

DESCRIPTION

TITLE OF INVENTION:

5 Tape Affixing Apparatus, Resin Molding System, Tape Affixing Method, and
Method for Manufacturing Resin Molded Product

TECHNICAL FIELD

[0001] The present disclosure relates to a tape affixing apparatus, a resin molding system, a tape affixing method, and a method for manufacturing a resin molded product.

10 BACKGROUND ART

[0002] For example, PTL 1, Fig. 2A shows one example of a conventional tape affixing method. In this method, initially, a lead frame is placed on a receiving table with a chip mounted surface facing downward. The receiving table supports the lead frame only at a portion to be pressed, that is, an outer frame of the lead frame.

15 Subsequently, a tape is placed to position an adhesive surface of the tape on a back surface of the lead frame opposite to the chip mounting surface.

[0003] Subsequently, a cylindrical side surface of a rubber roller is placed on the back surface of the tape (a surface opposite to the adhesive surface) to press the tape against the back surface of the lead frame. Subsequently, by rotating the roller along the back surface of the tape, the tape is entirely pressed against the lead frame and thus affixed to the lead frame.

CITATION LIST

PATENT LITERATURE

[0004] [PTL 1] Japanese Patent Laying-Open No. 2012-238689

25 SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0005] The conventional tape affixing method described in PTL 1, however, has the following problem. That is, when the lead frame is strained by a thermal history received in mounting and bonding steps, its own weight, etc., and the roller cannot

deform along the strained shape of the lead frame, the roller may insufficiently press the tape against the lead frame. In that case, the lead frame may have a portion without the tape adhering thereto.

SOLUTION TO PROBLEM

5 [0006] An embodiment disclosed herein can provide a tape affixing apparatus comprising a tape holding mechanism, a bending mechanism spaced from the tape holding mechanism, and a movement mechanism configured to be capable of moving the tape holding mechanism and the bending mechanism relative to each other, wherein the bending mechanism includes a resilient member holding mechanism configured to
10 be capable of holding at least a portion of an outer periphery of the resilient member and is configured to be capable of bending the resilient member convexly toward the tape holding mechanism while the resilient member is held by the resilient member holding mechanism.

[0007] An embodiment disclosed herein can provide a resin molding system
15 comprising the tape affixing apparatus.

[0008] An embodiment disclosed herein can provide a tape affixing method using a tape affixing apparatus, comprising the steps of: holding a tape by a tape holding mechanism; placing a resilient member on a stage of a bending mechanism; bending the resilient member by the bending mechanism convexly toward the tape holding
20 mechanism; bringing the tape held by the tape holding mechanism into contact with a convexed portion of the bent resilient member; and eliminating the bending of the resilient member to increase an area of the tape brought into contact with the resilient member.

[0009] An embodiment disclosed herein can provide a method for manufacturing a
25 resin molded product, comprising a resin molding step of molding with resin a resilient member having a tape affixed thereto by using the tape affixing method described above.

ADVANTAGEOUS EFFECTS OF INVENTION

[0010] The embodiments disclosed herein can reduce a portion of a resilient member

without a tape adhering thereto, as compared with the conventional tape affixing method described in PTL 1.

BRIEF DESCRIPTION OF DRAWINGS

5 [0011] Fig. 1 is a functional block diagram showing an example of a resin molding system according to an embodiment.

Fig. 2 is a schematic side view of an example of a tape affixing apparatus according to an embodiment.

Fig. 3 is a schematic side view for illustrating an example of a tape affixing method according to an embodiment.

10 Figs. 4(a) and 4(b) are schematic side views for illustrating an example of the tape affixing method according to an embodiment.

Figs. 5(a) to 5(d) are schematic side views for illustrating an example of the tape affixing method according to an embodiment.

15 Fig. 6 is a schematic side view of another example of the tape affixing apparatus according to an embodiment.

Fig. 7 is a schematic cross section of an example of a resin molding apparatus according to an embodiment.

Fig. 8 is a schematic cross section for illustrating an example of a method for manufacturing a resin molded product according to an embodiment.

20 Fig. 9 is a schematic cross section for illustrating the example of the method for manufacturing the resin molded product according to the embodiment.

Fig. 10 is a schematic cross section for illustrating the example of the method for manufacturing the resin molded product according to the embodiment.

25 Fig. 11 is a schematic cross section for illustrating the example of the method for manufacturing the resin molded product according to the embodiment.

Fig. 12 is a schematic cross section of an example of a resin molded product according to an embodiment.

Fig. 13 is a schematic plan view of an example of the tape affixing apparatus of an embodiment in a state in which a tape holding mechanism is absent and no resilient

member is placed.

DESCRIPTION OF EMBODIMENTS

[0012] Hereinafter, an embodiment will be described. In the drawings used for describing the embodiment, identical reference characters denote identical or corresponding parts.

[0013] <Resin Molding System>

Fig. 1 is a functional block diagram of an example of a resin molding system according to an embodiment. A resin molding system 1000 shown in Fig. 1 comprises: a resin supply module 1001 capable of supplying a resin material; a tape affixing module 1002 capable of affixing a tape to a resilient member; a resin molding module 1003 capable of compression-molding the resilient member to manufacture a resin molded product; a supply and storage module 1004 capable of supplying the resilient member before it is molded, and storing the resilient member after it is molded, or the resin molded product; and a controller 1005. Controller 1005 is configured to be capable of controlling resin supply module 1001, tape affixing module 1002, resin molding module 1003, and supply and storage module 1004.

[0014] Resin supply module 1001, tape affixing module 1002, resin molding module 1003, and supply and storage module 1004 are detachably attachable to one another and also replaceable.

[0015] Resin supply module 1001 comprises a resin material supply apparatus capable of supplying resin molding module 1003 with a resin material.

[0016] Tape affixing module 1002 comprises a tape affixing apparatus of an embodiment. The tape affixing apparatus of the embodiment will more specifically be described hereinafter.

[0017] Resin molding module 1003 comprises a resin molding apparatus of an embodiment. The resin molding apparatus of the embodiment will more specifically be described hereinafter. A plurality of resin molding modules 1003 may be provided.

[0018] Supply and storage module 1004 comprises: a supply apparatus capable of supplying a resilient member before it is resin-molded; and a storage apparatus capable

of storing the resilient member after it is resin-molded, or a resin molded product. The resin molded product resin-molded by the resin molding apparatus of the embodiment is stored in supply and storage module 1004.

[0019] <Tape Affixing Apparatus>

5 Fig. 2 is a schematic side view of an example of the tape affixing apparatus of an embodiment. As shown in Fig. 2, the tape affixing apparatus of the embodiment comprises a tape holding mechanism 21, a bending mechanism 23 spaced from tape holding mechanism 21, and a movement mechanism (not shown) configured to be capable of moving tape holding mechanism 21 and bending mechanism 23 relative to
10 each other. Bending mechanism 23 comprises a resilient member holding mechanism 22 configured to be capable of holding at least a portion of an outer periphery of a resilient member (not shown in Fig. 2) and is configured be capable of bending the resilient member convexly toward tape holding mechanism 21 while the resilient member is held by resilient member holding mechanism 22. Bending mechanism 23
15 further comprises a stage 23b configured to allow the resilient member to be placed thereon. The tape affixing apparatus further comprises a base 24 positioned opposite to tape holding mechanism 21 with stage 23b interposed.

[0020] Tape holding mechanism 21 is configured to be capable of holding a tape to be affixed to the resilient member. While how tape holding mechanism 21 holds the tape
20 is not particularly limited, it may be configured to be capable of holding the tape by comprising a suction mechanism capable of sucking the tape.

[0021] Tape holding mechanism 21 may comprise a recess 21a configured to be capable of accommodating at least a portion of resilient member holding mechanism 22 to prevent tape holding mechanism 21 and resilient member holding mechanism 22
25 from coming into contact with each other. While the figures of the present application show recesses 21a all accommodated in a lower surface of tape holding mechanism 21, some of recesses 21a may be opened outward from a side surface of tape holding mechanism 21.

[0022] Bending mechanism 23 further comprise a first connecting shaft 23d that

connects tape holding mechanism 21 and base 24, a first resilient member 23a that surrounds an outer periphery of first connecting shaft 23d and is configured to be capable of expanding and contracting between tape holding mechanism 21 and stage 23b, a second connecting shaft 23e that connects stage 23b and base 24, and a second resilient member 23c that surrounds an outer periphery of second connecting shaft 23e and is configured to be capable of expanding and contracting between stage 23b and base 24. A hollow 232b is provided at a center of stage 23b. First resilient member 23a may have a spring constant smaller than that of second resilient member 23c, for example.

[0023] Resilient member holding mechanism 22 is configured to be capable of holding at least a portion of an outer periphery of the resilient member placed on stage 23b. While how resilient member holding mechanism 22 holds at least a portion of the outer periphery of the resilient member is not particularly limited, in the present embodiment, resilient member holding mechanism 22 for example includes a pressing portion 22a that faces stage 23b and presses at least a portion of the outer periphery of the resilient member against stage 23b to hold at least a portion of the outer periphery of the resilient member placed on stage 23b. Resilient member holding mechanism 22 may hold at least a portion of the outer periphery of the resilient member for example by grasping at least a portion of the outer periphery of the resilient member. Further, resilient member holding mechanism 22 may be configured to be capable of rotating about a shaft that is fixed to the tape affixing apparatus to change pressing portion 22a in angle with respect to stage 23b.

[0024] Base 24 is configured to be immovable in the tape affixing apparatus. Thus, base 24 fixes first connecting shaft 23d and second connecting shaft 23e to the tape affixing apparatus. Accordingly, first connecting shaft 23d and second connecting shaft 23e are also configured to be immovable in the tape affixing apparatus.

[0025] Fig. 13 is a schematic plan view of an example of the tape affixing apparatus of an embodiment in a state in which the tape holding mechanism is absent and no resilient member is placed. In the example shown in Fig. 13, four sets of first

connecting shaft 23d and first resilient member 23a surrounding the outer periphery thereof are provided, and four sets of second connecting shaft 23e and second resilient member 23c surrounding the outer periphery thereof are also provided. Further, in the example shown in Fig. 13, hollow 232b of stage 23b in a plan view may for example
5 have a rectangular shape corresponding to that of the resilient member in the plan view, as will be described hereinafter. Base 24 is located under stage 23b.

[0026] <Tape Affixing Method>

Hereinafter, an example of a tape affixing method of an embodiment will be described with reference to Figs. 3, 4(a) and 4(b), and 5(a) to 5(d). Initially, as shown
10 in Fig. 3, the step of holding tape 31 by tape holding mechanism 21 and the step of placing resilient member 32 on stage 23b of bending mechanism 23 are performed.

[0027] The step of holding tape 31 by tape holding mechanism 21 can be performed for example by sucking tape 31 by tape holding mechanism 21. While tape 31 may be any tape adherable to resilient member 32 without any particular limitation, it can for
15 example be a tape that can suppress leakage of resin during resin-molding as well as resin flash produced after resin-molding, as will be described hereinafter.

[0028] The step of placing resilient member 32 on stage 23b of bending mechanism 23 can be performed for example as follows. Initially, resilient member holding mechanism 22 has pressing portion 22a rotated to be opened toward an outer side of the
20 tape affixing apparatus. Subsequently, resilient member 32 is placed on stage 23b so that at least a portion of the outer periphery of resilient member 32 is positioned between pressing portion 22a of resilient member holding mechanism 22 and stage 23b. While resilient member 32 may be any member that is resilient without any particular limitation, it can for example be a lead frame having one surface with at least one chip
25 fixed thereon. The lead frame as resilient member 32 can be placed on stage 23b such that a chip (not shown) is positioned in hollow 232b provided at the center of stage 23b.

[0029] The order of performing the step of holding tape 31 by tape holding mechanism 21 and the step of placing resilient member 32 on stage 23b of bending mechanism 23 is not particularly limited. In these steps, first resilient member 23a contracts due to

the weight of a member disposed thereabove, whereas second resilient member 23c does not contract.

[0030] Subsequently, as shown in Fig. 4(a), the step of bending resilient member 32 by bending mechanism 23 convexly toward tape holding mechanism 21 is performed.

5 This step can be performed for example by rotating pressing portion 22 toward an inner side of the tape affixing apparatus or the like so that pressing portion 22 presses at least a portion of the outer periphery of resilient member 32 to move at least a portion of the outer periphery of resilient member 32 relatively with respect to tape holding mechanism 21 toward a side farther away from tape holding mechanism 21. In this
10 step, first resilient member 23a remains contracted by the weight of the member disposed thereabove, whereas second resilient member 23c does not contract. Note that the bending of resilient member 32 can be adjusted for example by adjusting the degree of rotation of pressing portion 22.

[0031] In doing so, as shown in Fig. 4(b), at least a portion of the outer periphery of
15 resilient member 32 is pressed on the side of a depression 230b of stage 23b by pressing portion 22a of resilient member holding mechanism 22, and a portion of resilient member 32 which is not pressed by pressing portion 22a is in contact with a surface 231b of stage 23b inner than the outer periphery of the stage. Depression 230b of stage 23b is configured to be depressed toward base 24 with respect to surface
20 231b inner than the outer periphery of stage 23b. In Fig. 4(b), and Figs. 5(b) and 5(d) described later, a reference numeral 230b denotes a bottom surface of depression 230b.

[0032] Subsequently, as shown in Fig. 5(a), the step of bringing tape 31 held by tape holding mechanism 21 into contact with a convexed portion of resilient member 32 is performed. This step can be performed for example by a movement mechanism (not
25 shown) moving tape holding mechanism 21 toward stage 23b. In this step, while tape 31 may be brought into contact with resilient member 32 at a vertex of the convexity, the tape may not be brought into contact with the vertex of the convexity, and may be brought into contact with any portion of the convexed portion of resilient member 32. In this step as well, for example, as shown in Fig. 5(b), at least a portion of the outer

periphery of resilient member 32 remains pressed against depression 230b on the outer periphery of stage 23b by pressing portion 22a of resilient member holding mechanism 22. In this step, as tape holding mechanism 21 moves, first resilient member 23a further contracts from a state thereof assumed in the step of bending resilient member 32, and second resilient member 23c starts to contract due to the weight of a member disposed thereabove as well as a force of first resilient member 23a contracted as tape holding mechanism 21 moves. In this step, resilient member holding mechanism 22 is kept stationary relative to base 24.

[0033] Subsequently, the step of eliminating the bending of the convexity of resilient member 32 to increase an area of tape 31 brought into contact with resilient member 32 is performed. This step can be performed for example by the movement mechanism (not shown) further moving tape holding mechanism 21 toward stage 23b from a state while tape 31 held by tape holding mechanism 21 is in contact with the convexed portion of resilient member 32. In this step, as tape holding mechanism 21 moves, first resilient member 23a further contracts from a state thereof assumed in the step of bringing, and second resilient member 23c also further contracts from a state thereof assumed in the step of bringing due to the weight of the member disposed thereabove as well as the force of first resilient member 23a contracted as tape holding mechanism 21 moves. In this step as well, resilient member holding mechanism 22 is kept stationary relative to base 24.

[0034] Fig. 5(c) shows a state in which affixing tape 31 to resilient member 32 is completed. As shown in Fig. 5(c), when affixing tape 31 to resilient member 32 is completed, pressing portion 22a of resilient member holding mechanism 22 is accommodated in recess 21a of tape holding mechanism 21 so that tape holding mechanism 21 and resilient member holding mechanism 22 do not come into contact with each other. Further, as shown in Fig. 5(d), at least a portion of the outer periphery of resilient member 32 is in contact with neither pressing portion 22a of resilient member holding mechanism 22 nor depression 230b on the outer periphery of stage 23b. Resilient member 32 after tape 31 is affixed thereto will be supported on

surface 231b of stage 23b inner than the outer periphery of the stage.

[0035] Thereafter, tape holding mechanism 21 and stage 23b are returned to the position shown in Fig. 3. Thereafter, resilient member 32 after tape 31 is affixed thereto is removed from resilient member holding mechanism 22.

5 [0036] One example of the tape affixing apparatus and method of an embodiment bends resilient member 32 convexly and brings tape 31 into contact with the convexed portion of resilient member 32, and eliminates the bending of the convexity of resilient member 32 to increase an area of tape 31 brought into contact with resilient member 32 to thus affix tape 31. One example of the tape affixing apparatus and method of the
10 embodiment can affix tape 31 to resilient member 32 while expelling air between tape 31 and resilient member 32, and can thus suppress air bubbles produced between tape 31 and resilient member 32 and also suppress wrinkles resulting as tape 31 is affixed. Accordingly, one example of the tape affixing apparatus and method of the
15 embodiment can reduce a portion of resilient member 32 without tape 31 adhering thereto, as compared with the conventional method described in PTL 1.

[0037] Further, one example of the tape affixing apparatus and method of the embodiment can affix tape 31 while holding only at least a portion of the outer periphery of resilient member 32, and can thus affix tape 31 to resilient member 32 even when resilient member 32 on a side thereof opposite to a surface thereof having
20 tape 31 affixed thereto has a chip fixed region or a similar region disallowed to be brought into contact with another member.

[0038] Further, one example of the tape affixing apparatus and method of the embodiment bends resilient member 32 convexly toward a side opposite to that toward which resilient member 32 bends due to its own weight (e.g., that side of a lead frame
25 on which a chip is fixed), and affixes tape 31 to resilient member 32 thus bent, and can thus affix tape 31 to resilient member 32 without considering the bending of resilient member 32 otherwise caused by its own weight.

[0039] Further, one example of the tape affixing apparatus and method of the embodiment allows first resilient member 23a and second resilient member 23c to

contract as described above to suppress rapid deformation of resilient member 32 when resilient member 32 is bent convexly and tape 31 is affixed to resilient member 32. Therefore, it can affix tape 31 to resilient member 32 without imposing a burden on resilient member 32.

5 [0040] While in the above-described embodiment a configuration with tape holding mechanism 21 overlying bending mechanism 23 has been described as an example of a tape affixing apparatus of an embodiment, another example of the tape affixing apparatus of the embodiment may for example have bending mechanism 23 overlying tape holding mechanism 21, as shown in a schematic side view shown in Fig. 6.

10 [0041] <Resin Molding Apparatus>

Fig. 7 is a schematic cross section of an example of a resin molding apparatus of an embodiment. Resin molding apparatus 1 of an embodiment shown in Fig. 7 comprises a compression mold 10. Compression mold 10 includes a first die 110 and a second die 120 disposed above first die 110 and facing first die 110.

15 [0042] First die 110 includes a side surface member 111 and a bottom surface member 112. Side surface member 111 is disposed so as to surround a periphery of bottom surface member 112.

[0043] Bottom surface member 112 includes an upper surface 112a on which a resin material can be disposed, and a sliding surface 112b extending downward from a peripheral edge of upper surface 112a. Sliding surface 112b of bottom surface member 112 is in contact with an inner peripheral surface 111a of side surface member 111 and is configured to be slidable with respect to inner peripheral surface 111a of side surface member 111.

20 [0044] Resin molding apparatus 1 further comprises an upper fixed plate 121, a lower fixed plate 122, and a movable platen 115. A plurality of supports 116 extend between upper fixed plate 121 and lower fixed plate 122 in a vertical direction. The plurality of supports 116 each have one end fixed to upper fixed plate 121 and the other end fixed to lower fixed plate 122. Furthermore, an elastic body 114 is provided between side surface member 111 and movable platen 115.

[0045] Resin molding apparatus 1 further comprises a first drive mechanism 117 on lower fixed plate 122 between the plurality of supports 116. First drive mechanism 117 is configured to be capable of moving movable platen 115 upward and downward. Upper fixed plate 121 and lower fixed plate 122 are fixed and thus configured to be immovable. Accordingly, movable platen 115 is movable relative to upper fixed plate 121 and lower fixed plate 122. Further, first drive mechanism 117 is configured to be capable of moving side surface member 111 and bottom surface member 112 via movable platen 115 upward and downward, that is, causing the members to ascend and descend.

10 [0046] Resin molding apparatus 1 further comprises a second drive mechanism 118 inside movable platen 115. Second drive mechanism 118 is configured to be capable of moving bottom surface member 112 upward and downward, that is, causing the member to ascend and descend. Thus, bottom surface member 112 is movable relative to side surface member 111.

15 [0047] <Method for Manufacturing Resin Molded Product>

Hereinafter, an example of a method for manufacturing a resin molded product according to an embodiment will be described with reference to the schematic cross sections of Figs. 8 to 12. Initially, as shown in Fig. 8, the step of placing an object to be molded 201 on second die 120 is performed and, together therewith, the step of supplying a resin material 202 is performed. Object to be molded 201 is resilient member 32 having tape 31 affixed thereto by one example of a tape affixing apparatus and method of an embodiment described above.

20 [0048] The step of placing object to be molded 201 on second die 120 can be performed for example by placing object to be molded 201 on second die 120 such that a surface of resilient member 32 on a side with tape 31 affixed thereto faces second die 120.

25 [0049] The step of supplying resin material 202 can be performed for example by supplying resin material 202 into a cavity formed by inner peripheral surface 111a of side surface member 111 and upper surface 112a of bottom surface member 112.

[0050] The order of performing the step of placing object to be molded 201 on second die 120 and the step of supplying resin material 202 is not particularly limited.

[0051] Subsequently, as shown in Fig. 9, the step of moving first die 110 toward second die 120 is performed. The step of moving first die 110 toward second die 120 can be performed for example by moving movable platen 115 toward second die 120 by first drive mechanism 117.

[0052] Subsequently, the step of resin-molding object to be molded 201 with resin material 202 is performed. The step of resin-molding object to be molded 201 with resin material 202 can be performed for example as follows.

[0053] Initially, as shown in Fig. 10, resin material 202 is heated and melted to be molten resin 202a, and upper surface 112a of bottom surface member 112 is pushed up by second drive mechanism 118. In doing so, bottom surface member 112 moves upward relative to side surface member 111 while sliding surface 112b of bottom surface member 112 slides relative to inner peripheral surface 111a of side surface member 111.

[0054] Subsequently, as shown in Fig. 11, while upper surface 112a of bottom surface member 112 is pushed up, molten resin 202a is further heated and cured to be cured resin 202b.

[0055] Thereafter, for example as shown in a schematic cross section of Fig. 12, object 201 resin-molded is removed from compression mold 10, and a resin molded product 301 in which a chip fixed to the resilient member with the tape affixed thereto is sealed with cured resin 202b, can be obtained.

[0056] One example of a method for manufacturing a resin molded product according to an embodiment can resin-seal a chip fixed to a side of a resilient member opposite to a side thereof having a tape affixed thereto, while minimizing a portion of the resilient member without the tape adhering thereto. Therefore, when one example of the method for manufacturing a resin molded product according to the embodiment is compared with the conventional tape affixing method described in PTL 1, the former can manufacture a resin molded product while suppressing leakage of resin from tape

31 during resin-molding as well as resin flash produced after resin-molding.

[0057] While in the above description a resin molded product is manufactured by compression molding as an example of a method for manufacturing a resin molded product according to an embodiment, the resin molded product may be manufactured in another resin molding method such as transfer molding.

[0058] It should be understood that the embodiments disclosed herein are illustrative 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

[0059] According to an embodiment disclosed herein, a tape affixing apparatus, a resin molding system, a tape affixing method, and a method for manufacturing a resin molded product can be provided.

REFERENCE SIGNS LIST

[0060] 1 resin molding apparatus, 10 compression mold, 21 tape holding mechanism, 21a recess, 22 resilient member holding mechanism, 22a pressing portion, 23 bending mechanism, 23a first resilient member, 23b stage, 23c second resilient member, 23d first connecting shaft, 23e second connecting shaft, 24 base, 31 tape, 32 resilient member, 110 first die, 111 side surface member, 111a inner peripheral surface, 112 bottom surface member, 112a upper surface, 112b sliding surface, 114 elastic body, 115 movable platen, 116 support, 117 first drive mechanism, 118 second drive mechanism, 120 second die, 121 upper fixed plate, 122 lower fixed plate, 201 object to be molded, 202 resin material, 202a molten resin, 202b cured resin, 230b depression, 231b surface, 232b hollow, 301 resin molded product, 1000 resin molding system, 1001 resin supply module, 1002 tape affixing module, 1003 resin molding module, 1004 supply and storage module, 1005 controller.

CLAIMS

[Claim 1] A tape affixing apparatus comprising:

a tape holding mechanism;

5 a bending mechanism spaced from the tape holding mechanism; and

a movement mechanism configured to be capable of moving the tape holding mechanism and the bending mechanism relative to each other,

the bending mechanism comprising a resilient member holding mechanism configured to be capable of holding at least a portion of an outer periphery of a resilient member, and configured to be capable of bending the resilient member convexly toward the tape holding mechanism while the resilient member is held by the resilient member holding mechanism.

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[Claim 2] The tape affixing apparatus according to claim 1, wherein

15 the bending mechanism comprises a stage on which the resilient member is placed thereon, and

the stage has an outer periphery with a depression.

[Claim 3] The tape affixing apparatus according to claim 2, further

20 comprising a base opposite to the tape holding mechanism with the stage interposed.

[Claim 4] The tape affixing apparatus according to claim 3, wherein the base is configured to be immovable.

25 [Claim 5] The tape affixing apparatus according to claim 3 or 4, wherein the bending mechanism comprises a first connecting shaft that connects the tape holding mechanism and the base, a first resilient member that surrounds an outer periphery of the first connecting shaft and is configured to be capable of expanding and contracting between the tape holding mechanism and the stage, a second connecting shaft that

connects the stage and the base, and a second resilient member that surrounds an outer periphery of the second connecting shaft and is configured to be capable of expanding and contracting between the stage and the base.

5 [Claim 6] The tape affixing apparatus according to claim 5, wherein a spring constant of the first resilient member is smaller than a spring constant of the second resilient member.

10 [Claim 7] The tape affixing apparatus according to any one of claims 1 to 6, wherein the bending mechanism is configured to be capable of bending the resilient member convexly by moving at least a portion of an outer periphery of the resilient member relatively with respect to the tape holding mechanism toward a side farther away from the tape holding mechanism.

15 [Claim 8] The tape affixing apparatus according to any one of claims 1 to 7, configured to be capable of adjusting bending of the resilient member.

20 [Claim 9] The tape affixing apparatus according to any one of claims 1 to 8, wherein the tape holding mechanism comprises a recess configured to be capable of accommodating at least a portion of the resilient member holding mechanism to prevent the tape holding mechanism and the resilient member holding mechanism from coming into contact with each other.

25 [Claim 10] The tape affixing apparatus according to any one of claims 1 to 9, wherein the resilient member comprises a lead frame.

 [Claim 11] A resin molding system comprising a tape affixing apparatus according to any one of claims 1 to 10.

[Claim 12] A tape affixing method using a tape affixing apparatus,
comprising:

holding a tape by a tape holding mechanism;

placing a resilient member on a stage of a bending mechanism;

5 bending the resilient member by the bending mechanism convexly toward the
tape holding mechanism;

bringing the tape held by the tape holding mechanism into contact with a
convexed portion of the bent resilient member; and

eliminating the bending of the resilient member to increase an area of the tape
10 brought into contact with the resilient member.

[Claim 13] The tape affixing method according to claim 12, wherein
the tape affixing apparatus comprises a base opposite to the tape holding
mechanism with the stage interposed,

15 the bending mechanism further comprises a first resilient member configured to
be capable of expanding and contracting between the tape holding mechanism and the
stage, and a second resilient member configured to be capable of expanding and
contracting between the stage and the base, and

the step of bringing comprises the first resilient member undergoing
20 contraction.

[Claim 14] The tape affixing method according to claim 13, wherein the step
of increasing an area of the tape brought into contact with the resilient member
comprises the first resilient member and the second resilient member both undergoing
25 contraction.

[Claim 15] A method for manufacturing a resin molded product, comprising a
resin molding step of molding with resin a resilient member having a tape affixed
thereto by using a tape affixing method according to any one of claims 12 to 14.

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