

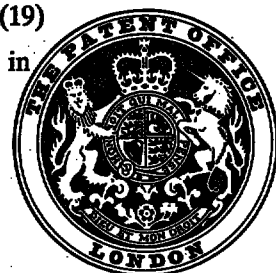
PATENT SPECIFICATION

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(54) MAGAZINE FOR STORING ELECTRONIC COMPONENTS

(71) We, HITACHI, Ltd. of 1-5-1 Marunouchi, Chiyoda-ku, Tokyo, Japan, a body corporate organized according to the laws of Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:-

The present invention relates to a magazine, and more particularly to a magazine for receiving electronic components of a semiconductor device therein.

Transportation of electronic components (for example, semiconductor devices) has hitherto been carried out using two forms of magazine. Figure 1a of the accompanying drawings shows a known straight magazine 2, which has a space 1, which is substantially C-shaped in section. Figure 1b shows a known box-shaped magazine 6 in which a sponge sheet 4 is laid on the bottom of a box 3, and a lid 5 is provided. In order to prevent the semiconductor devices from undergoing electrostatic breakdown due to static charge, the straight magazine 2 of Figure 1a is formed of an electrical conductor, such as aluminium, and an electrically conductive sponge sheet is used in the magazine of Figure 1b, so that the pins of the semiconductor devices are short-circuited.

The first magazine, however, is heavy, since it is wholly formed of aluminium. A large number of such magazines weigh a great deal and handling is difficult. Also, the cost of the magazine is high.

In the case of the box-shaped magazine, whenever electronic components are put in or taken out, the lid needs to be opened and shut. Also, since the electronic components need to be individually thrust into the electrically-conductive sponge sheet, automatic storage of components is difficult.

It is an object of this invention to provide a magazine into and from which products

can be simply put and taken, thereby overcoming the above disadvantage.

According to the present invention, there is provided a magazine including a main body and a cover, the main body having a plurality of parallel coextensive grooves of constant width on a side thereof, one set of adjacent ends of said grooves being open, the other set of adjacent ends of said grooves being closed, and the cover being arranged to be a fit over the main body so as to cover the open ends, and said side of the main body.

According to another aspect of the present invention, there is provided a method of storing electronic components in a magazine, said magazine being constructed as described above, said method including the steps of: removing the cover from the main body; sliding said components from the open ends of said grooves in said main body to the closed ends thereof, and replacing the cover over the main body.

Embodiments of the present invention will now be described, by way of example, with reference to the remaining figures of the accompanying drawings, wherein:

Figure 2 is a perspective diagram of a first magazine;

Figure 3 is a perspective diagram of a second magazine; and

Figures 4a and 4b are perspective diagrams of the cover of a third magazine.

Figure 2 illustrates a magazine embodying the present invention. As shown in the figure, the magazine 7 consists of a main body 8, and a cover 9. Five longitudinal grooves 10 separated by walls 14 are formed in the top of the main body 8. The grooves 10 are closed at one end by a vertical wall 11, whereas the other ends of the grooves 10 form openings 12 on an end face of the main body 8. Thus, an electronic component 13 can be automatically inserted into a groove 10 through an opening 12 from, for exam-

ple, an auto-handler or a printer. It is also possible to attach the magazine to the auto-handler or printer, and to load it with the electronic components via each opening 12 in succession. It is also possible to put the electronic components 13 into the grooves 10 from above.

In order to enable one to adjust the lengths of the grooves 10 in the main body 8, slots 15 are provided in the dividing walls 14 on both sides of each groove 10 near the end furthest from the opening 12. For the sake of convenience, each separating wall is provided with two slots 15 in the illustration. A plate 16 is fitted into a pair of slots 15 in the dividing walls 14 on both the sides of one groove 10. Thus, the length of the groove 10 can be adjusted. It is also possible to adjust the positions of the plates 16 so that the electronic components 13 may always be received in each groove 10 in, for example, tens, so as to facilitate counting. In this case, storage of a predetermined number of articles is achieved by admitting them until the groove 10 becomes full.

The main body 8 is made of an electrical-conductive plastics material whose electrical resistivity is $10^3 - 10^4$ ohms. cms.

On the other hand, the cover 9 is made of a transparent resin. A long passage 17 extends along the length of the cover 9 from one end face thereof. The main body 8 is inserted into the passage 17. The main body 8 can be drawn in and out only through the one end face of the cover 9.

After the main body 8 has been pulled from the cover 9, the electronic components are put in or taken out. The loading or removal of components is performed most efficiently via the openings 12. That is, an electronic component 13 is loaded or taken out by sliding it along the groove 10. As a result, the magazine 7 can be directly used as a magazine for automatic supply or removal of electronic components in a variety of jobs in, for example, an assembly test process.

If necessary, stop means may be provided on the cover and main body so as to prevent the cover from being completely withdrawn from the main body.

Since the main body is made of electrical-conductive plastics material, the pins of the electronic components placed thereon are short-circuited and electrostatic breakdown does not occur.

Since the cover of the magazine is transparent, the contents can be visually inspected conveniently.

Since the magazine is made of plastics material, it is lighter in weight and lower in cost than the prior art aluminium magazine.

Furthermore, a desired number of electronic components can be stored by adjusting the plates 16. In particular, when several

tens of components are stored in each groove, the management of the products is facilitated.

This invention is not restricted to the foregoing embodiment. For example, as shown in Figure 3, a cover 19 may be so constructed as to fit over a main body 18 from above.

Figures 4a and 4b show another cover for use in an embodiment of the present invention. Figure 4a is a perspective view of the cover. The cover 20 is formed of polyvinyl chloride, and has a thickness of about 0.5 mm. The entire surface of the cover 20 is coated with an antistatic agent, for example, 'Elecdan FFC Super' produced by Nippon Engineering Service Inc. of Japan. Side walls 25 and 26 have turned-over portions 21 and 22 which support the underside of the main body (not shown). An end wall 23 closes the open end of the main body, and an upper wall 24 closes the top. The upper wall 24 is provided with a semicircular cut-away portion 27 on one side at an open end 28, and the main body can be drawn out from the cover by employing the cut-away portion.

The main body is inserted into or removed from the cover via the open end 28. Figure 4b is an enlargement of part of Figure 4a. As is apparent from Figure 4b, the angle θ between the turned-over portion 22 and the side wall 25 is acute. This helps to produce close contact between the top of the main body and the upper plate 24 when the main body is inserted in the cover.

WHAT WE CLAIM IS:-

1. A magazine including a main body and a cover, the main body having a plurality of parallel coextensive grooves of constant width on a side thereof, one set of adjacent ends of said grooves being open, the other set of adjacent ends of said grooves being closed, and the cover being arranged to be a fit over the main body so as to cover the open ends and said side of the main body.

2. A magazine according to claim 1, wherein dividing walls separating the parallel grooves have slots therein.

3. A magazine according to claim 1 or 2, further including plates inserted in said slots, so as to partition the grooves.

4. A magazine according to any one of the preceding claims, wherein said main body is formed of electrically-conductive plastics material.

5. A magazine according to any one of the preceding claims, wherein said cover is formed of transparent plastics material, and has its surface coated with an antistatic agent.

6. A magazine according to any one of the preceding claims, wherein said cover comprises an end wall blocking off the ends

ple, an auto-handler or a printer. It is also possible to attach the magazine to the auto-handler or printer, and to load it with the electronic components via each opening 12 in succession. It is also possible to put the electronic components 13 into the grooves 10 from above.

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2. A magazine according to claim 1, wherein dividing walls separating the parallel grooves have slots therein.

3. A magazine according to claim 1 or 2, further including plates inserted in said slots, so as to partition the grooves.

4. A magazine according to any one of the preceding claims, wherein said main body is formed of electrically-conductive plastics material.

5. A magazine according to any one of the preceding claims, wherein said cover is formed of transparent plastics material, and has its surface coated with an antistatic agent.

6. A magazine according to any one of the preceding claims, wherein said cover comprises an end wall blocking off the ends



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of the grooves, and walls enclosing the main body.

7. A magazine according to claim 6, wherein said walls enclosing the main body comprise an upper, a lower and side walls, and form a passage into which the main body is inserted.

8. A magazine according to claim 6, wherein said walls enclosing the main body comprise an upper and side walls, the side walls having turned-over portions retaining the main body.

9. A magazine according to claim 8, wherein said turned-over portions are at an acute angle to and directed towards said upper wall.

10. A method of storing electronic components in a magazine, said magazine being constructed according to any one of the preceding claims, said method including the steps of: removing the cover from the main body; sliding said components from the open ends of said grooves in said main body to the closed ends thereof; and replacing the cover over the main body.

11. A magazine substantially as herein described, with reference to and as illustrated in Figure 2, Figure 3, Figure 2 as modified by Figures 4a and 4b, or Figure 3 as modified by Figures 4a and 4b of the accompanying drawings.

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