

TITLE OF THE INVENTION

Resin Molded Product Manufacturing Apparatus, Resin Molding System, and Resin Molded Product Manufacturing Method

BACKGROUND OF THE INVENTION

5 Field of the Invention

The present invention relates to a resin molded product manufacturing apparatus, a resin molding system, and a resin molded product manufacturing method.

Description of the Background Art

10 For example, Japanese Patent Laying-Open No. 2017-132108 discloses a resin molded product manufacturing apparatus in which an upper platen is not increased in thickness or a reinforcing component is not added or the like to enhance the upper platen in rigidity; rather, a base portion of the upper platen other than a mold attaching portion to which an upper mold chase is attached is reduced in thickness to enhance a mold chase mating surface in planarity in clamping mold chases together.

15 SUMMARY OF THE INVENTION

The resin molded product manufacturing apparatus disclosed in Japanese Patent Laying-Open No. 2017-132108, however, cannot enhance the upper platen in rigidity as the upper platen is reduced in thickness.

20 Although neither described nor suggested in Japanese Patent Laying-Open No. 2017-132108, a resin molded product may be manufactured by using a resin molded product manufacturing apparatus in which a mold chase holder that holds an upper mold chase is attached to an upper platen and a mold chase holder that holds a lower mold chase is attached to a lower platen. When this resin molded product manufacturing apparatus has the upper and lower mold chases clamped together, 25 pressure is applied, which deforms the upper and lower platens, and as the platens are deformed, the mold chase holders respectively attached to the platens are also deformed accordingly.

When resin molding is performed using the mold chases attached to the deformed mold chase holders, the resultant resin molded product may have a large

variation in thickness and be a defective product. In particular, when the resin molded product manufacturing apparatus described in Japanese Patent Laying-Open No.

2017-132108 with a mold chase holder attached thereto is used to manufacture a resin molded product, the upper platen does not have a large rigidity, and accordingly, it is
 5 believed that the mold chase holder that holds the upper mold chase is significantly deformed, resulting in a resin molded product having a larger variation in thickness.

According to an embodiment disclosed herein, there can be provided a resin molded product manufacturing apparatus comprising: a first platen; a first mold chase holder provided on the first platen and configured to hold a first mold chase; a second
 10 platen spaced from the first platen and facing the first platen; and a second mold chase holder provided on the second platen and configured to hold a second mold chase, a notch being provided on a side of the first platen closer to the second platen, a thickness of the first platen at an outer end portion of the notch being smaller than a thickness of the first platen at an inner end portion of the notch.

15 According to an embodiment disclosed herein, there can be provided a resin molding system comprising the above resin molded product manufacturing apparatus.

According to an embodiment disclosed herein, there can be provided a resin molded product manufacturing method using the above resin molded product manufacturing apparatus, comprising: disposing a support member on the first mold
 20 chase; supplying a resin material to a cavity of the second mold chase; and clamping the first mold chase and the second mold chase together.

The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

25 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic elevation of a resin molded product manufacturing apparatus according to an embodiment.

Fig. 2 is a schematic enlarged elevation of the resin molded product manufacturing apparatus shown in Fig. 1.

Fig. 3 is a view for illustrating how a resin molded product manufacturing apparatus has first and second platens deformed.

Fig. 4 is a view for illustrating how a resin molded product manufacturing apparatus has first and second platens deformed.

5 Fig. 5 shows a location in the first platen where stress is concentrated when mold chases are clamped together according to an embodiment.

Fig. 6 is a schematic elevation of the first platen in an exemplary variation.

Fig. 7 is a schematic cross section for illustrating a part of a process of a resin molded product manufacturing method of an embodiment.

10 Fig. 8 is a schematic cross section for illustrating a part of the process of the resin molded product manufacturing method of the embodiment.

Fig. 9 is a schematic cross section for illustrating a part of the process of the resin molded product manufacturing method of the embodiment.

Fig. 10 is a schematic plan view of a resin molding system of an embodiment.

15 Fig. 11 is a schematic cross section for illustrating a part of the process of the resin molded product manufacturing method of the embodiment.

Fig. 12 is a schematic cross section for illustrating a part of the process of the resin molded product manufacturing method of the embodiment.

20 Fig. 13 is a schematic elevation for illustrating a part of a process of a resin molded product manufacturing method of an embodiment.

Fig. 14 is a schematic cross section for illustrating a part of the process of the resin molded product manufacturing method of the embodiment.

Fig. 15 is a schematic cross section for illustrating a part of the process of the resin molded product manufacturing method of the embodiment.

25 Fig. 16 is a schematic elevation of a resin molded product manufacturing apparatus according to an embodiment in an exemplary variation.

Fig. 17 is a schematic enlarged cross section of the resin molded product manufacturing apparatus shown in Fig. 16.

Fig. 18 is a schematic perspective view of a resin molded product

manufacturing apparatus according to a comparative example.

Fig. 19 is a schematic perspective view of a resin molded product manufacturing apparatus according to a first example.

5 Fig. 20 is a schematic perspective view of a resin molded product manufacturing apparatus according to a second example.

Fig. 21 is a schematic perspective view of a resin molded product manufacturing apparatus according to a third example.

Fig. 22 is a schematic perspective view of a resin molded product manufacturing apparatus according to a fourth example.

10 Fig. 23 is a schematic perspective view of a resin molded product manufacturing apparatus according to a fifth example.

Fig. 24 is a schematic perspective view of a resin molded product manufacturing apparatus according to a sixth example.

15 Fig. 25 is a schematic perspective view of a resin molded product manufacturing apparatus according to a seventh example.

Fig. 26 shows a result of a simulation in which the resin molded product manufacturing apparatus of the fourth example has attached thereto a second platen increased in thickness at a portion to which the second mold chase holder is attached and pressure is applied.

20 DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, an embodiment will be described. In the drawings used for describing the embodiment, the same reference characters denote the same parts or corresponding parts.

25 Fig. 1 is a schematic elevation of a resin molded product manufacturing apparatus according to an embodiment. A resin molded product manufacturing apparatus 1 according to the embodiment includes a first platen 11, a second platen 12, and a third platen 13. One end of a press frame 17 extending vertically upward from third platen 13 is fixed to each of opposite ends of third platen 13, and the other end of press frame 17 is fixed to each of opposite ends of first platen 11. It should be noted

that first platen 11, third platen 13 and press frame 17 may be integrally formed as, for example, a casting.

Between first platen 11 and third platen 13, second platen 12 is attached to press frame 17 so as to be movable vertically upward and vertically downward. In a region of third platen 13 between press frames 17, a drive mechanism 16 configured to allow second platen 12 to be movable vertically upward and downward is provided. In the present embodiment, first platen 11 is fixed, and accordingly, second platen 12 is adapted to be movable relative to first platen 11.

A first mold chase holder 14 configured to hold a first mold chase (not shown) is attached on a vertically lower side of first platen 11. A second mold chase holder 15 configured to hold a second mold chase (not shown) is attached on a vertically upper side of second platen 12.

Fig. 2 is a schematic enlarged elevation of the resin molded product manufacturing apparatus shown in Fig. 1. Resin molded product manufacturing apparatus 1 shown in Fig. 2 is characterized in that first platen 11 has a lower surface with a notch 123 and an upper surface with an inclined surface 121 and a step 122.

In the resin molded product manufacturing apparatus shown in Fig. 2, a vertical thickness a of first platen 11 at an outer end portion 124 of notch 123 is smaller than a vertical thickness b of first platen 11 at an inner end portion 125 of notch 123. In the present embodiment, thickness a of first platen 11 at outer end portion 124 of notch 123 means thickness a from outer end portion 124 of notch 123 of a lower surface of first platen 11 to an upper surface of first platen 11. Further, in the present embodiment, thickness b of first platen 11 at inner end portion 125 of notch 123 means thickness b from inner end portion 125 of notch 123 of the lower surface of first platen 11 to the upper surface of first platen 11.

In the resin molded product manufacturing apparatus shown in Fig. 2, notch 123 can be configured to surround first mold chase holder 14, for example. Further, in the resin molded product manufacturing apparatus shown in Fig. 2, inclined surface 121 can be configured to extend from step 122 outward and obliquely downward, for

example.

When a resin molded product manufacturing apparatus having first platen 11 without notch 123 for example has drive mechanism 16 which is a linear motion mechanism, and has the mold clamped, then, as shown in the schematic cross section shown in Fig. 3, first platen 11 and second platen 12 may receive pressure locally at their respective centers from first mold chase holder 14 and second mold chase holder 15 and may be deformed to be convex upward. When a resin molded product manufacturing apparatus having first platen 11 without notch 123 for example has drive mechanism 16 which is a toggle link mechanism, and has the mold clamped, then, as shown in the schematic cross section shown in Fig. 4, first platen 11 receives stress at the center from first mold chase holder 14 and second platen 12 receives stress at an outer side, and accordingly, first platen 11 may be deformed to be convex upward and second platen 12 may be deformed to be convex downward.

In the present embodiment, in contrast, first platen 11 is provided with notch 123, and thickness a of first platen 11 at outer end portion 124 of notch 123 is smaller than thickness b of first platen 11 at inner end portion 125 of notch 123. In that case, when the mold chases are clamped together, and first platen 11 receives a stress from first mold chase holder 14, the stress can be relieved at the portion of first platen 11 having thickness a that is relatively small, and first platen 11 can also be kept rigid by the portion of first platen 11 located over an attachment portion 20 for first mold chase holder 14 and having thickness b that is relatively large. Thus the stress applied to first platen 11 when the mold chases are clamped together can be concentrated at a side outer than attachment portion 20 for first mold chase holder 14 (for example, a portion surrounded by a circle shown in Fig. 5), which can suppress deformation of attachment portion 20 of first platen 11 for first mold chase holder 14 when the mold chases are clamped together. This allows a resin molded product to be manufactured with further less variation in thickness, as will be described hereinafter. Note that inner end portion 125 of notch 123 corresponds to an end portion of attachment portion 20 of first platen 11 for first mold chase holder 14.

Furthermore, first platen 11 having inclined surface 121 allows the mold chases to be clamped together while first platen 11 receives stress at inclined surface 121, and first platen 11 having inclined surface 121 can thus distribute to another portion the stress received by first platen 11 when the mold chases are clamped together, which can
 5 further suppress deformation of attachment portion 20 of first platen 11 for first mold chase holder 14.

Furthermore, as shown in Fig. 6 and Japanese Patent Laying-Open No. 2017-132108, Figs. 1 and 2, it is also possible to provide only step 122, rather than inclined surface 121, on the upper surface of first platen 11. This case can also
 10 provide an effect similar to the above effect when thickness a of first platen 11 at outer end portion 124 of notch 123 is smaller than thickness b of first platen 11 at inner end portion 125 of notch 123. Thus, first platen 11 may have an upper surface with inclined surface 121 alone, step 122 alone, or both inclined surface 121 and step 122.

As shown in the schematic cross section shown in Fig. 7, first mold chase
 15 holder 14 comprises a first heat insulating member 22 on a side closer to first platen 11 and also comprises in a first heater plate 23 provided on a side closer to second platen 12 a first mold chase holder heater 25 configured to heat a first mold chase 41. Further, first mold chase holder 14 further comprises a first plate 21 on a side closer to first platen 11 than first heat insulating member 22, and also comprises a first side wall
 20 24 extending vertically downward from a peripheral edge of first heater plate 23. In the present embodiment, first heater plate 23 incorporates four first mold chase holder heaters 25 spaced from one another and extending in a horizontal direction.

Second mold chase holder 15 comprises a second heat insulating member 32 on a side closer to second platen 12 and also comprises in a second heater plate 33
 25 provided on a side closer to first platen 11 a second mold chase holder heater 35 configured to heat a second mold chase 42. Further, second mold chase holder 15 further comprises a second plate 31 on a side closer to second platen 12 than second heat insulating member 32, and also comprises a second side wall 34 extending vertically upward from a peripheral edge of second heater plate 33. In the present

embodiment, second heater plate 33 incorporates four second mold chase holder heaters 35 spaced from one another and extending in a horizontal direction.

Hereinafter, with reference to Figs. 7 to 15, a resin molded product manufacturing method according to an embodiment, which is an example of a resin molded product manufacturing method by using resin molded product manufacturing apparatus 1 according to an embodiment, will be described. Initially, as shown in the schematic cross section shown in Fig. 7, a first mold chase 41 is fixed on first heater plate 23 of first mold chase holder 14 and a second mold chase 42 is fixed on second heater plate 33 of second mold chase holder 15. A cavity 43 is provided on a side of second mold chase 42 closer to first mold chase 41.

Subsequently, as shown in the schematic cross section shown in Fig. 8, a mold release film 52 is placed so as to cover cavity 43 of second mold chase 42.

Subsequently, by vacuuming a space inside cavity 43 covered with mold release film 52, as shown in the schematic cross section shown in Fig. 9, mold release film 52 is brought into close contact with a surface of second mold chase 42 defining cavity 43.

Subsequently, from a support member supply device 201 of a supply module 1001 of a resin molding system 1000 of the embodiment shown in a schematic plan view shown in Fig. 10, a support member 51, which is an object to be molded by resin molding, is supplied on an upper side of a transport mechanism 301.

Support member 51 can include, for example, a lead frame, a substrate, an interposer, a semiconductor substrate (such as a silicon wafer), a metal substrate, a glass substrate, a ceramic substrate, a resin substrate, a wired substrate, and the like that can support a semiconductor chip, a chip-shaped electronic component, or a film (including a conductive film, an insulating film, a semiconductor film, and the like).

Further, support member 51 is not particularly limited in shape, and support member 51 may have, for example, a circular or quadrangular surface. In addition, support member 51 may or may not include wiring. In addition, support member 51 includes a carrier of a plate-shaped member used for FO-WLP (fan out wafer level package) or FO-PLP (fan out panel level package).

Subsequently, transport mechanism 301 supplied with support member 51 moves along a rail 401 provided in supply module 1001 for movement in a first direction, in which the rail extends, and thus reaches a resin material supply device 202.

5 Subsequently, resin material supply device 202 supplies a resin material 61 to a lower side of transport mechanism 301 so that transport mechanism 301 holds a solid matter of resin material 61 under transport mechanism 301. Accordingly, at this stage, transport mechanism 301 holds support member 51 on the upper side and holds resin material 61 on the lower side.

10 Subsequently, with support member 51 held on the upper side and resin material 61 held on the lower side, transport mechanism 301 moves in a second direction, which is a direction perpendicular to the first direction, along a rail 402 provided for movement in the second direction, and reaches a resin sealing module 1002 of resin molding system 1000. Transport mechanism 301 that has reached resin sealing module 1002 moves in the first direction along a rail 403 provided for movement in the first direction and thus reaches resin molded product manufacturing apparatus 1 of the embodiment. While Fig. 10 shows four resin sealing modules 1002, this is not a limitation, and the number of resin sealing modules 1002 can be increased or decreased.

20 Subsequently, as shown in the schematic cross section shown in Fig. 11, support member 51 is moved from transport mechanism 301 to first mold chase 41, and resin material 61 is supplied from transport mechanism 301 onto mold release film 52 closely attached to second mold chase 42. In the present embodiment, support member 51 including a semiconductor substrate 51a and a semiconductor chip 51b on semiconductor substrate 51a is used.

25 Subsequently, first mold chase 41 is heated by first mold chase holder heater 25 of first heater plate 23 and second mold chase 42 is heated by second mold chase holder heater 35 of second heater plate 33. Note that as second mold chase holder heater 35 heats second mold chase 42, resin material 61 is melted, and, as shown in the schematic cross section shown in Fig. 12, a flowable resin 71 is produced.

Subsequently, as shown in the schematic elevation shown in Fig. 13, second platen 12 is moved vertically upward to clamp first mold chase 41 and second mold chase 42 together. This brings flowable resin 71 into contact with a surface of support member 51, as shown in the schematic cross section shown in Fig. 14.

5 Subsequently, after flowable resin 71 is set, second platen 12 is moved vertically downward. As a result, as shown in the schematic cross section shown in Fig. 15, support member 51 has a surface sealed with a set resin 81, that is, a resin molded product 82 is manufactured.

10 Resin molded product 82 manufactured as described above is transported from resin molded product manufacturing apparatus 1 by transport mechanism 301 shown in Fig. 10. Then, transport mechanism 301 holding resin molded product 82 moves to rail 402 along rail 403 provided in resin sealing module 1002. Then, transport mechanism 301 moves along rail 402 in the second direction to a storage module 1003 of resin molding system 1000 of the embodiment. Transport mechanism 301 that has
15 reached storage module 1003 moves to a resin molded product storage device 203 along a rail 404 provided in storage module 1003 for movement in the first direction. Thereafter, resin molded product 82 is stored from transport mechanism 301 to resin molded product storage device 203.

20 Fig. 16 is a schematic elevation of a resin molded product manufacturing apparatus according to an embodiment in an exemplary variation. Resin molded product manufacturing apparatus 1 shown in Fig. 16 is characterized by comprising an intermediate plate 91 between first platen 11 and second platen 12, a third mold chase holder 93 provided on a side of intermediate plate 91 closer to first platen 11 and configured to hold a third mold chase (not shown), and a fourth mold chase holder 94
25 provided on a side of intermediate plate 91 closer to second platen 12 and configured to hold a fourth mold chase (not shown).

Fig. 17 is a schematic enlarged cross section of resin molded product manufacturing apparatus 1 shown in Fig. 16. Third mold chase holder 93 comprises a third heat insulating member 102 on a side closer to intermediate plate 91 and also

comprises in a third heater plate 103 provided on a side closer to first platen 11 a third mold chase holder heater 105 configured to heat a third mold chase 96 having a cavity 97. Further, third mold chase holder 93 further comprises a third plate 101 on a side closer to intermediate plate 91 than third heat insulating member 102, and also

5 comprises a third side wall 104 extending vertically upward from a peripheral edge of third heater plate 103. In the present embodiment, third heater plate 103 includes four third mold chase holder heaters 105 spaced from one another and extending in a horizontal direction.

Fourth mold chase holder 94 comprises a fourth heat insulating member 112 on

10 a side closer to intermediate plate 91 and also comprises in a fourth heater plate 113 provided on a side closer to second platen 12 a fourth mold chase holder heater 115 configured to heat a fourth mold chase 98. Further, fourth mold chase holder 94 comprises a fourth plate 111 on a side closer to intermediate plate 91 than fourth heat insulating member 112, and also comprises a fourth side wall 114 extending vertically

15 downward from a peripheral edge of fourth heater plate 113. In the present embodiment, fourth heater plate 113 includes four fourth mold chase holder heaters 115 spaced from one another and extending in a horizontal direction.

[Examples]

<Comparative Example>

20 Fig. 18 is a schematic perspective view of a resin molded product manufacturing apparatus according to a comparative example in another exemplary variation. The resin molded product manufacturing apparatus of the comparative example shown in Fig. 18 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 2 in that first platen 11 has a flat upper

25 surface and thickness a of first platen 11 at outer end portion 124 of notch 123 is equal to thickness b of first platen 11 at inner end portion 125 of notch 123.

<Example 1>

Fig. 19 is a schematic perspective view of a resin molded product manufacturing apparatus according to example 1. The resin molded product

manufacturing apparatus of example 1 shown in Fig. 19 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 2 in that first platen 11 has an upper surface without inclined surface 121 and instead has an upper surface with step 122.

5 <Example 2>

Fig. 20 is a schematic perspective view of a resin molded product manufacturing apparatus according to example 2. The resin molded product manufacturing apparatus of example 2 shown in Fig. 20 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 2 in that first
10 platen 11 has an upper surface without step 122 and instead has an upper surface with an excavation 127.

 <Example 3>

Fig. 21 is a schematic perspective view of a resin molded product manufacturing apparatus according to example 3. The resin molded product manufacturing apparatus of example 3 shown in Fig. 21 is different from resin molded
15 product manufacturing apparatus 1 of example 2 shown in Fig. 20 in that first platen 11 has an upper surface provided with step 122 rather than inclined surface 121.

 <Example 4>

Fig. 22 is a schematic perspective view of a resin molded product manufacturing apparatus according to example 4. The resin molded product manufacturing apparatus of example 4 shown in Fig. 22 is different from resin molded
20 product manufacturing apparatus 1 of the embodiment shown in Fig. 2 in that first platen 11 is increased in thickness.

 <Example 5>

Fig. 23 is a schematic perspective view of a resin molded product manufacturing apparatus according to example 5. The resin molded product manufacturing apparatus of example 5 shown in Fig. 23 is different from resin molded
25 product manufacturing apparatus 1 of example 2 shown in Fig. 20 in that first platen 11 has an upper surface without excavation 127.

<Example 6>

Fig. 24 is a schematic perspective view of a resin molded product manufacturing apparatus according to example 6. The resin molded product manufacturing apparatus of example 6 shown in Fig. 24 is different from resin molded product manufacturing apparatus 1 of example 4 shown in Fig. 22 in that first platen 11 has an upper surface with excavation 127.

<Example 7>

Fig. 25 is a schematic perspective view of a resin molded product manufacturing apparatus according to example 7. The resin molded product manufacturing apparatus of example 7 shown in Fig. 25 is different from resin molded product manufacturing apparatus 1 of example 4 shown in Fig. 22 in that first platen 11 has an upper surface provided with two cylindrical protrusions 126.

<Evaluation>

Table 1 below shows a result of a simulation indicating a difference in thickness (or variation in thickness) between a thickest portion of first platen 11 at attachment portion 20 for first mold chase holder 14 (a maximum value) and a thinnest portion of first platen 11 at attachment portion 20 for first mold chase holder 14 (a minimum value) when the resin molded product manufacturing apparatuses of the comparative example and examples 1, 4 and 7 shown in Figs. 18-25 have their first platens 11s subjected to a pressure of a force of 18 tons exerted from below.

In Table 1 at a column of "maximum value" is indicated a thickness of a thickest portion of first platen 11 at attachment portion 20 for first mold chase holder 14 (a maximum value) in millimeters when first platen 11 experiences pressure as described above. In Table 1 at a column of "minimum value" is indicated a thickness of a thinnest portion of first platen 11 at attachment portion 20 for first mold chase holder 14 (a minimum value) in millimeters when first platen 11 experiences pressure as described above. In Table 1 at a column of "difference" is indicated a difference between the maximum value and the minimum value (or variation in thickness) in millimeters. Further, in table 1 at a column of "relationship between a and b" is

indicated a relationship in magnitude between thickness a of first platen 11 at outer end portion 124 of notch 123 and thickness b of first platen 11 at inner end portion 125 of notch 123 before first platen 11 experiences pressure as described above.

Table 1

	thickness of attachment portion for first chase holder (mm)			relationship between a and b
	maximum value	minimum value	difference	
comparative example 1	0.11172	0.12081	0.00909	$a = b$
example 1	0.11589	0.12484	0.00895	$a < b$
example 4	0.10866	0.11721	0.00855	$a < b$
example 7	0.10943	0.11824	0.00881	$a < b$

5

As shown in Table 1, it has been confirmed that when the resin molded product manufacturing apparatuses of examples 1, 4 and 7 with thickness a of first platen 11 at outer end portion 124 of notch 123 being smaller than thickness b of first platen 11 at inner end portion 125 of notch 123 before first platen 11 experiences pressure as described above are compared with the resin molded product manufacturing apparatus of the comparative example, the former can reduce a difference in thickness (or variation in thickness) between a thickest portion of first platen 11 at attachment portion 20 for first mold chase holder 14 (a maximum value) and a thinnest portion of first platen 11 at attachment portion 20 for first mold chase holder 14 (a minimum value) when first platen 11 experiences pressure as described above.

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Thus, when the resin molded product manufacturing apparatuses of examples 1, 4 and 7 are compared with that of the comparative example, it is believed that the former can suppress deformation of first platen 11 at attachment portion 20 for first mold chase holder 14 when clamping the mold and thus manufacture a resin molded product with reduced variation in thickness.

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Further, as is apparent from comparing the resin molded product manufacturing

apparatus of example 4 with those of examples 1 and 7, it has been confirmed that deformation of first platen 11 when it experiences pressure as described above can be more suppressed when first platen 11 at attachment portion 20 for first mold chase holder 14 has larger thickness. Thus, when the resin molded product manufacturing apparatus of example 4 is compared with those of examples 1 and 7, it is believed that the former can manufacture a resin molded product with further reduced variation in thickness.

Fig. 26 shows a result of a simulation in which the resin molded product manufacturing apparatus of example 4 has attached thereto second platen 12 which is increased in thickness at an attachment portion for second mold chase holder 15 and second platen 12 is subjected to pressure in the same manner as described above.

As shown in Fig. 26, it has been confirmed that the resin molded product manufacturing apparatus of example 4 with second platen 12 increased in thickness at the attachment portion for the second mold chase holder 15 from 232.5 mm to 382.7 mm has second platen 12 with a variation in thickness reduced from 0.012 mm to 0.008 mm at the attachment portion for the second mold chase holder 15, and can thus suppress deformation of second platen 12 when it experiences pressure as described above. Thus it is believed that this case also allows a resin molded product to be manufactured with further reduced variation in thickness.

Further, as an exemplary variation of the resin molding system of the embodiment shown in Fig. 10, an embodiment can be indicated as an example in which storage module 1003 is not employed and resin molded product storage device 203 is provided in supply module 1001. In that case, a single transport mechanism can supply support member 51 from supply module 1001 to resin sealing module 1002, and store resin molded product 82 manufactured by resin molded product manufacturing apparatus 1 to resin molded product storage device 203 in supply module 1001.

Further, as an exemplary variation of the resin molding system of the embodiment shown in Fig. 10, an embodiment can also be indicated as an example in which resin material supply device 202 is provided in storage module 1003. In that

case, a transport mechanism (not shown) can collectively supply mold release film 52 and resin material 61 from storage module 1003 to resin molded product manufacturing apparatus 1 installed in resin sealing module 1002, and recover mold release film 52 after resin molded product 82 is manufactured by resin molded product manufacturing apparatus 1.

While embodiments and examples have thus been described, it is also initially planned to combine the configuration of each embodiment and that of each example described above with another, as appropriate.

While embodiments of the present invention have been described, it should be understood that the embodiments disclosed herein have been described for the purpose of illustration only and in a non-restrictive manner in any respect. The scope of the present invention is defined by the terms of the claims, rather than the description above, and is intended to include any modifications within the meaning and scope equivalent to the terms of the claims.

INDUSTRIAL APPLICABILITY

An embodiment disclosed herein can provide a resin molded product manufacturing apparatus, a resin molding system, and a resin molded product manufacturing method.

WHAT IS CLAIMED IS:

1. A resin molded product manufacturing apparatus comprising:
 - a first platen;
 - a first mold chase holder provided on the first platen and configured to hold a first mold chase;
 - 5 a second platen spaced from the first platen and facing the first platen; and
 - a second mold chase holder provided on the second platen and configured to hold a second mold chase,
 - a notch being provided on a side of the first platen closer to the second platen,
 - a thickness of the first platen at an outer end portion of the notch being smaller
 - 10 than a thickness of the first platen at an inner end portion of the notch.
2. The resin molded product manufacturing apparatus according to claim 1, wherein an inclination is provided on a side of the first platen opposite to the second platen.
3. The resin molded product manufacturing apparatus according to claim 1 or 2, wherein at least one of a step and an excavation is provided on a side of the first platen opposite to the second platen.
4. The resin molded product manufacturing apparatus according to any one of claims 1 to 3, further comprising:
 - an intermediate plate between the first platen and the second platen;
 - a third mold chase holder provided on a side of the intermediate plate closer to
 - 5 the first platen and configured to hold a third mold chase; and
 - a fourth mold chase holder provided on a side of the intermediate plate closer to the second platen and configured to hold a fourth mold chase.

5. A resin molding system comprising a resin molded product manufacturing apparatus according to any one of claims 1 to 4.

6. A resin molded product manufacturing method using a resin molded product manufacturing apparatus according to any one of claims 1 to 4, comprising:

disposing a support member on the first mold chase;

supplying a resin material to a cavity of the second mold chase; and

5 clamping the first mold chase and the second mold chase together.