.

[15] The pickup part may have a single-pickup unit for picking up an individual semiconductor package and a multi-pickup unit for simultaneously picking up a plurality of assemblies of semiconductor packages.

[16] The pickup part may include a vision unit for acquiring position information of the semiconductor material by photographing the semiconductor material accommodated in the accommodating groove of the tray or the semiconductor material accommodated in the accommodating groove of the seating part.

[17] A cassette magazine for stacking and supplying semiconductor packages may be detachably attached to one side of the material supply part in a modular form.

[18] Either of the first and second feeders of the material supply part may be engaged with a conversion unit through an engaging member, the conversion unit may be mounted to guide an assembly of semiconductor packages supplied in a direction parallel to the transfer direction of the pickup part from the cassette magazine which stacks and supplies the assemblies of semiconductor packages.

[19] Connection holes may be provided in the feeder and the conversion unit respectively, and the engaging member may be engaged with the connection holes of the feeder and the conversion unit.

[20] The conversion unit may include a pair of guide rails, a supporting plate for mounting the guide rails, and a driving means for adjusting a width of the guide rails.

[21] An individual driving means may be provided at each of the guide rails so that the guide rails may be driven independently from each other so as to adjust the width between the guide rails and a position of each guide rail.

[22] The driving means may approach or separate the guide rails by displacing the guide rails with a same distance, and the positions of the guide rails can be changed by moving the feeder engaged with the conversion unit.

[23] The the pickup part further may include a gripper for gripping a front end of an assembly of semiconductor packages in the cassette magazine and withdrawing the assembly of semiconductor packages to the guide rails.

A vision unit for acquiring position information of the assembly of semiconductor packages on the pickup unit or the guide rails may be provided below a transfer path of the assembly of semiconductor packages transferred from the material supply part to the chuck table of the sawing part through the pickup part or the guide rails.

BRIEF DESCRIPTION OF THE DRAWINGS

[24] FIG. 1 is a plan view showing a semiconductor package sawing apparatus according to the present invention.

[25] FIG. 2 is a view showing a conversion unit mounted on a feeder of a semiconductor package sawing apparatus according to the present invention.

[26] FIG. 3 is a plan view showing a semiconductor package sawing apparatus according to the present invention, on which a conversion unit is mounted.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[27] Preferred embodiments of the present invention will be described below in more detail with reference to the accompanying drawings. Advantages and features of the present invention, and implementation methods thereof will be clarified through following embodiments described with reference to the accompanying drawings. The present invention may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the present invention to those skilled in the art. Further, the present invention is only defined by scopes of claims. Like reference numerals refer to like elements throughout.

[28] FIG. 1 is a plan view showing a semiconductor package sawing apparatus 1000 according to the present invention.

[29] The semiconductor package sawing apparatus 1000 according to the present invention includes a pickup part 200 having at least one pickup units for picking up an assembly of semiconductor packages, a transfer part 300 for transferring the pickup part 200 in a predetermined direction, a material supply part 100 having at least one material accommodating grooves sp for accommodating the assembly of semiconductor packages and at least one feeders for transferring any one tray t among a plurality of stacked or to-be-stacked trays in a direction perpendicular to the transfer direction of the pickup part 200 to supply the assembly of semiconductor packages to the pickup part 200, and a sawing part 500 having at least one chuck tables 510 having at least one holding parts (not shown) for holding the assembly of semiconductor packages supplied from the material supply part 100, and at least one sawing units 520.

[30] The semiconductor package sawing apparatus 1000 according to the present invention can be supplied with sawing target assembly of semiconductor packages ss through a tray t for holding a plurality of semiconductor packages, unlike a conventional semiconductor package sawing apparatus.

[31] The semiconductor package sawing apparatus 1000 includes the pickup part 200. The pickup part 200 transfers the

assembly of semiconductor packages from the material supply part 100 to the sawing part, as the transfer part 300 moves while the assembly of semiconductor packages is being picked up by the pickup part 200.

[32] The pickup part 200 may includes a single-pickup unit 220 for picking up an individual assembly (which is composed of semiconductor packages) and a multi-pickup unit 230 for simultaneously picking up a plurality of assemblies.

[33] The single-pickup unit 220 may be provided to individually pick up the assembly provided in the tray t or the like. The multi-pickup unit 230 may be provided at the pickup part 200 together with the single-pickup unit 220 to pick up a plurality of assemblies, simultaneously. The multi-pickup unit 230 will be described below.

[34] In addition, the pickup part 200 may include a vision unit 240 for inspecting the alignment state of an assembly. Specifically, the pickup part 200 may include the vision unit 240 for acquiring position information of an assembly by photographing the assembly accommodated in the material accommodating groove sp provided in the tray t or the assembly loaded in an material seating groove 410 provided in a seating part 400.

[35] Accordingly, the vision unit 240 collects information on misalignment or the like of the assembly in the process of

picking the assembly up or seating the assembly on, and the misalignment or the like can be corrected in the seating process which seats the assembly on a holding groove of a chuck table.

[36] The semiconductor package sawing apparatus 1000 according to the present invention may include a pair of feeders, disposed parallel to each other. One of the feeders can be used to transfer a tray t, in which at least one assemblies are accommodated, to a pickup position of the pickup part 200, and the other to transfer an empty tray, from which all assemblies of semiconductor packages are picked up by the pickup part 200, to a tray discharge position.

[37] Specifically, the material supply part 100 includes a tray supply unit 180 for stacking trays, in which assemblies are accommodated, and a tray discharge unit 190 for stacking empty trays from which the assemblies of semiconductor packages are picked up by the pickup unit 200, and the feeder may include a first feeder 120 for transferring a tray from the tray supply unit 180 to the pickup position of the pickup part and a second feeder 140 for transferring a tray from which the assemblies of semiconductor packages are picked up by the pickup unit 200 to the tray discharge unit 190.

[38] A pair of the feeders 120 and 140 may include a first feeder 120 for withdrawing or towing a tray in which assemblies of semiconductor packages are acoommodated from the tray supply

unit and a second feeder 140 for transferring or towing a tray to discharge a tray from which the assemblies of semiconductor packages have been picked up by the pickup unit 200 to the tray discharge unit.

[39] The material supply part 100 may include guide rails 110 and 130 for supporting the tray t so that the tray may be supplied from the tray supply unit 180 or discharged from the tray discharge unit 190 by the first or second feeder 120 or 140. Each of the guide rails 110 and 130 can be provided in parallel to support the tray transferred by each of the feeders 120 and 140.

[40] The guide rails 110 and 130 may be arranged in a direction perpendicular to the transfer part 300 respectively. When the transfer part 300 reciprocatingly transfers the pickup part 200 in a predetermined direction (x-axis direction), each of the trays is supplied or discharged in the predetermined direction (y-axis direction) since the guide rails are respectively arranged in a direction parallel to a predetermined direction (y-axis direction).

[41] The tray supply unit 180 and the tray discharge unit 190 are respectively provided at one end of the guide rails 110 and 130 in the same direction.

[42] Trays t holding sawing target assembly of semiconductor packages ss in a plurality of material

accommodating grooves sp can be supplied to the tray supply unit 180 in a stacked state.

[43] Accordingly, the first feeder 120 may transfer the tray t stacked in the tray supply unit 180 to a pickup position where the tray can be picked up by the pickup part 200.

[44] The first feeder 120 may move to the pickup position along the first guide rails 110 while grippers 121 and 123 provided at both ends grip the tray cradled at the uppermost or lowermost position among the trays stacked in the tray supply unit. Since the pickup position means a position where the pickup part 200 picks up the assembly of semiconductor packages contained in the tray, the pickup position means a position on a transfer path along which the pickup part 200 is transferred by the transfer part 300.

[45] Each of the trays t may have a plurality of material accommodating grooves sp for accommodating assemblies of semiconductor packages.

[46] The tray t supplied from the tray supply unit 180 may have the material accommodating grooves sp in a plurality of rows and columns.

[47] The pickup part 200 may be transferred only in a predetermined direction (x-axis direction) by the transfer part 300. Accordingly, the first feeder 120 may transfer the tray in a predetermined direction (y-axis direction) by the unit of row so

that each of the assemblies of semiconductor packages can be picked up by the pickup part 200.

[48] That is, when all the assemblies of semiconductor packages held in a specific row are picked up by the pickup part, the tray can be transferred (of row) so that the assemblies of semiconductor packages held in the next row may be picked up.

[49] When all the assemblies of semiconductor packages held in a specific tray supplied by the tray supply unit 180 are picked up and transferred to the sawing part, the first feeder 120 moves forward the tray along the first guide rails 110.

[50] A tray pickup unit 150 for picking up and transferring a tray in a direction perpendicular to the transfer direction of the first feeder 110 may be provided at the rear portion of the first guide rails 110.

[51] The tray pickup unit 150 moves a tray from which all the assemblies of semiconductor packages are pick up by the pickup part 200 toward the second guide rails 130 having the tray discharge unit 190.

[52] The second guide rails 130 guide transfer of the tray transferred by the tray pickup unit 150. The second feeder 140 is also provided on the second guide rails 130 side. The second feeder 140 holds and transfers a discharge target tray to the tray discharge unit 190 along the second guide rails 130.

[53] The tray discharge unit 190 also holds discharge target trays in a stacked state, and it may stack and discharge empty trays in a method of stacking the tray discharged by the second feeder 140 at the uppermost or lowermost position.

[54] A vision unit 160 for acquiring position information of an assembly of semiconductor packages on the pickup unit or the guide rails may be provided below the transfer path of the assembly of semiconductor packages transferred from the material supply part 100 to the chuck table of the sawing part 500 through the pickup part 200 or the guide rails of the conversion unit 1500 described below (refer to FIG. 2).

[55] The vision unit 160 may photograph images for confirming an alignment state of an assembly of semiconductor packages or overturn of the assembly of semiconductor packages transferred by the pickup part 200, as well as images for obtaining position information of the assembly of assemblies of semiconductor packages.

[56] This is to confirm information on the overturn or alignment of the assembly of semiconductor packages through the image of the bottom surface of the assembly of semiconductor packages while the assembly of semiconductor packages is picked up and transferred by the pickup part 200.

[57] The pickup part 200 can be reciprocatingly transferred in a direction (x-axis direction) perpendicular to the transfer direction of each feeder of the material supply part 100.

[58] As described above, the pickup part 200 may include the single-pickup unit 220 for picking up an individual assembly (which is composed of semiconductor packages) and the multi-pickup unit 230 for simultaneously picking up a plurality of assemblies. The single-pickup unit 220 may be provided to individually pick up the assembly of semiconductor packages held in the tray t or the like. The multi-pickup unit 230 may be provided in the pickup part 200 together with the single-pickup unit 220 to simultaneously pick up a plurality of assemblies of semiconductor packages.

[59] The semiconductor package sawing apparatus 1000 according to the present invention may include the seating part 400 in front of the chuck table 510 which provides a space for singulation of an assembly of semiconductor packages, specifically in front of the chuck table 510 on the transfer path of the pickup part 200.

[60] The sawing part may perform a singulation process to separate the assembly of semiconductor packages held on the chuck table 510a or 510b into individual semiconductor package. If the size of semiconductor packages contained in an assembly of semiconductor packages is small and thus the assembly of

semiconductor packages contains a large number of semiconductor packages, most of time spent in a the process of sawing the assembly of semiconductor packages is required for the singulation process performed by the sawing part.

[61] Accordingly, if the seating part 400 is not provided, the pickup part 200 may suspend the sawing process until the singulation process performed on the assembly of semiconductor packages is completed by the sawing part 500 and then pick up and transfer the assembly of assemblies of semiconductor packages.

[62] In addition, although each of the sawing units 520 configuring the sawing part 500 may perform a sawing process considering the alignment state of each semiconductor package, alignment or the like of each chip can be corrected in advance for the efficiency of the sawing process.

[63] Accordingly, the pickup part 200 may load the assembly of semiconductor packages picked up by the single-pickup unit 220 on the material seating groove 410 of the seating part 400 and correct alignment of the loaded semiconductor package (e.g., twist in the z-axis direction) in the process of loading the assembly of semiconductor packages on the material seating groove 410.

[64] If all the assemblies of semiconductor packages are loaded on the material accommodating grooves 410 of the seating part 400 after the alignment or the like is corrected and the

sawn semiconductor packages are discharged after the sawing process at the chuck table 510 is completed, the multi-pickup unit 230 of the pickup part 200 simultaneously rests the assemblies of semiconductor packages loaded on the material accommodating grooves 410 of the seating part 400 on the material holding grooves of the chuck table 510.

[65] That is, each of the assemblies of semiconductor packages is transferred to the seating part 400 by the single-pickup unit 220 of the pickup part 200, and alignment or the like is corrected. Then, the sawing process is prepared by simultaneously transferring the assemblies of semiconductor packages loaded on respective material loading units to the chuck table after the alignment or the like is corrected.

[66] Accordingly, although the sawing process is not completed by the sawing part, alignment or the like of each semiconductor package can corrected, and the assemblies of semiconductor packages can be loaded on the seating part 400 in advance. If the chuck table 510 of the sawing part is ready to rest new sawing target assembly of semiconductor packages, the pickup part 200 may simultaneously pick up and transfer the assemblies of semiconductor packages onto the chuck table 510 through the multi-pickup unit 230.

[67] That is, the single-pickup unit 220 of the pickup part 200 may correct the alignment, as soon as the assembly of

semiconductor packages is transferred onto the material seating groove 410 of the seating part 400, regardless of the sawing process performed by the sawing part, and a unit picker part 800 described below may simultaneously pick up and supply the new semiconductor packages as soon as the sawn semiconductor packages are discharged from the chuck table 510. Therefore, the sawing part 500 may minimize the blank of process that may occur in the process of transferring the new assemblies of semiconductor packages.

[68] In addition, since an alignment state on the seating part 400 can be determined by the single-pickup unit 220, alignment of the assembly of semiconductor packages performed by the sawing unit 520 of the sawing part 500 in the sawing process reflecting the alignment state of each semiconductor package can be minimized, and as a result, efficiency of singulation can be maximized.

[69] The seating part 400 can be configured so as to be driven in a predetermined direction (y-axis direction). Specifically, the seating part 400 may include a driving means (not shown) so as to be driven by the transfer part 300 in a direction perpendicular to the transfer direction of the pickup part.

[70] Since the pickup part 200 can be transferred by the transfer part 300 only in a predetermined direction (x-axis

direction) as described above, the seating part needs to be driven in the y-axis direction to load semiconductor packages in the material accommodating grooves 410 arranged in all the rows of the seating part 400.

[71] In the embodiment shown in FIG. 1, a tray t is having material accommodating grooves sp of nine rows and three columns.

[72] The tray can be configured such that the number and positions of the material accommodating grooves of the seating part 400 correspond to those of the material holding grooves of the chuck table 510. In the embodiment shown in FIG. 1, the tray t is having total 27 material accommodating grooves sp in nine rows and three columns, and the number of the material accommodating grooves 410 of the seating part 400 and the number of the material holding grooves of the chuck table 510 are respectively nine.

[73] Although the material accommodating grooves 410 of the seating part 400 and the material holding grooves of the chuck table 510 can be arranged as many as ten respectively, only nine of them are arranged respectively for the reasons described below.

[74] The number of material accommodating grooves 410 of the seating part 400 and the number of material holding grooves of the chuck table 510 are preferably a divisor of the number of material accommodating grooves sp of the tray t.

[75] Specifically, in the embodiment shown in FIG. 1, 9 among 1, 3, 9 and 27, which are divisors of 27, i.e., the number of material accommodating grooves sp of the tray t, is selected as the number of material accommodating grooves 410 of the seating part 400 and the number of material holding grooves of the chuck table 510.

[76] The number of material accommodating grooves 410 of the seating part 400 and the number of material holding grooves of the chuck table 510 are preferably determined as the largest number 9 among the divisors 3 and 9 of the number of material accommodating grooves of the tray, excluding the number of material accommodating grooves sp and 1. The reason is to improve efficiency of managing and processing the assemblies of semiconductor packages picked up from each tray and sawn in the sawing process.

[77] Apparently, the number of the material accommodating grooves sp of the tray t, the number of material accommodating grooves 410 of the seating part 400 and the number of material holding grooves of the chuck table 510 can be determined to be the same.

[78] It is since that if the number of material accommodating grooves 410 of the seating part 400 is determined as one of the divisors of the number of material accommodating grooves sp of the tray t, the multi-pickup unit may transfer all

the assemblies of semiconductor packages on one tray through a few pickup and transfer operations, and it is easy to manage the process of manufacturing a product.

[79] In addition, the number of material accommodating grooves sp of the tray t on which the assemblies of semiconductor packages are rested can be expressed as a K multiple (K = 1, 2, 3 … N, N is a natural number) of the number of holding parts of the chuck table 510 or the number of material accommodating grooves the seating part.

[80] In addition, the sawing part 500 may include at least one chuck tables 510a and 510b and at least one sawing units 520a and 520b.

[81] As shown in FIG. 1, since the sawing units 520a and 520b are provided on the opposite side of the transfer part 300, the chuck tables 510a and 510b also can be driven in a predetermined direction (y-axis direction) like the seating part 400, and it may have a pivotable structure so as to change the sawing direction.

[82] It is shown in the figure that a pair of chuck tables 510a and 510b is provided to minimize the blanks in the sawing process, and the number of chuck tables can be increased or decreased as needed.

[83] The transfer part 300 may include the unit picker part 800, in addition to the pickup part 200 described above. The unit

picker part 800 may simultaneously pick up all the assemblies of semiconductor packages that have been sawn at the chuck tables 510a and 510b of the sawing part and discharge the assemblies of semiconductor packages to a sorting unit (not shown) which performs a sorting process for sorting assemblies of semiconductor packages.

[84] The unit picker part 800 mounted on the transfer part 300 may pick up and transfer the assemblies of semiconductor packages to the assembly of semiconductor packages sorting unit described above by way of a cleaning part 700 for cleaning the assemblies of semiconductor packages using a compressed gas or a cleaning liquid.

[85] In the semiconductor package sawing apparatus 1000 according to the present invention shown in FIG. 1, sawing target assembly of semiconductor packages are supplied while being accommodated in a tray.

[86] However, if the semiconductor package sawing apparatus 1000 shown in FIG. 1 can be used even when the assemblies of semiconductor packages are supplied through a cassette magazine cm that is frequently used in the prior art, other than the case where the assemblies of semiconductor packages are supplied while being accommodated in a tray, this may improve utilization, efficiency and competitiveness of the device.

[87] FIG. 2 is a view showing a conversion unit 1500 mounted on a feeder of a material supply part 100 of a semiconductor package sawing apparatus 1000 according to the present invention.

[88] The conversion unit 1500 may include guide rails 1100 for guiding an assembly of semiconductor packages supplied from a cassette magazine cm, supporting shafts 1200 for supporting the guide rails so that the width of the guide rails 1100 may vary, a supporting plate 1300 on which the guide rails 1100 are mounted, and a driving means 1400 for adjusting the width of the guide rails 1100.

[89] The conversion unit 1500 may be mounted on either of the feeders of the material supply part 100.

[90] Specifically, as shown in FIGs. 1 and 2, the first feeder 120 among the first and second feeders 120 and 140 of the material supply part 100 may be engaged with the conversion unit 1500 through an engaging member, and the conversion unit 1500 can be mounted to guide an assembly of semiconductor packages supplied in a direction parallel to the transfer direction of the pickup part 200 from a cassette magazine cm which stacks and supplies assemblies of semiconductor packages.

[91] The cassette magazine cm for stacking and supplying semiconductor packages can be detachably mounted at one side of the material supply part 100 in the form of a module. The

cassette magazine cm can be arranged to be adjacent to the transfer part 300 so as to supply an assembly of semiconductor packages to a position parallel to the transfer direction of the pickup part.

[92] The engaging member may be a connection bolt or the like. Accordingly, connection holes are provided on the feeder 120 and the conversion unit 1500 respectively, and the engaging member can be engaged with the connection holes 125 and 1305 of the feeder 120 and the conversion unit 1500.

[93] Although it is shown that the conversion unit 1500 is mounted on the first feeder 120 in the embodiment of FIG.2, it can be mounted on the second feeder 140. For the convenience of explanation, the second feeder is omitted in FIG. 2.

[94] Since the connection holes formed on the feeder 120 and the conversion unit 1500 and the connection member described above are means for mounting the conversion unit on the feeder, connection means of another method also can be used.

[95] The guide rails 1100 are configured to guide transfer of the assembly of semiconductor packages supplied from the cassette magazine, and the supporting shafts 1200 are configured to support the guide rails 1100 so that the width between the guide rails 1100 can be adjusted. The supporting plate 1300 may function as a mounting place where the supporting shafts or the guide rails are mounted, and the guide rails 1100 can be mounted

on the supporting plate 1300 with the intervention of the supporting shafts 1200.

[96] The conversion unit 1500 may include at least one driving means 1400 for adjusting the width of the guide rails.

[97] In the embodiment shown in FIG. 2, the driving means 1400 may include a screw 1430 that is shaft-coupled to at least any one of the guide rails and a motor 1410 for rotating the screw 1430. A screw nut (not shown) can be provided on the guide rails 1100 side. In addition, a finishing member 1450 for finishing and supporting the screw 1430 and the like can be provided.

[98] The screw may be a ball screw, a TM screw or like, and the screw nut is provided at the guide rails as needed so that a process of sawing semiconductor packages having a variety of widths can be performed by increasing or decreasing the width of the rails.

[99] In the embodiment shown in FIG. 2, although it is shown that the driving means 1400 is provided only at either side of the guide rails, the driving means can be provided at both sides of the guide rails.

[100] Specifically, the driving means 1400 approaches or separates the guide rails 1100 by displacing the guide rails with the same distance, and the positions of the guide rails can be

changed by moving the feeder engaged with the conversion unit 1500.

[101] The driving unit can be provided at each of the guide rails. In this case, an individual driving means can be provided at each of the guide rails 1100 so that the guide rails 1100 can be driven independently from each other so as to adjust the width between the guide rails and the position of each guide rail 1100. In this case, the position of each guide rail 1100 can be changed by the individual driving means, and the feeder does not need to be driven.

[102] Since an assembly of semiconductor packages can be sawn even when the conversion unit shown in FIG. 2 is mounted on the semiconductor package sawing apparatus 1000 shown in FIG. 1 and the assembly of semiconductor packages is supplied through the cassette magazine cm, applicability of the semiconductor package sawing apparatus 1000 can be improved.

[103] FIG. 3 is a plan view showing a semiconductor package sawing apparatus 1000 according to the present invention, on which a conversion unit is mounted.

[104] As described above, sawing target assembly of semiconductor packages can be supplied while being accommodated in the material accommodating grooves of each tray after a preliminary sawing process is performed, or they can be supplied

through a cassette magazine cm, like in a method frequently used in the prior art.

[105] FIG. 3 shows the conversion unit 1500 of FIG. 2 mounted on the feeder 120 of the material supply part 100.

[106] By mounting the conversion unit 1500 on the feeder 120, the guide rails for transferring a sawing target assembly of semiconductor packages in a direction parallel to the transfer part 300 can be provided in the material supply part 100.

[107] That is, in the semiconductor package sawing apparatus 1000 according to the present invention described above with reference to FIG. 1, the feeder transfers a tray which accommodates a sawing target assembly of semiconductor packages in a direction perpendicular to the transfer direction of the pickup part 200 which is transferred by the transfer part 300, and each of semiconductor packages can be picked up by the pickup part 200.

[108] However, when the assembly of semiconductor packages ss' is supplied through the cassette magazine cm shown in FIG. 3, the assembly of semiconductor packages can be towed and transferred to the pickup position of the pickup part 200 while being gripped by the gripper 210 or the like.

[109] In the embodiment shown in FIG. 3, it is assumed that the assembly of semiconductor packages ss' supplied through the cassette magazine is an assembly of semiconductor packages having

an appropriate type and size, unlike the assembly of semiconductor packages shown in FIG. 1.

[110] In this case, in the cassette magazine cm, the sawing target assembly of semiconductor packages ss' can be pushed to a predetermined area by a pusher 1600 that can be provided in the material supply part, and the pushed semiconductor package ss' can be towed by the gripper described below and transferred to the pickup position through the guide rails of the conversion unit.

[111] Accordingly, the semiconductor package sawing apparatus 1000 according to the present invention is having the gripper for withdrawing and towing an assembly of semiconductor packages from the cassette magazine cm, and specifically, the gripper 210 is provided at one end of the pickup part 200.

[112] Since the pickup part 200 can be transferred along the transfer direction of the transfer part 300, the gripper provided in the pickup part 200 may withdraw the sawing target assembly of semiconductor packages from the cassette magazine cm provided at one end of the transfer part 300 and transfer the sawing target assembly of semiconductor packages along the guide rails 1100 of the conversion unit 1500.

[113] In the case where the sawing target assembly of semiconductor packages withdrawn from the cassette magazine cm is configured in the form of a substrate, if the sawing target

assembly of semiconductor packages is transferred to the pickup position along the guide rails by the gripper of the pickup part 200, the sawing target assembly of semiconductor packages can be transferred to the chuck table 510 by the multi-pickup unit 230 of the pickup part 200 without performing the loading process of the seating part 400, and the sawing process can be performed.

[114] In the case where the sawing target assembly of semiconductor packages withdrawn from the cassette magazine cm is not configured in the form of a substrate and supplied while being held on a separate boat or the like, the assembly of semiconductor packages can be transferred to the chuck table 510 by the single-pickup unit 220, the seating part 400 and the multi-pickup unit 230 of the pickup part 200, in the same manner as the process of picking up the assembly of semiconductor packages through a tray described above with reference to FIG. 1.

[115] In the latter case, since the conversion unit 1500 is mounted on the feeder 120 that can be transferred in a predetermined direction (y-axis direction), although the pickup part 200 may be transferred only in a predetermined direction (x-axis direction) by the transfer part 300, an individual semiconductor package can be disposed at the pickup position of the single-pickup unit 220 of the pickup part 200.

[116] In the embodiment shown in FIG. 3, the transfer part 300 may be having a unit picker part 800, in addition to the

pickup part 200 described above, and the unit picker part 800 may pick up and discharge semiconductor packages that have been sawn at the chuck tables 510a and 510b of the sawing part.

[117] In addition, the assembly of semiconductor packages may pass through a cleaning part 700 for cleaning the assembly of semiconductor packages using a compressed gas or a cleaning liquid in the discharge process of the unit picker part 800, like in the embodiment described above with reference to FIG. 1.

[118] According to the semiconductor package sawing apparatus according to the present invention, although a means for supplying semiconductor packages is changed, the sawing process can be performed by adding a simple conversion unit to the semiconductor package sawing apparatus.

[119] In addition, according to the semiconductor package sawing apparatus according to the present invention, although a means for supplying semiconductor packages is changed from a tray method to a cassette magazine method, utilization of the facility can be maximized by mounting a conversion unit.

[120] In addition, according to the semiconductor package sawing apparatus according to the present invention, since the sawing process can be performed although a means for supplying semiconductor packages is changed from a tray method to a cassette magazine method, it is possible to prevent overlapping

investment and improve price competitiveness of the semiconductor manufacturing process.

[121] While the present invention has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiments but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention.

What is claimed is:

1. A semiconductor package sawing apparatus comprising:

a pickup part having at least one pickup units for picking up an assembly of semiconductor packages;

a transfer part for transferring the pickup part in a predetermined direction;

a material supply part including at least one feeders for transferring a tray in a direction perpendicular to a transfer direction of the pickup part, to supply the assembly of semiconductor packages to the pickup part; and

a sawing part including at least one chuck tables for holding semiconductor packages supplied from the material supply part and at least one sawing units.

2. The semiconductor package sawing apparatus according to claim 1, wherein the material supply part includes a tray supply unit for stacking trays in which assemblies of semiconductor packages are accommodated and a tray discharge unit for stacking empty trays, and the feeder includes a first feeder for transferring the tray from the tray supply unit to a pickup position of the pickup part and a second feeder for transferring the tray from which the assemblies of semiconductor packages are picked up by the pickup unit to the tray discharge unit.

3. The semiconductor package sawing apparatus according to claim 2, wherein the material supply part includes first guide rails and second guide rails arranged in a direction perpendicular to the transfer direction of the pickup part to support the tray so that the tray may be supplied from the tray supply unit or discharged to the tray discharge unit by the first or second feeder.

4. The semiconductor package sawing apparatus according to claim 3, wherein the material supply part further includes a tray pickup unit for picking up a tray from the first guide rails and seating the tray on the second guide rails.

5.

The semiconductor package sawing apparatus according to claim 1, wherein a seating part, on which a material accommodating groove is formed, provided between the material supply part and the chuck table of the sawing part, and the pickup part transfers the semiconductor material picked up from the material supply part to the chuck table by way of the seating part.

6. The semiconductor package sawing apparatus according to claim 5, wherein the seating part includes a driving means for driving the seating part in a direction perpendicular to the transfer direction of the pickup part transferred by the transfer part.

7. The device according to claim 5, wherein the number of material holding grooves formed on the chuck table to rest the assemblies of semiconductor packages and the number of the material accommodating grooves of the seating part are respectively a divisor of the number of material accommodating grooves of the tray.

8. The semiconductor package sawing apparatus according to claim 1, wherein the pickup part has a single-pickup unit for picking up an individual assembly of semiconductor packages and a multi-pickup unit for simultaneously picking up a plurality of assemblies of semiconductor packages.

9. The semiconductor package sawing apparatus according to claim 8, wherein the pickup part includes a vision unit for acquiring position information of the semiconductor material by photographing the semiconductor material accommodated in the

accommodating groove of the tray or the semiconductor material accommodated in the accommodating groove of the seating part.

10. The semiconductor package sawing apparatus according to claim 1, wherein a cassette magazine for stacking and supplying semiconductor packages is detachably attached to one side of the material supply part in a modular form.

11. The semiconductor package sawing apparatus according to claim 10, wherein either of the first and second feeders of the material supply part is engaged with a conversion unit through an engaging member, the conversion unit being mounted to guide an assembly of semiconductor packages supplied in a direction parallel to the transfer direction of the pickup part from the cassette magazine which stacks and supplies the assemblies of semiconductor packages.

12. The semiconductor package sawing apparatus according to claim 11, wherein connection holes are provided in the feeder and the conversion unit respectively, and the engaging member is engaged with the connection holes of the feeder and the conversion unit.

13. The semiconductor package sawing apparatus according to claim 11, wherein the conversion unit includes a pair of guide rails, a supporting plate for mounting the guide rails, and a driving means for adjusting a width of the guide rails.

14. The semiconductor package sawing apparatus according to claim 13, wherein an individual driving means is provided at each of the guide rails so that the guide rails may be driven independently from each other so as to adjust the width between the guide rails and a position of each guide rail.

15. The semiconductor package sawing apparatus according to claim 13, wherein the driving means approaches or separates the guide rails by displacing the guide rails with a same distance, and the positions of the guide rails can be changed by moving the feeder engaged with the conversion unit.

16. The semiconductor package sawing apparatus according to claim 11, wherein the pickup part further includes a gripper for gripping a front end of an assembly of semiconductor packages in the cassette magazine and withdrawing the assembly of semiconductor packages to the guide rails.

17. The semiconductor package sawing apparatus according to claim 11, wherein a vision unit for acquiring position information of the assembly of semiconductor packages on the pickup unit or the guide rails is provided below a transfer path of the assembly of semiconductor packages transferred from the material supply part to the chuck table of the sawing part through the pickup part or the guide rails.