CLAIMS

1. A release film cutting apparatus, comprising:

a rotating member;

a rotating arm; and

a cutter, ~~wherein~~

a base on which the release film is placed, wherein

the rotating member is directly or indirectly connected to a first end of the rotating arm and the cutter is directly or indirectly connected to a second end of the rotating arm,

a rotation axis of the rotating member penetrates through the rotating member and is substantially perpendicular to a surface of the release film to be cut,

the cutter pierces a predetermined position of the release film by moving the cutter toward the surface of the release film, ~~and~~

the release film is cut out into a circle by rotation of the rotating arm and the cutter that pierces the release film in response to rotation of the rotating member around the rotation axis~~.~~,

the base includes a groove along a circle that is a rotation locus of the cutter at its upper part,

the release film is cut out into a circle in a state where a tip of the cutter is positioned in an inside of the groove,

the base is divided into an inner part member and an outer part member with the groove along the circle as a boundary, and

the inner part member is a resin-sprinkling table.

~~2. The apparatus according to claim 1, further comprising:~~

~~a base on which the film is placed, wherein~~

~~the base includes a groove along a circle that is a rotation locus of the cutter at its upper part, and~~

~~the film is cut out into a circle in a state where a tip of the cutter is positioned in an inside of the groove.~~

~~3. The apparatus according to claim 2, wherein~~
~~the base is divided into an inner part member and an outer part member with the groove along the circle as a boundary.~~

~~4. The apparatus according to claim 3, wherein~~
~~the inner part member is a resin-sprinkling table.~~

~~5~~2. The apparatus according to claim ~~3 or 4~~1, further comprising:

a vertical direction movement unit, wherein
the vertical direction movement unit moves at least one of the inner part member and the outer part member in a vertical direction.

~~6~~3. The apparatus according to any one of claims 1 ~~to 5~~or 2, further comprising:

a release film fixing unit that is placed on a top surface of the release film to fix the release film, wherein
the release film fixing unit comprises an inner part fixing member and an outer part fixing member,
the inner part fixing member is positioned at an inside of the circle that is the rotation locus of the cutter, and
the outer part fixing member is positioned at an outside of the circle that is the rotation locus of the cutter.

~~7~~4. The apparatus according to claim ~~6~~3, wherein
the inner part fixing member is a substantially disc-shaped member, and
the outer part fixing member is a substantially ring-shaped member that surrounds the circle that is the rotation locus of the cutter.

85. The apparatus according to claim 63, wherein
the inner part fixing member and the outer part fixing member are both substantially ring-shaped members,
the circle that is the rotation locus of the cutter is surrounded by the outer part fixing member, and
a ring opening of the inner part fixing member serves as a resin supply portion.

96. The apparatus according to any one of claims 1 to 85, further comprising:

a rotation controlling unit, wherein
the rotation controlling unit is connected to the rotating member in such a manner that a part of a periphery of the rotating member is surrounded by the rotation controlling unit.

107. The apparatus according to claim 96, wherein
the rotation controlling unit is a torque limiter.

118. The apparatus according to any one of claims 1 to 107, wherein
the rotating member is a rotating shaft.

~~12. A release film cutting method, comprising:~~

~~a piercing step of piercing a predetermined position of a long release film with a cutter; and~~

~~a cutting out step of cutting out the release film into a circle by rotating the cutter that pierces the release film in a circumferential direction.~~

139. A release film cutting method using the release film cutting apparatus according to any one of claims 1 to 118, comprising:

a piercing step of piercing a predetermined position of the release film with the cutter by moving the cutter toward the surface of the release film; and

a cutting out step of cutting out the release film into a circle by rotation of the rotating arm and the cutter that pierces the release film in response to rotation of the rotating member around the rotation axis that penetrates through the rotating member and is substantially perpendicular to the surface of the release film.

~~14~~10. The method according to claim ~~13~~9, wherein
~~the film cutting apparatus is the film cutting apparatus according to claim 2 or 3, and~~
in the cutting out step, the release film is cut out into a circle in a state where the tip of the cutter is positioned in the inside of the groove.

~~15~~11. The method according to claim ~~13~~9 or ~~14~~10, wherein
the release film cutting apparatus is the release film cutting apparatus according to any one of claims ~~6~~3 to ~~8~~5,
the method further comprises:

a release film fixing step of fixing the release film by placing the release film fixing unit on the top surface of the release film,
in the release film fixing step, the inner part fixing member is placed at the inside of the circle that is the rotation locus of the cutter and the outer part fixing member is placed at the outside of the circle that is the rotation locus of the cutter,
in the piercing step, the predetermined position to be pierced with the cutter is positioned between the inner part fixing member and the outer part fixing member, and
in the cutting out step, the release film is cut out into a circle along a periphery of the inner part fixing member.

~~16~~12. A resin-molding apparatus, comprising:

the release film cutting apparatus according to any one of claims 1 to ~~11~~8,

a resin-sprinkling unit sprinkling resin on a circular release film formed by the cutting apparatus, and

a resin-molding unit molding the sprinkled resin.

~~17~~13. The apparatus according to claim ~~16~~12, wherein

in the resin-molding, at least one electronic component is resin-encapsulated.

~~18~~14. A resin-molding method, comprising:

a cutting step of forming a circular release film by the release film cutting method according to any one of claims ~~12~~9 to ~~15~~11;

a resin-sprinkling step of sprinkling resin on the formed circular release film; and

a resin-molding step of molding the sprinkled resin on the circular release film.

~~19~~15. The method according to claim ~~18~~14, wherein

in the resin-molding step, at least one electronic component is resin-encapsulated.

~~20~~16. The method according to claim ~~18~~14 or ~~19~~15, wherein

in the resin-sprinkling step, a circular frame is placed on the release film and resin is sprinkled on an inside of the circular frame.

~~21~~17. A production apparatus for a resin-molded article, comprising:

the resin-molding apparatus according to claim ~~16~~12 or ~~17~~13; and

a transfer unit, wherein

the transfer unit transfers at least the resin-molded article after resin-molding.

~~22~~18. The apparatus according to claim ~~21~~17, wherein
the release film cutting apparatus, the resin-sprinkling unit, the resin-molding unit, and the transfer unit are separately arranged as independent units, and
at least one of the units is detachable to at least another one of the units.