

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. 11-74297 discloses a resin
molding apparatus and a resin molded product manufacturing method comprising a
heater-equipped platen to compress and heat a mounted lead frame of an electronic
device comprising a stack of thermoplastic plastic sheets to seal the electronic device.

SUMMARY OF THE INVENTION

15 The resin molding apparatus described in Japanese Patent Laying-Open No.
11-74297 is predicated on that a mold chase of a mold or the like is not used, and
accordingly, the document neither describes nor suggests using a mold chase holder for
holding a mold chase. However, a resin molding apparatus which uses a mold chase
to perform resin molding may have a mold chase holder attached to a platen to hold the
mold chase. The mold chase holder is attached to the platen to hold the mold chase
20 and also comprises a heater to heat the mold chase.

When heating the mold chase, if heat is conducted from the mold chase holder
to the platen, the platen may have parts thermally expanded and as a result the platen
may be deformed. Accordingly, to prevent conduction of heat to the platen, the mold
chase holder comprises a heat insulating member on a side of the heater closer to the
25 platen.

However, as a result of a diligent study done by the present inventors, it has
been found that even the heat insulating member of the mold chase holder cannot
completely prevent conduction of heat from a heater plate to the platen, and that the
platen is deformed by the heat conducted to the platen, and as the platen is deformed,

the mold chase holder is also deformed.

When resin molding is performed using the mold chase attached to the deformed mold chase holder, the resultant resin molded product may have a large variation in thickness and be a defective product.

5 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; and a second platen spaced from the first platen and facing the first platen, the first mold chase holder comprising a first heat insulating member on a side closer to the first
10 platen and also comprising on a side closer to the second platen a first mold chase holder heater configured to heat the first mold chase, the first platen comprising a first platen heater configured to heat the first platen.

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

15 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 chase; supplying a resin material to a cavity of the second mold chase; heating the support member; heating the resin material; clamping the first mold chase and the
20 second mold chase together; and heating the first platen with the first platen heater.

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.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Fig. 2 is a schematic perspective view of a first mold chase holder and a second mold chase holder shown in Fig. 1.

Fig. 3 is a schematic cross section for illustrating a part of a process of a resin

molded product manufacturing method of the embodiment.

Fig. 4 is a schematic cross section for illustrating a part of the process of the resin molded product manufacturing method of the embodiment.

5 Fig. 5 is a schematic cross section for illustrating a part of the process of the resin molded product manufacturing method of the embodiment.

Fig. 6 is a schematic plan view of a resin molding system of an embodiment.

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 elevation for illustrating a part of a process of a resin molded product manufacturing method of an embodiment.

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

Figs. 12(a) to 12(c) are diagrams showing a result of measuring variation in thickness of a resin molded product manufactured in the resin molded product manufacturing method according to the embodiment.

20 Figs. 13(a) to 13(c) are diagrams showing a result of measuring variation in thickness of a resin molded product of a reference example.

Fig. 14 is a schematic elevation of a resin molded product manufacturing apparatus according to an embodiment in an exemplary variation.

25 Fig. 15 is a schematic enlarged cross section of the resin molded product manufacturing apparatus shown in Fig. 14.

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

Fig. 17 represents a temperature distribution of the Fig. 16 resin molded product manufacturing apparatus when a resin molded product is manufactured by heating a

first platen with a first platen heater.

Fig. 18 represents a temperature distribution of a resin molded product of the reference example when the resin molded product is manufactured in the same manner as in the case shown in Fig. 17, except that the first platen is not heated with the first
5 platen heater.

Fig. 19 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

Fig. 20 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

10 Fig. 21 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

Fig. 22 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

15 Fig. 23 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

Fig. 24 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

Fig. 25 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

20 Fig. 26 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

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
25 corresponding parts.

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.

5 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
10 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. A first platen heater 18 configured to heat first platen 11 is
15 incorporated in first platen 11. A second platen heater 19 configured to heat second platen 12 is incorporated in second platen 12. In the present embodiment, first platen heater 18 and second platen heater 19 extend in the direction of a normal to the plane of the sheet of Fig. 1. While in the present embodiment second platen heater 19 is positioned to be outer than first platen heater 18, second platen heater 19 may be
20 positioned to face first platen heater 18 or be inner than first platen heater 18. It suffices that a position where second platen heater 19 faces first platen heater 18 is such that when it is assumed that resin molded product manufacturing apparatus 1 has its interior seen through at a bottom surface of third platen 13 in the direction of a normal to the bottom surface of third platen 13, at least a part of second platen heater 19
25 overlaps at least a part of first platen heater 18.

 Fig. 2 is a schematic perspective view of first mold chase holder 14 and second mold chase holder 15 shown in Fig. 1. First mold chase 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 (not shown). 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 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 provided on a side closer to first platen 11 a second mold chase holder heater 35 configured to heat a second mold chase (not shown). 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 heat insulating member 32. 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. 3 to 11, 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. 3, 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. 4, 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. 5, 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. 6, 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, and a semiconductor film). 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 may include 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.

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.

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. 6 shows four resin sealing modules 1002, this is not a

limitation, and the number of resin sealing modules 1002 can be increased or decreased.

Subsequently, as shown in the schematic cross section shown in Fig. 7, 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.

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. At the time, first platen 11 is heated by first platen heater 18. 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. 8, a flowable resin 71 is produced.

Subsequently, as shown in the schematic elevation shown in Fig. 9, 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. 10.

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. 11, support member 51 has a surface sealed with a set resin 81, that is, a resin molded product 82 is manufactured.

Resin molded product 82 manufactured as described above is transported from resin molded product manufacturing apparatus 1 by transport mechanism 301 shown in Fig. 6. 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 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.

5 Figs. 12(a) to 12(c) are diagrams showing a result of measuring variation in thickness of resin molded product 82 manufactured in the resin molded product manufacturing method according to the embodiment. Fig. 12(a) shows a result of measuring variation in thickness of a surface of resin molded product 82 divided by three rows a to c and five columns A to E into 15 regions.

10 Fig. 12(a) indicates values, which indicate an increase/decrease in thickness of resin molded product 82 in each of the 15 regions when resin molded product 82 is measured in thickness in each of the 15 regions and an average value thereof is set as 0. In Fig. 12(a) a positive numerical value means being larger in thickness than the average value in thickness of resin molded product 82 by the indicated numerical value. In Fig. 12(a) a negative numerical value means being smaller in thickness than the
15 average value in thickness of resin molded product 82 by the indicated numerical value.

Fig. 12(b) shows maximum and minimum numerical values shown in Fig. 12(a) and a difference between the maximum and minimum values. As shown in Fig. 12(b), resin molded product 82 has a maximum value in thickness of + 0.003 mm, and a minimum value in thickness of - 0.003 mm. Accordingly, the maximum and
20 minimum values have a difference of 0.006 mm therebetween.

Fig. 12(c) shows variation in thickness of resin molded product 82 in the regions of five columns A to E shown in Fig. 12(a). As shown in Fig. 12(c), it has been confirmed that resin molded product 82 has a tendency to be larger in thickness at a center region, or column C, and opposite end regions, or columns A and E, than the
25 regions corresponding to columns B and D.

Figs. 13(a) to 13(c) show a result of measuring in planarity a surface of a resin molded product of a reference example manufactured in the resin molded product manufacturing method according to the present embodiment except that first platen heater 18 is not comprised and accordingly, first platen 11 is not heated thereby. Fig.

13(a) corresponds to Fig. 12(a), Fig. 13(b) corresponds to Fig. 12(b), and Fig. 13(c) corresponds to Fig. 12(c).

As shown in Figs. 13(a) and 13(b), the resin molded product of the reference example has a maximum value in thickness of + 0.007 mm and a minimum value in thickness of - 0.004 mm, and the maximum and minimum values have a difference of 0.011 mm therebetween. Furthermore, as shown in Fig. 13(c), it has been confirmed that the resin molded product of the reference example has a tendency to be large in thickness locally at the region of column E.

From the above results, it has been confirmed that resin molded product manufacturing apparatus 1 of the embodiment comprising first platen 11 including first platen heater 18 allows a resin molded product to be manufactured with first platen heater 18 heating first platen 11 to manufacture resin molded product 82 with little variation in thickness.

In the resin molded product manufacturing method of the above embodiment, second platen heater 19 does not heat second platen 12. However, heating first platen 11 with first platen heater 18 and also heating second platen 12 with second platen heater 19 can suppress deformation of first platen 11 and can also suppress deformation of second platen 12, and thus allow resin molded product 82 to be manufactured with less variation in thickness.

Fig. 14 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. 14 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 provided on a side of intermediate plate 91 closer to second platen 12 and configured to hold a fourth mold chase (not shown).

Fig. 15 is a schematic enlarged cross section of resin molded product manufacturing apparatus 1 shown in Fig. 14. 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
 5 closer to intermediate plate 91 than third heat insulating member 102, and also comprises a third side wall 104 extending vertically upward from a peripheral edge of third heat insulating member 102. 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.

10 Fourth mold chase holder 94 comprises a fourth heat insulating member 112 on 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 further comprises a fourth plate 111 on a side closer to intermediate plate 91 than fourth
 15 heat insulating member 112, and also comprises a fourth side wall 114 extending vertically downward from a peripheral edge of fourth heat insulating member 112. 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.

Fig. 16 is a partial, schematic enlarged elevation of a resin molded product
 20 manufacturing apparatus according to an embodiment in another exemplary variation. Resin molded product manufacturing apparatus 1 shown in Fig. 16 is characterized in that first platen 11 has a lower surface with a notch 123 and an upper surface with a step 122 and an inclined surface 121. In this example, when first mold chase 41 and second mold chase 42 are clamped together, notch 123 can alleviate a stress applied to
 25 first platen 11 and thus further suppress deformation of first platen 11 in manufacturing resin molded product 82. This allows resin molded product 82 to be manufactured with further less variation in thickness.

In the resin molded product manufacturing apparatus shown in Fig. 16, 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. 16, inclined surface 121 can be configured to extend from step 122 outward and obliquely downward.

In the resin molded product manufacturing apparatus 1 shown in Fig. 16, 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.

Fig. 17 represents a temperature distribution of the Fig. 16 resin molded product manufacturing apparatus 1 when a resin molded product is manufactured by heating first platen 11 with first platen heater 18. Further, Fig. 18 represents a temperature distribution of a resin molded product of the reference example when the resin molded product is manufactured in the same manner as in the case shown in Fig. 17, except that first platen 11 is not heated with first platen heater 18. As is apparent from comparing Fig. 17 with Fig. 18, it is understood that resin molded product manufacturing apparatus 1 shown in Fig. 17 presents a temperature distribution which is more uniform than that shown in Fig. 18.

Fig. 19 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation. Resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 19 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 16 in that first platen 11 has a flat upper surface.

Fig. 20 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation. Resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 20 is different from resin molded product manufacturing apparatus 1 of the embodiment

shown in Fig. 16 in that first platen 11 has an upper surface without inclined surface 121.

Fig. 21 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

5 Resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 21 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 16 in that first platen 11 has an upper surface without step 122 and instead has an upper surface with an excavation 127.

Fig. 22 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation.

10 Resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 22 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 21 in that first platen 11 has an upper surface provided with step 122 rather than inclined surface 121.

15 Fig. 23 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation. Resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 23 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 16 in that first platen 11 is increased in thickness.

20 Fig. 24 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation. Resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 24 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 21 in that first platen 11 has an upper surface without excavation 127.

25 Fig. 25 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation. Resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 25 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 23 in that first platen 11 has an upper surface with excavation 127.

Fig. 26 is a schematic perspective view of a resin molded product manufacturing apparatus according to an embodiment in another exemplary variation. Resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 26 is different from resin molded product manufacturing apparatus 1 of the embodiment shown in Fig. 23 in that first platen 11 has an upper surface provided with two cylindrical protrusions 126.

Note that while Figs. 19 to 26 do not show first platen heater 18 incorporated in first platen 11 for convenience of explanation, resin molded product manufacturing apparatuses 1 shown in Figs. 19 to 26 also comprise first platen heater 18 incorporated in first platen 11. Accordingly, resin molded product manufacturing apparatuses 1 shown in Figs. 19 to 26 also allow resin molded product 82 to be manufactured with first platen heater 18 heating first platen 11 to suppress deformation of first platen 11 and hence variation in thickness of resin molded product 82.

Further, as an exemplary variation of the resin molding system of the embodiment shown in Fig. 6, 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. 6, 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 have thus been described, it is also initially planned to

combine the configuration of each embodiment 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; and
 - 5 a second platen spaced from the first platen and facing the first platen, the first mold chase holder comprising a first heat insulating member on a side closer to the first platen and also comprising on a side closer to the second platen a first mold chase holder heater configured to heat the first mold chase, the first platen comprising a first platen heater configured to heat the first platen.
2. The resin molded product manufacturing apparatus according to claim 1, further comprising a second mold chase holder provided on the second platen and configured to hold a second mold chase, wherein the second mold chase holder comprises a second heat insulating member on a side closer to the second platen and
 - 5 also comprises on a side closer to the first platen a second mold chase holder heater configured to heat the second mold chase.
3. The resin molded product manufacturing apparatus according to claim 1 or 2, wherein the second platen comprises a second platen heater configured to heat the second platen.
4. The resin molded product manufacturing apparatus according to claim 3, wherein the second platen heater is located at a position facing the first platen heater or outer than the position.
5. The resin molded product manufacturing apparatus according to any one of claims 1 to 4, further comprising:

an intermediate plate between the first platen and the second platen;

5 a third mold chase holder provided on a side of the intermediate plate closer to 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, wherein

10 the third mold chase holder comprises a third heat insulating member on a side closer to the intermediate plate and also comprises on a side closer to the first platen a third mold chase holder heater configured to heat the third mold chase, and

the fourth mold chase holder comprises a fourth heat insulating member on a side closer to the intermediate plate and also comprises on a side closer to the second platen a fourth mold chase holder heater configured to heat the fourth mold chase.

6. The resin molded product manufacturing apparatus according to any one of claims 1 to 5, wherein

a notch is provided on a side of the first platen closer to the second platen, and

5 a thickness of the first platen at an outer end portion of the notch is smaller than a thickness of the first platen at an inner end portion of the notch.

7. The resin molded product manufacturing apparatus according to any one of claims 1 to 6, wherein the first platen has a side opposite to the second platen provided with at least one selected from the group consisting of a step, an inclination, and an excavation.

8. A resin molding system comprising a resin molded product manufacturing apparatus according to any one of claims 1 to 7.

9. A resin molded product manufacturing method using a resin molded product manufacturing apparatus according to any one of claims 1 to 7, comprising:
disposing a support member on the first mold chase;

- 5 supplying a resin material to a cavity of the second mold chase;
heating the support member;
heating the resin material;
clamping the first mold chase and the second mold chase together; and
heating the first platen with the first platen heater.