

CONTAINER FOR RETICLE

BACKGROUND OF INVENTION

1. FIELD OF INVENTION

The present invention relates to a container for a reticle.

2. RELATED PRIOR ART

The sizes of electronic products are getting smaller, the operative frequencies higher, and the performance better. Accordingly, the sizes of chips used in electronic products are getting smaller, and the performance better. The wiring in the chips is getting finer to include more circuits and elements. The width of the wiring has been reduced to 90 to 45 nanometers from 0.25 micrometers. Photolithography is the key to the success of the minimizing of the width of the wiring. In such a process, a scanner and reticles are used. The throughput of such a process would severely be affected should there be fine particles or moisture on the surfaces of such reticles or wafers. Therefore, such a process must be executed in a white room, and containers are used to protect such reticles or wafers from fine particles and moisture. Examples of such containers can be found in US Patent Nos. 4532970 and 4534389.

Referring to Fig. 1, a conventional container includes a frame 11, a base 12, a cover 13, pressing elements 14, guiding elements 15 and supporting elements 16. The frame 11 is detachably attached to the base 12. The supporting elements 16 are formed on the base 12. The frame 11 and the base 12 can be covered by the cover 13. The pressing

1 elements 14 and the guiding elements 15 are attached to an internal side
2 of the cover 13. A reticle 20 can be located on the supporting elements
3 16. A lower side of the reticle 20 is in contact with upper sides 160 of
4 the supporting elements 16. The reticle 20 is retained in position by the
5 pressing elements 14 and the guiding elements 15. The area of contact
6 of the supporting elements 16 with the reticle 20 is however large so that
7 the supporting elements 16 could easily damage the reticle 20.
8 Moreover, since the sight of reticle 20 is often hindered, the reticle 20
9 could be dropped onto the base 12 from the supporting elements 16 and
10 damaged by the base 12.

11 Disclosed in Taiwanese Patent I224719 is an apparatus for supporting
12 a reticle. The apparatus includes a base and blocks attached to the base.
13 The blocks are made of polyether ether ketone ("PEEK") for supporting
14 the reticle. Each of the blocks includes an inclined upper side for
15 guiding and restraining the reticle. The area of contact of the blocks
16 with the reticle is however too large. Moreover, the attachment of the
17 blocks to the base is not firm so that the blocks could easily be detached
18 from the base should they be subjected to a very low or high temperature.
19 Furthermore, since the sight of reticle is often hindered, the reticle could
20 be dropped onto the base from the blocks and damaged by the base.

21 The present invention is therefore intended to obviate or at least
22 alleviate the problems encountered in prior art.

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24 **SUMMARY OF INVENTION**

25 It is the primary objective of the present invention to provide a
26 container for securely containing reticles.

1 To achieve the primary objective of the present invention, a container
2 includes a base, two supporting elements attached to the base along an
3 edge of the base, two other supporting elements attached to the base along
4 an opposite edge of the base and a covering device for covering the base.
5 A flat object can be supported on the supporting elements. Each of the
6 supporting elements includes a primary rounded tooth and a shorter
7 auxiliary rounded tooth separated from the primary rounded tooth. The
8 primary rounded teeth are located further from one another than the
9 auxiliary rounded teeth are from one another.

10 Other objectives, advantages and features of the present invention
11 will become apparent from the following description referring to the
12 attached drawings.

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14 **BRIEF DESCRIPTION OF DRAWINGS**

15 The present invention will be described via detailed illustration of the
16 preferred embodiment in view of prior art referring to the drawings.

17 Fig. 1 is a side view of a conventional container for reticles.

18 Fig. 2 is an exploded view of a reticle and a container according to
19 the preferred embodiment of the present invention.

20 Fig. 3 is an exploded partial view of the container shown in Fig. 2.

21 Fig. 4 is a partial view of the container shown in Fig. 3.

22 Fig. 5 is a partial top view of the container shown in Fig. 4.

23 Fig. 6 is a cross-sectional view of the reticle and the container shown
24 in Fig. 2.

25 Fig. 7 is a partial view of the container shown in Fig. 6.

26 Fig. 8 is a side view of the container shown in Fig. 7.

1 Fig. 9 is a cross-sectional view of the reticle and the container in
2 another position than shown in Fig. 6.

3 4 **DETAILED DESCRIPTION OF PREFERRED EMBODIMENT**

5 Referring to Fig. 2, a reticle 70 can be contained in a container
6 according to the preferred embodiment of the present invention. The
7 container includes a base 50 and a covering device 60.

8 The base 50 includes two recesses 51 in an edge thereof and two
9 other recesses 51 in an opposite edge thereof.

10 Referring to Fig. 3, two strips 52 are attached to the base 50 by
11 threaded bolts inserted through apertures defined in the strips 52 and
12 engaged with nuts embedded in the base 50. Two tabs 53 are formed on
13 each of the strips 52. A restraining element 54 is extended from each of
14 the tabs 53. The pressers 54 are made of a bent shaped.

15 Referring to Figs. 4 and 5, two supporting elements 55 are attached to
16 each of the strips 52. Each of the supporting elements 55 includes a
17 primary rounded tooth 551 and an auxiliary rounded tooth 553 formed
18 thereon and separated from one another. The primary rounded teeth 551
19 are located further from one another than the auxiliary rounded teeth 553
20 are located from one another. The primary rounded tooth 551 is taller
21 than the auxiliary rounded tooth 553. The primary rounded tooth 551
22 includes an arched tip 552. The auxiliary rounded tooth 553 includes an
23 arched tip 554. The supporting elements 55 are made of a durable and
24 rigid material such as PEEK and VESPEL.

25 A block 56 is extended from each of the supporting elements 55
26 through a connector 560. The size of the connectors 560 are smaller

1 than that of the blocks 56. The blocks 56 are attached to the strips 52.
2 The supporting elements 55 are firmly attached to the strips 52 since the
3 supporting elements 55 are integrated with the blocks 56 through the
4 connectors 560.

5 A strip 58 is attached to the base 50 through fasteners. The strip 58
6 is located between the strips 52. Two tabs 59 are formed on the strip 58.

7 Referring to Figs. 2 and 6, the covering device 60 includes an
8 external cover 61 and an internal cover 65 detachably attached to the
9 external cover 61. The external cover 61 includes a handle 62 formed
10 on the top thereof and four buckles 63 formed on an edge thereof. The
11 buckles 63 are located corresponding to the recesses 51. The external
12 cover 61 is made of plastic for example.

13 The internal cover 62 is made of metal for example and used as a
14 shield against static discharge. Two pressing elements 72 are attached to
15 an internal side of the internal cover 62. Each of the pressing elements
16 72 includes a flat body, a first leg 66 extended from an edge of the flat
17 body and a second leg 67 extended from another edge of the flat body.

18 Two pressing elements 74 are attached to the internal side of the
19 internal cover 62. The pressing elements 74 are identical to the pressing
20 elements 72 except including an extensive portion extended from the flat
21 body and a third leg 68 extended from the extensive portion.

22 Referring to Figs. 6 and 7, the reticle 70 is located on the primary
23 rounded teeth 551 of the supporting elements 55. The weight of the
24 reticle 70 is evenly exerted on the supporting elements 55.

25 The buckles 312 are inserted in the recesses 22 to make sure that the
26 external cover 31 is firmly attached to the base 2.

1 During the mount of the covering device 3 on the base 2, an edge of
2 the reticle 70 is pushed by the third legs 68 so that an opposite edge of the
3 reticle 70 is abutted against the tabs 59. Two other edges of the reticle
4 70 are pressed by the second legs 67 and restrained by the restraining
5 elements 54 (Fig. 8). Thus, the horizontal position of the reticle 70 is
6 retained. The top of the reticle 70 is pressed by the first legs 66 so that
7 the vertical position of the reticle 70 is retained. The first legs 66 are
8 used independent of the second legs 67.

9 Referring to Fig. 9, during the locating of the reticle 70 onto the
10 supporting elements 55 or the removing of the covering device 60 from
11 the base 50, the reticle 70 might be dropped from the primary rounded
12 teeth 551 of some of the supporting elements 55. Fortunately, the reticle
13 70 are very likely to be dropped onto the auxiliary rounded teeth 553 of
14 the same supporting elements 55.

15 The primary advantage of the container according to the present
16 invention is the limited area of contact with the reticle.

17 The present invention has been described via the detailed illustration
18 of the preferred embodiment. Those skilled in the art can derive
19 variations from the preferred embodiment without departing from the
20 scope of the present invention. Therefore, the preferred embodiment
21 shall not limit the scope of the present invention defined in the claims.

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1 **CLAIMS**

- 2 1. A container comprising:
- 3 a base;
- 4 two supporting elements attached to the base along an edge of the
- 5 base and two other supporting elements attached to the base along an
- 6 opposite edge of the base so that a flat object can be supported on the
- 7 supporting elements, wherein each of the supporting elements
- 8 comprises a primary rounded tooth and a shorter auxiliary rounded
- 9 tooth separated from the primary rounded tooth so that the primary
- 10 rounded teeth are located further from one another than the auxiliary
- 11 rounded teeth are from one another; and
- 12 a covering device for covering the base.
- 13 2. The container according to claim 1, wherein the supporting elements
- 14 are made of a material selected from a group consisting of polyether
- 15 ether ketone and VESPEL.
- 16 3. The container according to claim 1, wherein each of the primary and
- 17 auxiliary rounded teeth comprises an arched tip for contact with the
- 18 flat object in a small area.
- 19 4. The container according to claim 1 comprising two lateral strips
- 20 attached to the base, wherein two of the supporting elements are
- 21 attached to one of the lateral strips while the other supporting
- 22 elements are attached to the other lateral strip.
- 23 5. The container according to claim 4 comprising a block extended from
- 24 each of the supporting elements and attached to a related one of the
- 25 lateral strips so that the supporting elements are firmly attached to the
- 26 base.

- 1 6. The container according to claim 5 comprising a reduced connector
2 formed between each of the blocks and a related one of the supporting
3 elements.
- 4 7. The container according to claim 6 comprising a middle strip attached
5 to the base between the lateral strips, wherein each of the middle and
6 lateral strips comprises at least one tab for restraining the flat object.
- 7 8. The container according to claim 7 comprising a restraining element
8 extended from the tab of each of the lateral strips.
- 9 9. The container according to claim 1, wherein the covering device
10 comprises at least two buckles located opposite to each other, and the
11 base comprises at least two recesses for receiving the buckles.
- 12 10. The container according to claim 1, wherein the covering device
13 comprises an external cover and an internal cover attached to the
14 external cover.

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