

RECLAIMING APPARATUS FOR INSPECTION OF ELECTRONIC COMPONENTS AND METHOD THEREOF

BACKGROUND OF THE INVENTION

5 **Technical Field**

The technical field relates to an inspection equipment technology, and more particularly relates to a reclaiming apparatus for inspection of electronic components and a method thereof.

Description of Related Art

10 As the electronic components industry blooms, manufacturers not only need to know about the trend of “light, thin, short, and small” products, but also need to have fast mass production methods to improve competitiveness. In recent years, automated production and inspection have gradually become a development trend of the industry, and labor costs can be greatly reduced by investing in the automated equipment to expedite production and
15 inspection.

Existing reclaiming apparatuses for inspection of electronic components generally include a turntable structure and a reclaiming device, wherein electronic components are sequentially placed on the turntable structure, and then sucked and moved by the reclaiming device to the inspection stations for inspection. During the inspection process, the turntable
20 structure is limited by the reclaiming device and it can only wait in the original position till the inspection of each electronic component is completed, before continuing to convey the next batch of electronic components to the inspection stations for inspection, thus resulting in low inspection efficiency and non-compliance with the cost benefit principle.

In view of the aforementioned problems, the discloser proposed this invention based on
25 his expert knowledge and elaborated researches to overcome the problems of the related art.

SUMMARY OF THE INVENTION

Therefore, it is a primary objective of this invention to provide a reclaiming apparatus for inspection of electronic components and a method thereof which can reduce the overall operating time to improve inspection efficiency.

5 In order to achieve the aforementioned objective, the present invention provides a reclaiming apparatus for inspection of electronic components, and the apparatus includes a turntable structure and a reclaiming device, wherein the turntable structure includes a drive and a disk body connected to and driven by the drive for rotation, and the disk body has a plurality of load bearing positions provided for placing the electronic components, and
10 arranged apart from one another in a round shape; and the reclaiming device is installed on a side of the turntable structure, and the reclaiming device includes a plurality of retrieving mechanisms, each being installed in each respective load bearing position, and each retrieving mechanism includes a base and a suction member that can be moved to connect the base, and
15 the electronic component, the disk body can rotate continuously through the yield space.

In order to achieve the aforementioned objective, the present invention further provides a reclaiming method for inspection of electronic components, and the method includes the steps of:

a) providing a turntable structure, a reclaiming device and a plurality of inspection
20 stations, wherein each turntable structure includes a disk body having a plurality of load bearing positions, and the reclaiming device includes a plurality of suction members, each having a yield space;

b) placing a plurality of electronic components into the load bearing positions respectively, wherein at least one of the load bearing positions is not placed with the
25 electronic component to form a vacancy;

c) respectively sucking the electronic components from the load bearing positions by the

suction members, and moving the electronic components in a direction towards the inspection stations;

d) continuously rotating the disk body through the yield space, during the inspection of each electronic component in each inspection station; and

5 e) respectively returning the electronic components to the load bearing positions next in line by the suction members after the inspection of the electronic components in the inspection stations is completed.

This invention has the effects to effectively prevent the suction member from colliding with the disk body, which may cause damages or and create other undesirable situations.

10

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a reclaiming apparatus for inspection of electronic components and each inspection station in accordance with this invention;

15 FIG. 2 is a partial blowup view showing a reclaiming apparatus for inspection of electronic components and each inspection station in accordance with this invention;

FIG. 3 is a blowup view of an area indicated by the dotted circle in FIG. 2;

FIG. 4 is a partial blowup view of a retrieving mechanism of this invention;

FIG. 5 is a cross-sectional view of a disk body of this invention;

FIG. 6 is a blowup view of an area indicated by the dotted circle in FIG. 5;

20 FIG. 7 is a cross-sectional view showing a disk body, a retrieving mechanism and an inspection station of this invention;

FIG. 8 is a first cross-sectional view showing a using status of a disk body, a retrieving mechanism and an inspection station of this invention;

25 FIG. 9 is a second cross-sectional view showing a using status of a disk body, a retrieving mechanism and an inspection station of this invention; and

FIG. 10 is top view of a turntable structure and each inspection station of this invention.

DETAILED DESCRIPTION

The technical contents of this disclosure will become apparent with the detailed description of embodiments accompanied with the illustration of related drawings as follows.

5 It is intended that the embodiments and drawings disclosed herein are to be considered illustrative rather than restrictive.

With reference to FIGS. 1 to 6 for a reclaiming apparatus for inspection of electronic components in accordance with this invention, the reclaiming apparatus includes a turntable structure 10, a reclaiming device 20, and a plurality of inspection stations 7 configured into in
10 a round shape under the turntable structure 10, and provided for inspecting an electronic component 8.

In FIG. 1, the turntable structure 10 includes a drive 11, a disk body 12 and a connection assembly 13, and the connection assembly 13 is connected between the drive 11 and the disk body 12, and the disk body 12 is driven by the drive 11 to rotate the connection assembly 13,
15 and the disk body 12 of this embodiment is a round disk body with a plurality of load bearing positions 121 defined at the outer periphery of the disk body 12 and spaced apart from one another, and each load bearing position 121 is provided for placing the electronic component 8.

In FIGS. 5 and 6, the disk body 12 has a negative pressure suction channel 122
20 configured to be responsive to the corner of each load bearing position 121 and communicating with the load bearing position 121, and the load bearing position 121 of this embodiment is substantially in a cross shape. However, this invention is not limited to this shape only, and the load bearing position 121 can also be in other various geometric shapes. When the electronic component 8 is placed in the load bearing position 121, the electronic
25 component 8 is positioned by the suction of the negative pressure suction channel 122.

In FIGS. 2 to 4 and 7, the reclaiming device 20 is installed at the upper side of the

turntable structure 10 and includes a plurality of retrieving mechanisms 21, each disposed around the outer periphery of the connection assembly 13 and configured to be corresponding to the load bearing position 121, and each retrieving mechanism 21 includes a base 211 and a suction member 212, and the suction member 212 can be moved to connect the base 211, and
5 each suction member 212 has a yield space 213. Similarly, the reclaiming device 20 can also be installed under the turntable structure 10 in order to meet actual use requirements.

The suction member 212 includes a sliding board 2121 and a suction arm 2122, and the sliding board 2121 is connected to the base 211, and the suction arm 2122 is fixed onto sliding board 2121. The suction arm 2122 includes an arm plate 2123 and a suction head 2124, and
10 the arm plate 2123 is connected to the sliding board 2121, and the yield space 213 is defined in an area enclosed by the suction head 2124, the arm plate 2123 and the sliding board 2121. An end of the suction head 2124 is provided with a nozzle 2125, and the inside of the arm plate 2123 and the suction head 2124 is provided with a suction channel 2126 communicating with the nozzle 2125.

15 In FIGS. 7 to 9, during operation, the electronic components 8 are placed in the load bearing positions 121 respectively, and each electronic component 8 is sucked by the negative pressure suction channel 122 and positioned to each respective load bearing position 121, wherein the disk body 12 is driven to rotate by the drive 11. After the load bearing position 121 is rotated to a position precisely under the suction member 212, the electronic component
20 8 is sucked by the nozzle 2125 of the suction member 212 and moved in a direction towards the inspection station 7, and the electronic component 8 is inspected in the inspection station 7. In the process of moving the suction member 212 downward, since each yield space 213 is disposed at the outer edge of the disk body 12 (as shown in FIG. 8), therefore there will be no interference with the disk body, and the disk body 12 can be rotated continuously. After the
25 inspection of each electronic component 8 is completed in each inspection station 7, the suction member 212 will return the electronic component 8 to the load bearing position 121

next in line.

With reference to FIG. 10 for a reclaiming method for inspection of electronic components in accordance with this invention, the reclaiming method includes the steps of:

- a) providing a turntable structure 10, a reclaiming device 20 and a plurality of inspection
5 stations 7, wherein the turntable structure 10 includes a disk body 12 with a plurality of load bearing positions 121, and the reclaiming device 20 includes a plurality of suction members 212, each having a yield space 213;
- b) placing a plurality of electronic components 8 into the load bearing position 121 respectively, wherein at least one load bearing position 121 is not placed with the electronic
10 component 8 to form a vacancy;
- c) respectively sucking the electronic components 8 from the load bearing positions 121 by the suction members 212, and moving the electronic components 8 towards the inspection stations;
- d) continuously rotating the disk body 12 through the yield space, during the inspection
15 of the electronic components 8 in the inspection stations; and
- e) respectively returning the electronic components 8 to the load bearing position 121 next in line by the suction member 212 after the inspection of the electronic components 8 in the inspection stations 7 is completed. In other words, the electronic component 8 will not be placed back to its original load bearing position 121, but into the aforementioned vacancy
20 or a load bearing position 121 from where another electronic component 8 is taken out.

In an embodiment, if there is a vacant load bearing position 121 between any two adjacent inspection stations 7, the electronic component 8 can be carried in the load bearing position 121 with a vacant load bearing position 121 apart, so that after the electronic component 8 is inspected, the suction member 212 can return the electronic component 8
25 back to the vacant load bearing position 121.

In an embodiment, if there are two vacant load bearing positions 121 between any two

adjacent inspection stations 7, (1) the electronic component 8 can be carried in the load bearing position 121 with two vacant load bearing positions 121 apart; (2) the electronic component 8 can be carried by two successive load bearing positions 121, and the next load bearing position 121 will not be used to place the electronic component 8 to form a vacancy.

5 In an embodiment, if there are three vacant load bearing positions 121 between any two adjacent inspection stations 7, (1) the electronic component 8 can be carried in the load bearing position 121 with a vacant load bearing position 121 apart; (2) the electronic component 8 can be carried in the load bearing position 121 with three vacant positions 121 apart; (3) the electronic component 8 can be carried in three successive load bearing positions
10 121, and the next load bearing position 121 will not be used to place the electronic component 8 to form a vacancy.

From the description above, if the inspection station 7 has n vacancies, then $(n+1)$ successive load bearing positions 121 are provided for carrying the electronic component 8, but at least one load bearing position 121 is not used to place the electronic component 8 to be
15 inspected, so as to form a vacancy.

In an embodiment, the quantity of suction members 212 is smaller than the quantity of load bearing positions 121, wherein the quantity of suction members 212 is one-half, one-third or one-quarter of the quantity of load bearing positions 121. The quantity of suction members 212 is equal to the quantity of inspection stations 7.

20 In summation of the description above, this invention surely achieves the expected objectives, overcomes the drawbacks of the related art, and complies with the patent application requirements, and thus is duly filed for patent application.

While this invention has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without
25 departing from the scope and spirit of this invention set forth in the claims.

CLAIMS

1. A reclaiming apparatus for inspection of electronic components, comprising:

a turntable structure (10), comprising a drive (11) and a disk body (12) coupled to the drive (11) and driven to rotate by the drive (11), and the disk body (12) comprising a plurality of load bearing positions (121) for placing the electronic components (8) respectively, and the load bearing positions (121) being spaced apart from one another; and

a reclaiming device (20), installed on a side of the turntable structure (10), and comprising a plurality of retrieving mechanisms (21), each being disposed along the load bearing positions (121) and comprising a base (211) and a suction member (212) that can be moved to couple the base (211), and each of the suction members (212) having a yield space (213);

wherein, after the suction member (212) sucks and moves the electronic component (8), the disk body (12) can be rotated continuously through the yield space (213).

2. The reclaiming apparatus for inspection of electronic components according to claim 1, wherein the suction member (212) comprises a sliding board (2121) and a suction arm (2122), and the sliding board (2121) is coupled to the base (211), and the suction arm (2122) is disposed on the sliding board (2121), and the suction arm (2122) comprises an arm plate (2123) and a suction head (2124) extending from the arm plate (2123), and the arm plate (2123) is coupled to the sliding board (2121) and moved with the sliding board (2121), and the yield space (213) is formed in an area enclosed by the suction head (2124), the arm plate (2123) and the sliding board (2121).

3. The reclaiming apparatus for inspection of electronic components according to claim 2, wherein the suction head (2124) comprises a nozzle (2125), and the arm plate (2123) and the suction head (2124) comprise a suction channel (2126) formed therein and communicating with the nozzle (2125).

4. The reclaiming apparatus for inspection of electronic components according to claim 1, wherein the turntable structure (10) further comprises a connection assembly (13) coupled between the drive (11) and the disk body (12), and the disk body (12) is driven by the drive (11) to rotate the connection assembly (13).

5. The reclaiming apparatus for inspection of electronic components according to claim 1, wherein the disk body (12) is a round disk body (12), and each load bearing position (121) is defined at the outer periphery of the round disk body (12).

6. The reclaiming apparatus for inspection of electronic components according to claim 1, wherein the disk body (12) comprises a negative pressure suction channel (122) configured to be corresponsive to a corner of each of the load bearing positions (121) and communicating with the load bearing position (121).

7. A reclaiming method for inspection of electronic components, comprising the steps of:

a) providing a turntable structure (10), a reclaiming device (20) and a plurality of inspection stations (7), wherein the turntable structure (10) comprises a disk body (12) with a plurality of load bearing positions (121), and the reclaiming device (20) comprises a plurality of suction members (212), each having a yield space (213);

b) placing a plurality of electronic components (8) into the plurality of load bearing positions (121) respectively, wherein at least one of the load bearing positions (121) is not placed with the electronic component (8) to form a vacancy;

5 c) respectively sucking the electronic components (8) from the load bearing positions (121) by the suction members (212), and moving the electronic components (8) towards the inspection stations (7);

d) continuously rotating the disk body (12) through the yield space (213), during the inspection of the electronic components (8) in the inspection stations (7); and

10 e) respectively returning the electronic components (8) to the load bearing positions (121) next in line by the suction members (212) after the inspection of the electronic components (8) in the inspection stations (7) is completed.

8. The reclaiming apparatus for inspection of electronic components according to claim 7, wherein the quantity of suction members (212) is smaller than the quantity of load
15 bearing positions (121).

9. The reclaiming apparatus for inspection of electronic components according to claim 8, wherein the quantity of suction members (212) is equal to one-half, one-third or one-quarter of the quantity of load bearing positions (121).

20

10. The reclaiming apparatus for inspection of electronic components according to claim 7, wherein the quantity of suction members (212) is equal to the quantity of inspection stations (7).