Amended Claims

[Received by International Bureau on September 29th 2014 (29.09.2014)]

[Claim 1] (Currently amended)

A resin molding die set for resin-molding a workpiece in which a second member is mounted on a first member, comprising:

one molding die having a cavity recess, which constitutes a cavity for accommodating the second member and which is constituted by a cavity piece forming a bottom part of the cavity and a first insert enclosing the cavity piece;

the other molding die having a pot and a plunger for supplying a molding resin, a workpiece support for supporting a first member side of the workpiece, and a second insert being located between the workpiece support and the pot and located adjacent to the workpiece support;

a cavity-height-varying mechanism for varying a height of the cavity recess, by moving the cavity piece in an opening/closing direction of the dies, so as to match a height of the second member;

a thickness-varying mechanism for varying a height of the workpiece support, by moving the workpiece support with respect to the second insert in the opening/closing direction of the dies, so as to match a thickness of the first member; and

a decompressing mechanism for producing a decompression space, which includes the cavity, by decompressing a closed space, which is shut off from outside and which is formed before completing a closing action of the dies in which the first insert contacts the first member and the second insert,

wherein the height of the workpiece support is adjusted by the thickness-varying mechanism to match the thickness of the first member so as to make the workpiece supported by the workpiece support level

with or higher than a clamping face of the other molding die, and the height of the cavity recess is adjusted by the cavity-height-varying mechanism to match the height of the second member before the molding resin is supplied into the cavity.

[Claim 2]

The resin molding die set according to claim 1, wherein the cavity-height-varying mechanism includes a wedge mechanism, which adjusts a position of the cavity piece in the opening/closing direction of the dies by moving a movable taper block by a driving source.

[Claim 3]

The resin molding die set according to claim 1, wherein one or both of the cavity piece and the first insert are floating-supported by one of mold chases.

[Claim 4]

The resin molding die set according to any one of claims 1-3, wherein the thickness-varying mechanism includes a wedge mechanism, which adjusts a position of the workpiece support in the opening/closing direction of the dies by moving a movable taper block by a driving source.

[Claim 5]

The resin molding die set according to any one of claims 1-4, wherein a dummy cavity is formed in a clamping face of the first insert, and the surplus resin is introduced from the cavity recess to the dummy cavity.

[Claim 6]

The resin molding die set according to claim 5, further comprising closing means for pressing a part of the clamping face of the first insert, which is located on the outer side of the dummy cavity, so as to stop air purge.

[Claim 7] (Deleted)

[Claim 8] (Currently amended)

The resin molding die set according to any one of claims 1-7, further comprising an intermediate plate, in which a through-hole for accommodating the second member and a resin path communicated to the through-hole are formed and which is provided to cover a gap between an outer edge of the first member supported by the workpiece support and the second insert and piled on a clamping face of the other molding die.

[Claim 9]

The resin molding die set according to claim 8, wherein a dummy cavity is formed in the intermediate plate and located on an outer side of the first member, and the surplus resin is introduced from the through-hole to the dummy cavity.

[Claim 10]

The resin molding die set according to any one of claims 1-9, further comprising a swivel mechanism having a guide piece, wherein a guide face of the guide piece faces one face of the cavity piece, which is opposite to the other face contacting the second member, and the cavity piece is capable of being tilted along the guide face.

[Claim 11] (Currently amended)

The resin molding die set according to any one of claims 1-10, wherein a pressing face of the cavity piece of the second member is formed into a convex shape, and a recessed groove is formed around the pressing face.

[Claim 12] (Currently amended)

The resin molding die set according to any one of claims 1-11, wherein a release film is sucked and held on a clamping face of the one molding die, which includes the cavity recess.

[Claim 13]

A resin molding apparatus comprising: a workpiece supplying section; a pressing section in which a workpiece is clamped and resin-molded by the molding die set according to any one of claims 1-12; and an accommodating section for accommodating molded products,

wherein an operation amount of the cavity-height-varying mechanism is set, according to the thickness of the first member and the height of the second member, to locate the cavity piece at a prescribed position in the opening/closing direction of the dies before the molding resin is supplied into the cavity, and then the first member is clamped and resin-molded.

[Claim 14]

The resin molding apparatus according to claim 13, wherein a liquid resin supplying section is provided adjacent to the pressing section, and a liquid resin is supplied by moving a resin supply nozzle into and away from a pot of the opened molding die set.

Claims

1. A resin molding die set for resin-molding a workpiece in which a second member is mounted on a first member, comprising:

one molding die having a cavity recess, which constitutes a cavity for accommodating the second member and which is constituted by a cavity piece forming a bottom part of the cavity and a first insert enclosing the cavity piece;

the other molding die having a workpiece support for supporting the workpiece and a second insert being located adjacent to the workpiece support;

a pot and a plunger, which supply a molding resin, being provided to the one molding die or the other molding die;

a cavity-height-varying mechanism for varying a height of the cavity recess, by moving the workpiece support, with respect to the second insert, in an opening/closing direction of the dies, so as to match a height of the second member;

a thickness-varying mechanism for varying a height of the workpiece support, by moving the workpiece support with respect to the second insert in the opening/closing direction of the dies, so as to match a thickness of the first member; and

a decompressing mechanism for decompressing a closed space, which is shut off from outside and which is formed before completing a die closing action in which the first insert contacts the first member and the second insert, so as to form a decompressed space including the cavity,

wherein a dummy cavity for storing a surplus resin is formed in a clamping face of the first insert and located on an outer side of a workpiece facing surface, and closing means for stopping the decompressing action of the decompressing mechanism is located on_an

outer side of the dummy cavity, the closing means is capable of moving close to and away from a facing clamping surface of the second insert, and

wherein the height of the workpiece support is adjusted by the thickness-varying mechanism to match the thickness of the first member, and the height of the cavity recess is adjusted by the cavity-height-varying mechanism to match the height of the second member before the molding resin is supplied into the cavity.

2. The resin molding die set according to claim 1, wherein the cavity-height-varying mechanism includes a wedge mechanism, which adjusts a position of the cavity piece in the opening/closing direction of the dies by moving a movable taper block by a driving source.

3. The resin molding die set according to claim 1, wherein one or both of the cavity piece and the first insert are floating-supported by one of mold chases.

4. The resin molding die set according to any one of claims 1-3, wherein the thickness-varying mechanism includes a wedge mechanism, which adjusts a position of the workpiece support in the pening/closing direction of the dies by moving a movable taper block by a driving source.

5. The resin molding die set according to any one of claims 1-4, further comprising an intermediate plate, in which a through-hole for accommodating the second member and a resin path communicated to the through-hole are formed and which is provided to cover a gap between an outer edge of the first member supported by the workpiece support and the second insert and piled on a clamping face of the other molding die.

6. The resin molding die set according to claim 5, wherein a dummy cavity is formed in the intermediate plate and located on an outer side of the first member, and the surplus resin is introduced from the through-hole to the dummy cavity.

7. The resin molding die set according to any one of claims 1-6, further comprising a swivel mechanism having a guide piece, wherein a guide face of the guide piece faces one face of the cavity piece, which is opposite to the other face contacting the second member, and the cavity piece is capable of being tilted along the guide face.

8. The resin molding die set according to any one of claims 1-7, wherein a pressing face of the cavity piece of the second member is an uneven surface including a plurality of convex parts corresponding to a contact face of a semiconductor chip and a recessed groove formed around the convex parts.

9. The resin molding die set according to any one of claims 1-8, wherein a release film is sucked and held on a clamping face of the one molding die, which includes the cavity recess.

10. A resin molding apparatus comprising: a workpiece supplying section; a pressing section in which a workpiece is clamped and resin-molded by the molding die set according to any one of claims 1-9; and an accommodating section for accommodating molded products,

wherein an operation amount of the cavity-height-varying mechanism is set, according to the thickness of the first member and the height of the second member, to locate the cavity piece at a prescribed position in the opening/closing direction of the dies before the molding resin is supplied into the cavity, and then the first member is clamped and resin-molded.

11. The resin molding apparatus according to claim 10, wherein a liquid resin supplying section is provided adjacent to the pressing section, and a liquid resin is supplied by moving a resin supply nozzle into and away from a pot of the opened molding die set.