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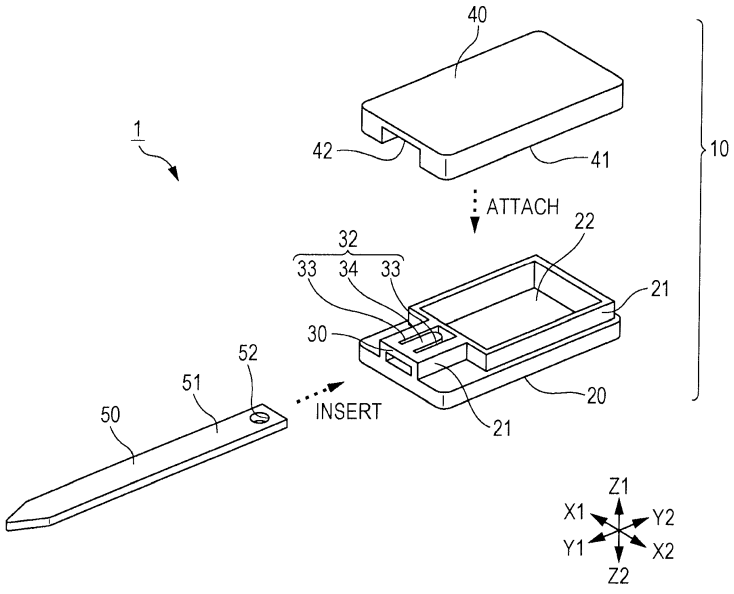
(54) **Vehicle key device**

(57) A vehicle key device (1) includes a key head portion (10) and a key blade (50). The key head portion (10) includes a first cover (20) having a blade insertion slot (30), and a second cover (40) fitted to the first cover (20). The key blade (50) includes an inserted portion (51) inserted into the blade insertion slot (30) and having a through hole (52). The blade insertion slot (30) includes inner walls (31) including upper, lower, left, right, and rear walls; and an upper end portion (32) providing the upper wall. The upper end portion (32) includes an elastic part (34) provided between a pair of notches (33). The elastic part (34) includes a first projection (35) that snap-engages with the through hole (52). The second cover (40) is fitted to the first cover (20) in such a manner as to press the upper end portion (32).

FIG. 2



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a vehicle key device and in particular to a vehicle key device that includes a less number of components and that is easy to assemble.

2. Description of the Related Art

[0002] A vehicle key device including a key head portion housing an electronic circuit for radio communication and a battery for power supply, and a key blade functioning as an emergency mechanical key has been widespread as a handheld device included in a keyless entry system or the like. A keyless entry system allows a user of a vehicle to perform vehicle operations, such as locking or unlocking of the doors of the vehicle, without using a mechanical key but over the radio communication between an onboard device provided in the vehicle and a handheld device carried by the user.

[0003] As a technology concerning the vehicle key device having such a configuration, an unlocking key (a vehicle key device) or the like is disclosed by Japanese Unexamined Patent Application Publication No. 2007-297775. Figs. 12A to 12C illustrate a configuration of an unlocking key 200 according to Japanese Unexamined Patent Application Publication No. 2007-297775. Fig. 12A is a plan view of the unlocking key 200. Fig. 12B is a sectional view taken along line XIIB-XIIB illustrated in Fig. 12A. Fig. 12C is another sectional view taken along line XIIC-XIIC illustrated in Fig. 12A with a screw 205 fastened.

[0004] As illustrated in Figs. 12A to 12C, the unlocking key 200 includes a key head portion 202 having a blade insertion hole 201, a key blade 204 one end of which is inserted into the blade insertion hole 201 and is fastened there, and the screw 205 with which the key blade 204 is fastened to the key head portion 202.

[0005] The key blade 204 has a rectangular sectional shape. The one end of the key blade 204 has an inserted head portion 204a. A screw hole 203 is provided in the center of the inserted head portion 204a. One of wide surfaces of the inserted head portion 204a has sloping surfaces 207a at the right and left edges thereof.

[0006] The key head portion 202 includes a first cover 208 and a second cover 209 that are stacked one on top of the other. The key head portion 202 houses an electronic circuit, a battery, and so forth (all not illustrated). The first cover 208 and the second cover 209 are separably connected to each other. The blade insertion hole 201 is provide in a sidewall 210 of the first cover 208 and has a rectangular sectional shape whose long side is slightly longer than the width of the key blade 204. The first cover 208 has two projection insertion holes 208a and one screw insertion hole 208b in a surface thereof that adjoins the second cover 209.

[0007] The second cover 209 has two lines of interference projections 206 on a surface thereof that adjoins the first cover 208. The interference projections 206 each have a sectional shape that is insertable into a corresponding ones of the projection insertion holes 208a. One of edges of each of the interference projections 206 that is on a side from which the key blade 204 is inserted and that faces a corresponding one of the sloping surfaces 207a is chamfered and provides a sloping surface 207b. The second cover 209 has a screw insertion hole 209b that communicates with the screw insertion hole 208b provided in the first cover 208. The screw insertion hole 209b includes, at an end thereof on the upper side in Fig. 12B, a receiving recess 209d that receives the head of the screw 205.

[0008] The unlocking key 200 is assembled by inserting the inserted head portion 204a of the key blade 204 into the blade insertion hole 201 of the key head portion 202 and then fastening the key head portion 202 and the key blade 204 to each other with the screw 205. In the assembling process, the sloping surfaces 207a of the key blade 204 and the sloping surfaces 207b of the key head portion 202 are pressed against each other, whereby the key blade 204 is prevented from wobbling.

[0009] Such a vehicle key device is desired to include a less number of components and to be easy to assemble from viewpoints of cost reduction and so forth. However, in the unlocking key 200 according to Japanese Unexamined Patent Application Publication No. 2007-297775, a component, such as the screw 205, for fastening the key blade 204 to the key head portion 202 is necessary, which increases the number of components. Moreover, a screwing work or the like is necessary in the process of assembling the unlocking key 200, which makes the process of assembling the unlocking key 200 complicated.

SUMMARY OF THE INVENTION

[0010] In view of the above technical circumstances in the related art, the present invention provides a vehicle key device including a less number of components and that is easy to assemble.

[0011] To solve the above problems, an aspect of the present invention provides a vehicle key device including a key head portion and a key blade fastened to the key head portion. The key head portion includes a first cover having a blade insertion slot into which the key blade is inserted, and a second cover fitted to the first cover. The key blade includes an inserted portion inserted into the blade insertion slot and having a through hole. The blade insertion slot includes inner walls including an upper wall, a lower wall, a left wall, a right wall, and a rear wall; and an upper end portion providing the upper wall. The upper end portion includes an elastic part provided between a pair of notches. The elastic part includes a first projection

that snap-engages with the through hole of the key blade when the key blade is inserted into the blade insertion slot. The second cover is fitted to the first cover in such a manner as to press the upper end portion of the blade insertion slot.

[0012] In the vehicle key device configured as described above, the first projection provided on the elastic part of the blade insertion slot snap-engages with the through hole provided in the inserted portion of the key blade. Hence, the key blade is prevented from moving. Accordingly, the key blade is prevented from coming off the blade insertion slot. Moreover, since the second cover presses the upper end portion of the blade insertion slot from the upper side, the elastic part of the blade insertion slot is prevented from undergoing upward elastic deformation. Accordingly, the snap engagement between the first projection and the through hole is stabilized. Consequently, in the vehicle key device configured as described above, the key blade is fastened to the key head portion without screwing the key blade and the key head portion together. Since no screws for screwing are necessary, the number of components is reduced. Moreover, since screwing is unnecessary, the assembling method is simplified.

[0013] In the vehicle key device according to the above aspect of the present invention, the upper wall, the lower wall, the left wall, and the right wall of the blade insertion slot may each have a plurality of second projections that support the inserted portion of the key blade. Furthermore, the rear wall may have a contact surface with which the inserted portion of the key blade comes into contact.

[0014] In the vehicle key device configured as described above, the upper wall, the lower wall, the left wall, and the right wall of the blade insertion slot each have the plurality of second projections. Since the tops of such projections are easily deformable, the dimensional variations in the key head portion and in the key blade are absorbed by the deformation of the tops of the second projections, whereby the tops of the second projections are in close contact with the inserted portion of the key blade. Since the tops of the second projections are closely in contact with and thus support the inserted portion of the key blade, the key blade is prevented from moving in the vertical and horizontal directions. Moreover, the rear wall of the blade insertion slot provides a contact surface that comes into contact with the inserted portion of the key blade. Since the contact surface of the blade insertion slot comes into contact with the inserted portion of the key blade, the key blade is prevented from moving in the direction of insertion of the key blade. Consequently, in the vehicle key device configured as described above, the key blade is prevented from wobbling in the assembling process.

[0015] In the above aspect of the present invention, the lower wall may have a third projection that engages with the through hole of the key blade.

[0016] In the vehicle key device configured as described above, the lower wall of the blade insertion slot has the third projection that engages with the through hole of the key blade. Since the first projection and the third projection of the blade insertion slot engage with the through hole of the key blade, the force of preventing the key blade from moving is increased. Consequently, the key blade is more effectively prevented from coming off the blade insertion slot than in a case where only the first projection of the blade insertion slot engages with the through hole of the key blade.

[0017] According to the above aspect of the present invention, a vehicle key device including a less number of components and that is easy to assemble is provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Fig. 1 is a perspective view illustrating a configuration of a vehicle key device according to a first embodiment of the present invention;
Fig. 2 is an exploded perspective view illustrating the configuration of the vehicle key device according to the first embodiment of the present invention;
Figs. 3A and 3B illustrate a configuration of a first cover illustrated in Fig. 2;
Figs. 4A and 4B illustrate a configuration of a blade insertion slot illustrated in Fig. 2;
Figs. 5A and 5B illustrate a configuration of a second cover illustrated in Fig. 2;
Figs. 6A and 6B illustrate a configuration of a key blade illustrated in Fig. 2;
Figs. 7A to 7C illustrate a method of assembling the vehicle key device according to the first embodiment of the present invention;
Fig. 8 illustrates a state where the assembling of the vehicle key device according to the first embodiment of the present invention has been complete;
Fig. 9 is an exploded perspective view illustrating a configuration of a vehicle key device according to a second embodiment of the present invention;
Figs. 10A and 10B illustrate a configuration of a first cover illustrated in Fig. 9;
Figs. 11A and 11B illustrate a configuration of a blade insertion slot illustrated in Figs. 10A and 10B; and
Figs. 12A to 12C illustrate a configuration of a vehicle key device according to a related art.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Embodiment

[0019] A first embodiment of the present invention will now be described with reference to the accompanying drawings. The description proceeds on the basis of the following definitions: in each of the drawings, the X1 side corresponds to the left side, the X2 side corresponds to the right side, the Y1 side corresponds to the front side, the Y2 side corresponds to the rear side, the Z1 side

corresponds to the upper side, and the Z2 side corresponds to the lower side.

[0020] A configuration of a vehicle key device 1 according to the first embodiment of the present invention will first be described with reference to Figs. 1 to 6B. Fig. 1 is a perspective view illustrating the configuration of the vehicle key device 1 according to the first embodiment of the present invention. Fig. 2 is an exploded perspective view illustrating the configuration of the vehicle key device 1 according to the first embodiment of the present invention. Figs. 3A and 3B illustrate a configuration of a first cover 20 illustrated in Fig. 2. Fig. 3A is a top view. Fig. 3B is a sectional view taken along line IIIB-IIIB illustrated in Fig. 3A. Figs. 4A and 4B illustrate a configuration of a blade insertion slot 30 illustrated in Fig. 2. Fig. 4A is a sectional view taken along line IVA-IVA illustrated in Fig. 3A and illustrates a configuration around the blade insertion slot 30. Fig. 4B is a sectional view taken along line IVB-IVB illustrated in Fig. 3A and illustrates the configuration around the blade insertion slot 30. Figs. 5A and 5B illustrate a configuration of a second cover 40 illustrated in Fig. 2. Fig. 5A is a bottom view. Fig. 5B is a sectional view taken along line VB-VB illustrated in Fig. 5A. Figs. 6A and 6B illustrate a configuration of a key blade 50 illustrated in Fig. 2. Fig. 6A is a top view. Fig. 6B is a sectional view taken along line VIB-VIB illustrated in Fig. 6A.

[0021] The vehicle key device 1 is used as a handheld device included in a keyless entry system. The keyless entry system allows a user of a vehicle to perform vehicle operations, such as locking or unlocking of the doors of the vehicle, without using a mechanical key but over the radio communication between an onboard device provided in the vehicle and a handheld device carried by the user.

[0022] As illustrated in Figs. 1 and 2, the vehicle key device 1 includes a key head portion 10 and the key blade 50 fastened to the key head portion 10. The key head portion 10 is made of a synthetic resin and has a substantially rectangular-parallelepiped external shape. The key head portion 10 includes the first cover 20, the blade insertion slot 30 provided in the first cover 20, and the second cover 40 fitted to the first cover 20. The key head portion 10 houses an electronic circuit for radio communication and a battery for power supply (both not illustrated). The key blade 50 is a plate-like member made of metal and is used as an emergency mechanical key. The key blade 50 includes an inserted portion 51 inserted into the blade insertion slot 30 of the key head portion 10.

[0023] As illustrated in Figs. 3A and 3B, the first cover 20 includes a first fitting portion 21 fitted to the second cover 40 and a housing portion 22 housing the electronic circuit and the battery. The first cover 20 has, on the front side thereof, the blade insertion slot 30 into which the key blade 50 is inserted. The first fitting portion 21 extends along the right, left, and rear outer walls of the housing portion 22 and along the right and left outer walls of the blade insertion slot 30.

[0024] As illustrated in Figs. 4A and 4B, the blade insertion slot 30 has five inner walls 31 including an upper wall 31a, a lower wall 31b, a left wall 31c, a right wall 31d, and a rear wall 31e; and an upper end portion 32 providing the upper wall 31a. A space in the blade insertion slot 30 that is defined by the upper wall 31a, the lower wall 31b, the left wall 31c, the right wall 31d, and the rear wall 31e has a substantially rectangular-parallelepiped shape. The key blade 50 is inserted into the space.

[0025] The upper end portion 32 of the blade insertion slot 30 is a plate-like portion having upper and lower plate surfaces. The lower surface of the upper end portion 32 provides the upper wall 31a. The upper end portion 32 has a pair of notches 33 each extending from the rear side toward the front side. The pair of notches 33 are provided in a left-side part and in a right-side part, respectively, of the upper end portion 32. A part of the upper end portion 32 that is between the pair of notches 33 corresponds to an elastic part 34 extending from the front side toward the rear side. The elastic part 34 is made of a synthetic resin, as with the blade insertion slot 30. A rear portion of the elastic part 34 is elastically deformable in such a manner as to bend in the vertical direction.

[0026] The rear portion of the elastic part 34 has a first projection 35 projecting downward. The first projection 35 is a substantially truncated-conical member having a lower surface and an outer peripheral surface, with a lower front part thereof being cut off obliquely. Hence, the front side of the first projection 35 has a gentle slope, whereas the rear side of the first projection 35 has a steep slope.

[0027] The upper wall 31a, the lower wall 31b, the left wall 31c, and the right wall 31d of the blade insertion slot 30 each have a plurality of second projections 36 projecting inward therefrom. The second projections 36 each have a substantially semicircular sectional shape and extend from the front side toward the rear side. The second projections 36 are made of a synthetic resin, as with the blade insertion slot 30. The tops of the respective second projections 36 in the direction of projection (hereinafter simply referred to as the tops of the second projections 36) are easily deformable when a strong force is applied thereto.

[0028] The rear wall 31e of the blade insertion slot 30 provides a flat surface spreading in a direction orthogonal to the anteroposterior direction. The rear wall 31e of the blade insertion slot 30 serves as a contact surface with which the inserted portion 51 of the key blade 50 comes into contact when the key blade 50 is inserted into the blade insertion slot 30.

[0029] As illustrated in Figs. 5A and 5B, the second cover 40 includes a second fitting portion 41 fitted to the first fitting portion 21 of the first cover 20, and a supporting portion 42 provided at a position corresponding to the upper end portion 32 of the blade insertion slot 30.

[0030] The second fitting portion 41 extends as the inner wall of the second cover 40 and in conformity with the first fitting portion 21. The supporting portion 42 is a

flat portion with which the upper end portion 32 of the blade insertion slot 30 comes into contact. When the second cover 40 is attached to the first cover 20, the supporting portion 42 presses the upper end portion 32 of the blade insertion slot 30 from the upper side, thereby suppressing excessive upward elastic deformation of the elastic part 34 of the blade insertion slot 30.

[0031] The first cover 20 and the second cover 40 configured as described above are each formed by injection molding or the like. The first fitting portion 21 of the first cover 20 and the second fitting portion 41 of the second cover 40 are fitted to each other by a known method, for example, press fitting, snap fitting, or the like. Therefore, detailed description of the fitting method is omitted.

[0032] A configuration of the key blade 50 will now be described. As illustrated in Figs. 6A and 6B, the key blade 50 is a long, narrow, plate-like member having upper and lower plate surfaces and extending in the anteroposterior direction. A front portion of the key blade 50 is processed as a mechanical key. A rear portion of the key blade 50 corresponds to the inserted portion 51 that is inserted into the blade insertion slot 30 of the key head portion 10. The inserted portion 51 has an upper surface 51a, a lower surface 51b, a left side surface 51c, a right side surface 51d, and an end surface 51e. A part of the inserted portion 51 that is surrounded by the upper surface 51a, the lower surface 51b, the left side surface 51c, the right side surface 51d, and the end surface 51e has a substantially rectangular-parallelepiped shape.

[0033] To allow the key blade 50 to be inserted into the blade insertion slot 30, the outside dimensions of the inserted portion 51 are set to slightly smaller values than the outside dimensions of the space of the blade insertion slot 30 that is defined by the upper wall 31a, the lower wall 31b, the left wall 31c, the right wall 31d, and the rear wall 31e. The outside dimensions of the inserted portion 51 are set such that, when the key blade 50 is inserted into the blade insertion slot 30, the upper surface 51a, the lower surface 51b, the left side surface 51c, and the right side surface 51d of the inserted portion 51 come into close contact with the tops of the plurality of second projections 36 provided on the upper wall 31a, the lower wall 31b, the left wall 31c, and the right wall 31d of the blade insertion slot 30.

[0034] The end surface 51e of the inserted portion 51 provides a flat surface spreading in the direction orthogonal to the anteroposterior direction. When the key blade 50 is inserted into the blade insertion slot 30, the rear wall 31e of the blade insertion slot 30 and the end surface 51e of the inserted portion 51 come into contact with each other. The key blade 50 configured as described above is formed by performing a processing operation, such as cutting, on a plate-like member made of metal.

[0035] The inserted portion 51 also has a cylindrical through hole 52 extending therethrough from the upper surface 51a to the lower surface 51b. The through hole 52 is provided at a position corresponding to the first projection 35 provided on the elastic part 34 of the blade insertion slot 30. When the key blade 50 is inserted into the blade insertion slot 30, the through hole 52 and the first projection 35 snap-engage with each other.

[0036] A method of assembling the vehicle key device 1 will now be described with reference to Figs. 7A to 7C and Fig. 8. Figs. 7A to 7C illustrate the method of assembling the vehicle key device 1 according to the first embodiment of the present invention. Fig. 7A illustrates the key blade 50 and the blade insertion slot 30 in a state where the vehicle key device 1 is yet to be assembled. Fig. 7B illustrates a state where the key blade 50 have been inserted into the blade insertion slot 30. Fig. 7C illustrates the key blade 50, the blade insertion slot 30, and the supporting portion 42 with the second cover 40 having been attached to the first cover 20. Fig. 8 illustrates a state where the assembling of the vehicle key device 1 according to the first embodiment of the present invention has been complete. Figs. 7A to 7C and Fig. 8 are each a sectional view taken along line VII-VII or VIII-VIII illustrated in Fig. 3A. In Figs. 7A to 7C, the second projections 36 are omitted.

[0037] In the method of assembling the vehicle key device 1, after the electronic circuit and the battery are housed in the housing portion 22 of the first cover 20, the inserted portion 51 of the key blade 50 is inserted into the blade insertion slot 30 provided in the first cover 20. As illustrated in Fig. 7A, the key blade 50 is pushed into the blade insertion slot 30 from the front side toward the rear side.

[0038] The elastic part 34 of the blade insertion slot 30 has the first projection 35. With upward elastic deformation of the elastic part 34, the first projection 35 moves upward. Then, with the upward movement of the first projection 35, the key blade 50 is allowed to be inserted into the blade insertion slot 30. The gentle slope on the front side of the first projection 35 facilitates the insertion of the key blade 50 into the blade insertion slot 30.

[0039] As illustrated in Fig. 7B, when the key blade 50 is inserted into the blade insertion slot 30, the first projection 35 of the blade insertion slot 30 and the through hole 52 of the key blade 50 snap-engage with each other. With the snap engagement between the first projection 35 of the blade insertion slot 30 and the through hole 52 of the key blade 50, the key blade 50 is retained in the blade insertion slot 30. The steep slope on the rear side of the first projection 35 prevents the key blade 50 from moving toward the front side after the first projection 35 and the through hole 52 have snap-engaged with each other.

[0040] As illustrated in Fig. 8, when the key blade 50 is inserted into the blade insertion slot 30, the tops of the second projections 36 of the blade insertion slot 30 come into close contact with the inserted portion 51 of the key blade 50. Thus, the second projections 36 whose tops are in close contact with the inserted portion 51 of the key blade 50 support the inserted portion 51 of the key blade 50 and prevent the key blade 50 from moving in the vertical and horizontal directions.

[0041] As illustrated in Fig. 7B, when the key blade 50 is inserted into the blade insertion slot 30, the rear wall 31e of the blade insertion slot 30 and the end surface 51e of the key blade 50 come into contact with each other. With the contact between the rear wall 31e of the blade insertion slot 30 and the end surface 51e of the key blade 50, the key blade 50 is prevented from moving toward the rear side.

[0042] Subsequently, the second cover 40 is attached to the first cover 20 from the upper side. As illustrated in Fig. 7C, when the second cover 40 is attached to the first cover 20, the supporting portion 42 of the second cover 40 presses the upper end portion 32 of the blade insertion slot 30 from the upper side. With the pressing of the upper end portion 32 of the blade insertion slot 30 from the upper side by the supporting portion 42 of the second cover 40, the elastic part 34 of the blade insertion slot 30 is prevented from undergoing excessive upward elastic deformation. Hence, the snap engagement between the first projection 35 and the through hole 52 is stabilized, and the key blade 50 is fastened to the key head portion 10.

[0043] When the second cover 40 is attached to the first cover 20, the first fitting portion 21 of the first cover 20 and the second fitting portion 41 of the second cover 40 (not illustrated) are fitted to each other. With the fitting between the first fitting portion 21 of the first cover 20 and the second fitting portion 41 of the second cover 40, the second cover 40 is retained by the first cover 20. In this manner, the vehicle key device 1 is assembled.

[0044] Advantageous effects produced in the first embodiment will now be described. In the vehicle key device 1 according to the first embodiment, the first projection 35 provided on the elastic part 34 of the blade insertion slot 30 snap-engages with the through hole 52 provided in the inserted portion 51 of the key blade 50. Hence, the key blade 50 is prevented from moving toward the front side. Accordingly, the key blade 50 is prevented from coming off the blade insertion slot 30. Moreover, since the supporting portion 42 of the second cover 40 presses the upper end portion 32 of the blade insertion slot 30 from the upper side, the elastic part 34 of the blade insertion slot 30 is prevented from undergoing excessive upward elastic deformation. Accordingly, the snap engagement between the first projection 35 and the through hole 52 is stabilized. Consequently, in the vehicle key device 1, the key blade 50 is fastened to the key head portion 10 without screwing the key blade 50 and the key head portion 10 together. Since no screws for screwing are necessary, the number of components is reduced. Moreover, since screwing is unnecessary, the assembling method is simplified.

[0045] In the vehicle key device 1 according to the first embodiment that is configured as described above, it is desirable to provide a gap between the upper wall 31a, the lower wall 31b, the left wall 31c, and the right wall 31d of the blade insertion slot 30 and the upper surface 51a, the lower surface 51b, the left side surface 51c, and the right side surface 51d of the key blade 50, considering variations in the dimensions of the key head portion 10 and variations in the dimensions of the key blade 50. However, if such a gap is provided between the blade insertion slot 30 and the key blade 50, the key blade 50 tends to wobble in the assembling process unless any measures for supporting the key blade 50 are taken.

[0046] In the vehicle key device 1 according to the first embodiment, the upper wall 31a, the lower wall 31b, the left wall 31c, and the right wall 31d of the blade insertion slot 30 each have the plurality of second projections 36. Since the tops of the second projections 36 are easily deformable, the dimensional variations in the key head portion 10 and in the key blade 50 are absorbed by the deformation of the tops of the second projections 36, whereby the tops of the second projections 36 are in close contact with the inserted portion 51 of the key blade 50. Since the tops of the second projections 36 are closely in contact with and thus support the inserted portion 51 of the key blade 50, the key blade 50 is prevented from moving in the vertical and horizontal directions. Moreover, the rear wall 31e of the blade insertion slot 30 provides a contact surface that comes into contact with the end surface 51e of the inserted portion 51 of the key blade 50. Since the rear wall 31e of the blade insertion slot 30 comes into contact with the end surface 51e of the key blade 50, the key blade 50 is prevented from moving toward the rear side. Consequently, in the vehicle key device 1, the key blade 50 is prevented from wobbling in the assembling process.

Second Embodiment

[0047] A second embodiment of the present invention will now be described with reference to associated drawings. In the second embodiment, elements that are the same as those described in the first embodiment are denoted by corresponding ones of the reference numerals, and detailed description thereof is omitted.

[0048] A configuration of a vehicle key device 101 according to the second embodiment of the present invention will first be described with reference to Figs. 9 to 11B. Fig. 9 is an exploded perspective view illustrating the configuration of the vehicle key device 101 according to the second embodiment of the present invention. Figs. 10A and 10B illustrate a configuration of a first cover 120 illustrated in Fig. 9. Fig. 10A is a top view. Fig. 10B is a sectional view taken along line XB-XB illustrated in Fig. 10A. Figs. 11A and 11B illustrate a configuration of a blade insertion slot 130 illustrated in Figs. 10A and 10B. Fig. 11A is a sectional view taken along line XIA-XIA illustrated in Fig. 10A and illustrates a configuration around the blade insertion slot 130. Fig. 11B is a sectional view taken along line XIB-XIB illustrated in Fig. 10A and illustrates a configuration around the blade insertion slot 130.

[0049] As illustrated in Fig. 9, the vehicle key device 101 includes the key head portion 10 and the key blade

50 that is fastened to the key head portion 10. The key head portion 10 includes the first cover 120 and the second cover 40. The first cover 120 has the blade insertion slot 130. The first cover 120, the blade insertion slot 130, and the second cover 40 are made of a synthetic resin. The key blade 50 is made of metal.

[0050] As illustrated in Figs. 10A and 10B and Figs. 11A and 11B, the blade insertion slot 130 includes five inner walls 31 including the upper wall 31a, the lower wall 31b, the left wall 31c, the right wall 31d, and the rear wall 31e; and the upper end portion 32 providing the upper wall 31a. The upper end portion 32 of the blade insertion slot 130 includes the pair of notches 33 and the elastic part 34. The elastic part 34 has the first projection 35 provided on the rear portion thereof. The upper wall 31a, the lower wall 31b, the left wall 31c, and the right wall 31d of the blade insertion slot 130 each have the plurality of second projections 36.

[0051] As illustrated in Figs. 11A and 11B, the lower wall 31b of the blade insertion slot 130 has a substantially hemispherical third projection 131. The third projection 131 is made of a synthetic resin, as with the blade insertion slot 130. When the key blade 50 is inserted into the blade insertion slot 130, both the first projection 35 and the third projection 131 of the blade insertion slot 130 engage with the through hole 52 of the key blade 50. Since the first projection 35 and the third projection 131 of the blade insertion slot 130 engage with the through hole 52 of the key blade 50, a force of preventing the key blade 50 from moving toward the front side is increased.

[0052] Advantageous effects produced in the second embodiment will now be described. In the vehicle key device 101 according to the second embodiment, the lower wall 31b of the blade insertion slot 130 has the third projection 131, and not only the first projection 35 of the blade insertion slot 130 but also the third projection 131 of the blade insertion slot 130 engage with the through hole 52 of the key blade 50. Since the first projection 35 and the third projection 131 of the blade insertion slot 130 engage with the through hole 52 of the key blade 50, the force of preventing the key blade 50 from moving toward the front side is increased. Consequently, the key blade 50 is more effectively prevented from coming off the blade insertion slot 30 than in a case where only the first projection 35 of the blade insertion slot 130 engages with the through hole 52 of the key blade 50.

[0053] While the embodiments of the present invention have been described above, the present invention is not limited to the above embodiments. The above embodiments can be modified according to need without departing from the scope of the present invention.

[0054] For example, in each of the embodiments of the present invention, the vehicle key device 1 (or the vehicle key device 101) may be used for any other purposes instead of the keyless entry system. In that case, the key head portion 10 may house any devices other than the electronic circuit for radio communication and the battery for power supply.

[0055] In each of the embodiments of the present invention, the key head portion 10 may have any other external shape instead of that described above. Moreover, the key head portion 10 may be provided with any other devices in addition to those described above. For example, an operation switch for instructing the locking/unlocking of the doors of the vehicle may be provided on the surface of the key head portion 10.

[0056] As long as the predetermined functions are provided in each of the embodiments of the present invention, the first cover 20 (or the first cover 120), the blade insertion slot 30 (or the blade insertion slot 130), and the second cover 40 may each be made of any other material instead of a synthetic resin. Moreover, the key blade 50 may be made of any other material instead of metal.

[0057] As long as the upward elastic deformation of the elastic part 34 is suppressed in each of the embodiments of the present invention, the supporting portion 42 of the second cover 40 may have any other shape instead of that described above. For example, the supporting portion 42 may be a projection projecting downward in such a manner as to press a predetermined part of the upper end portion 32 of the blade insertion slot 30.

[0058] As long as the predetermined functions are provided in each of the embodiments of the present invention, the first projection 35, the second projections 36, and the third projection 131 may have any other shapes instead of those described above. For example, the first projection 35 may be a substantially hemispherical projection or a substantially truncated-conical projection; the second projections 36 may each be replaced with a plurality of substantially hemispherical or substantially truncated-conical projections that are arranged in the anteroposterior direction; and the third projection 131 may be a substantially truncated-conical projection.

[0059] As long as the predetermined functions are provided in each of the embodiments of the present invention, only a portion of the rear wall 31e may serve as the contact surface with which the end surface 51e of the key blade 50 comes into contact.

Claims

1. A vehicle key device (1) comprising:

a key head portion (10); and
a key blade (50) fastened to the key head portion (10),
wherein the key head portion (10) includes
a first cover (20) having a blade insertion slot (30) into which the key blade (50) is inserted; and
a second cover (40) fitted to the first cover (20),
wherein the key blade (50) includes
an inserted portion (51) inserted into the blade insertion slot (30) and having a through hole (52),
wherein the blade insertion slot (30) includes

inner walls (31) including an upper wall (31a), a lower wall (31b), a left wall (31c), a right wall (31d), and a rear wall (31e); and
an upper end portion (32) providing the upper wall (31a),
wherein the upper end portion (32) includes an elastic part (34) provided between a pair of notches (33),
wherein the elastic part (34) includes a first projection (35) that snap-engages with the through hole (52) of the key blade (50) when the key blade (50) is inserted into the blade insertion slot (30), and
wherein the second cover (40) is fitted to the first cover (20) in such a manner as to press the upper end portion (32) of the blade insertion slot (30).

2. The vehicle key device (1) according to Claim 1, wherein the upper wall (31a), the lower wall (31b), the left wall (31c), and the right wall (31d) of the blade insertion slot (30) each have a plurality of second projections (36) that support the inserted portion (51) of the key blade (50), and
wherein the rear wall (31e) has a contact surface with which the inserted portion (51) of the key blade (50) comes into contact.

3. The vehicle key device (1) according to Claim 1 or 2, wherein the lower wall (31b) has a third projection (131) that engages with the through hole (52) of the key blade (50).

FIG. 1

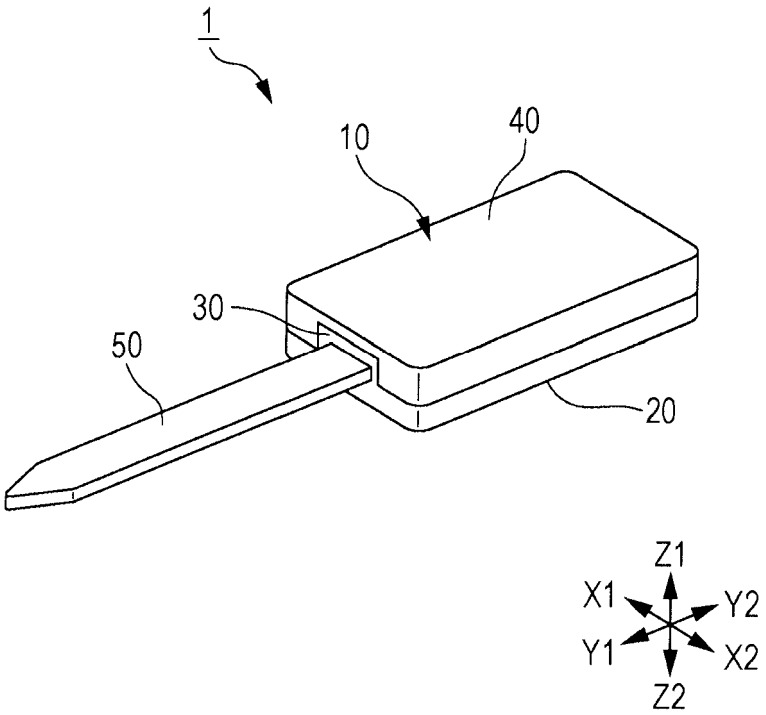


FIG. 2

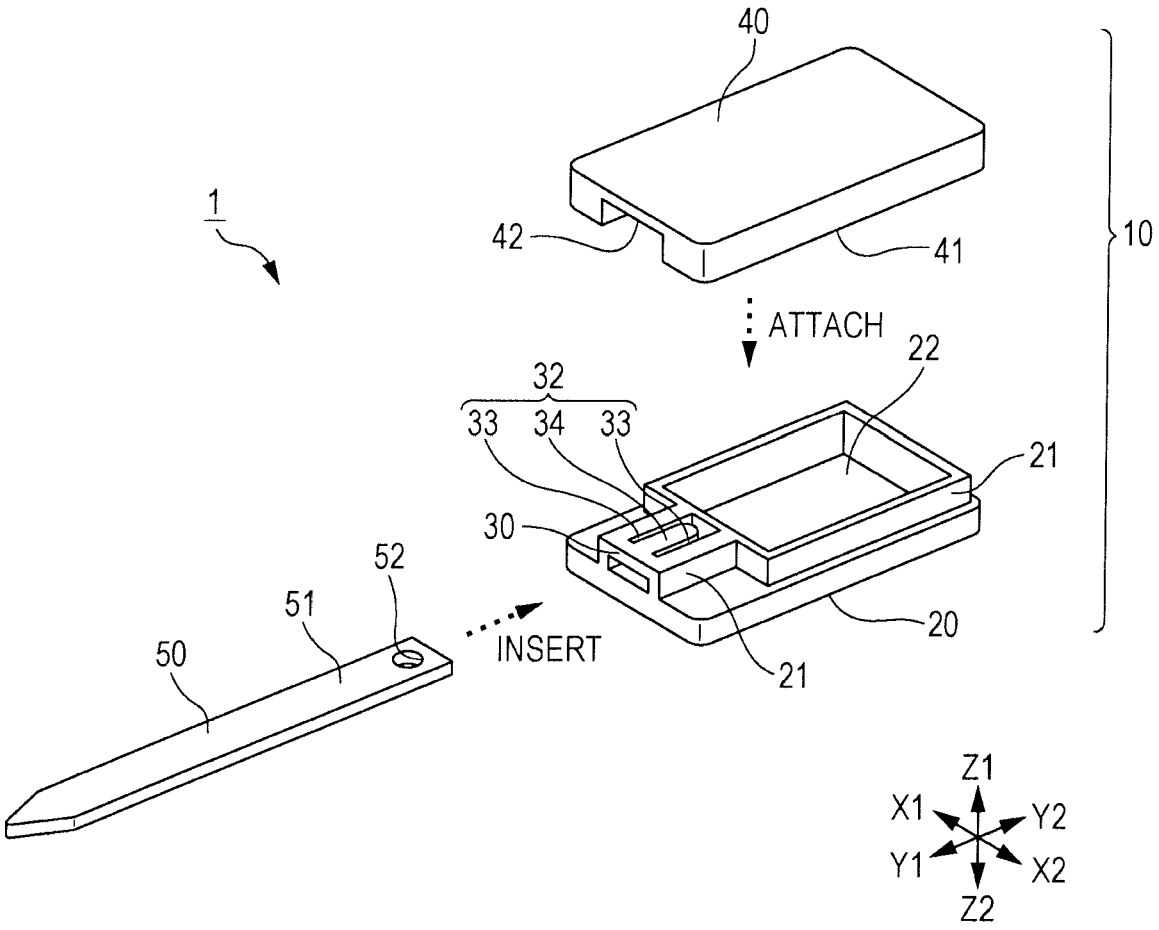

40
1
42
41
10
ATTACH
22
32
33
34
33
21
30
52
51
50
INSERT
20
21
Z1
X1
Y2
Y1
X2
Z2

FIG. 3A

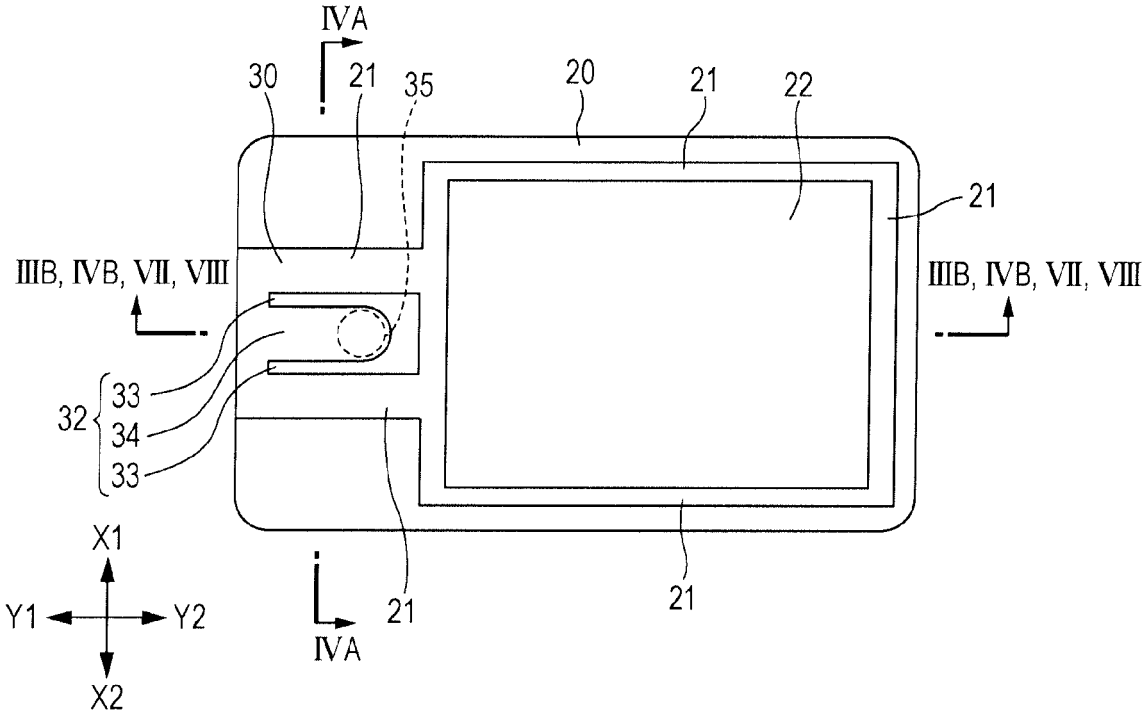

IVA
30
21
35
20
21
22
21
IIIB, IVB, VII, VIII
IIIB, IVB, VII, VIII
32
33
34
33
X1
Y1
Y2
X2
21
21
IVA

FIG. 3B

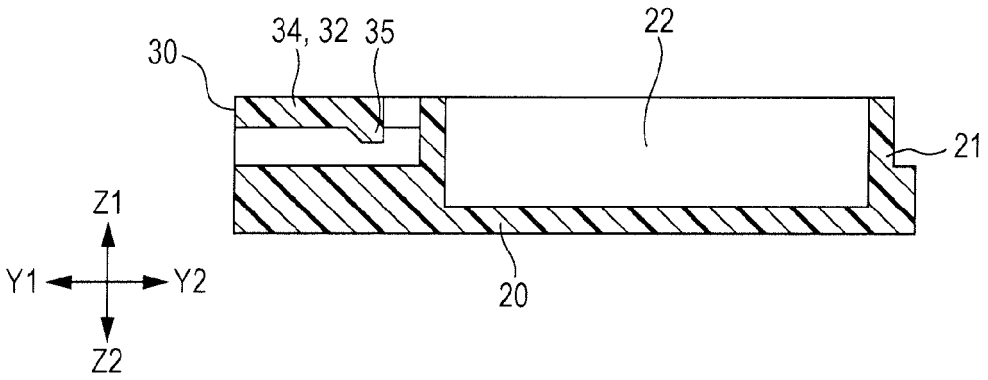

30
34, 32
35
22
21
Z1
Y1
Y2
Z2
20

FIG. 4A

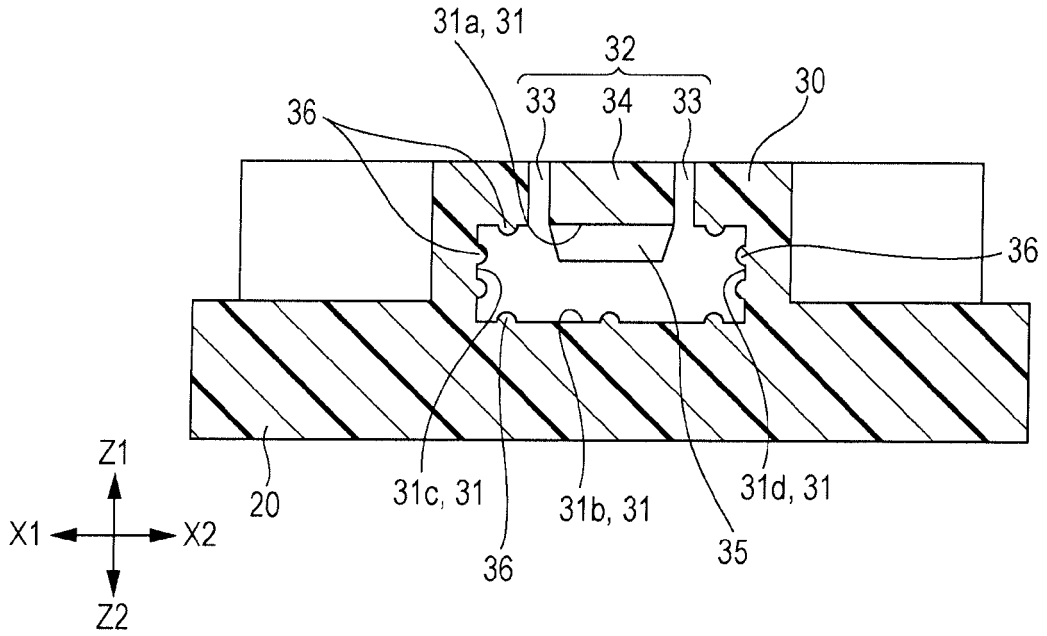

31a, 31
32
33
34
33
30
36
36
20
31c, 31
31b, 31
31d, 31
36
35
Z1
X1
X2
Z2

FIG. 4B

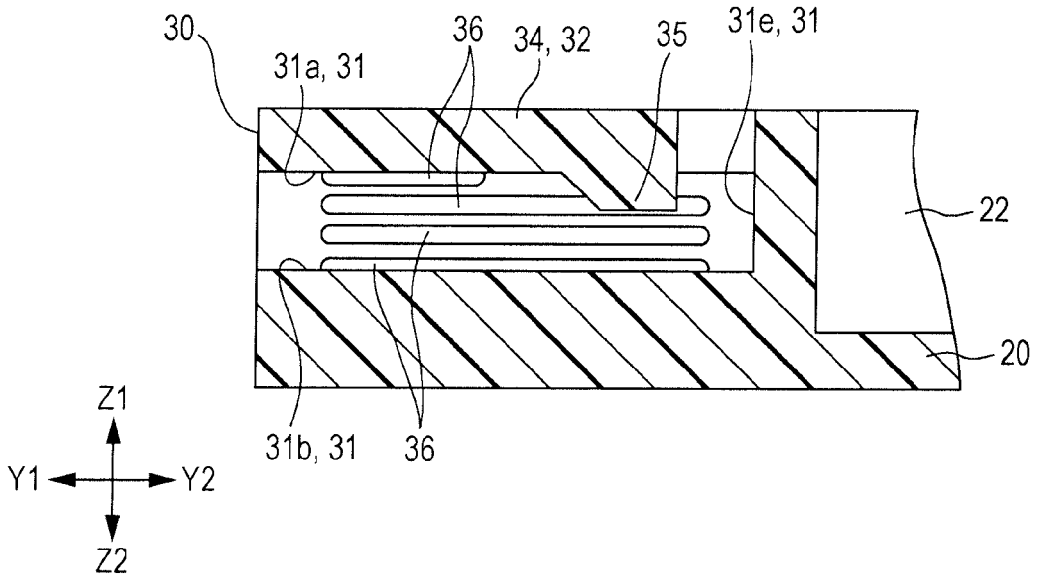

30
31a, 31
36
34, 32
35
31e, 31
22
20
31b, 31
36
Z1
Y1
Y2
Z2

FIG. 5A

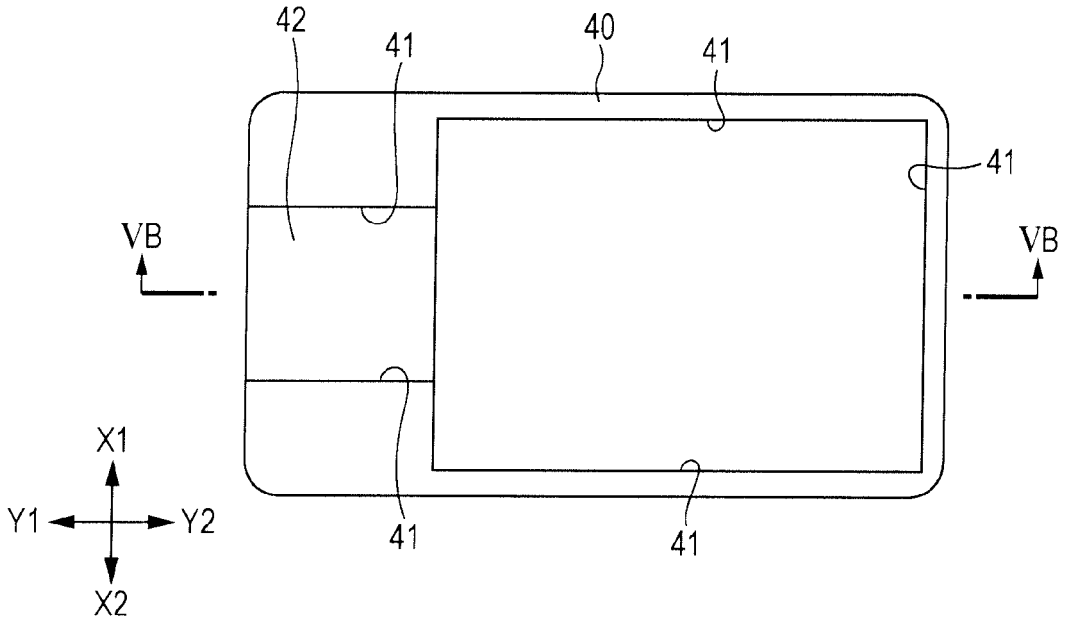


FIG. 5B

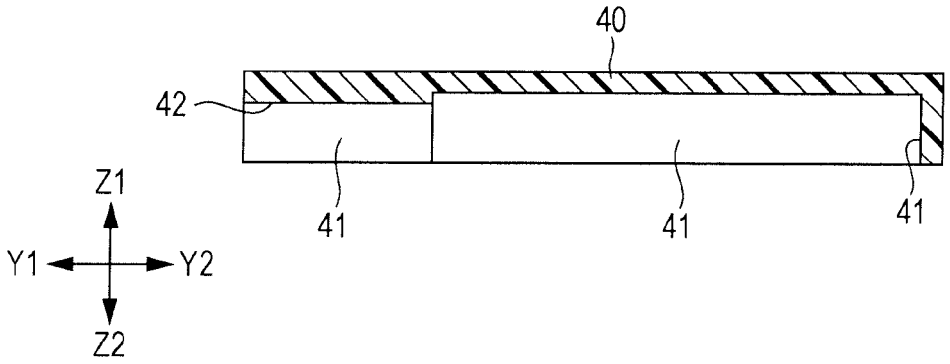


FIG. 6A

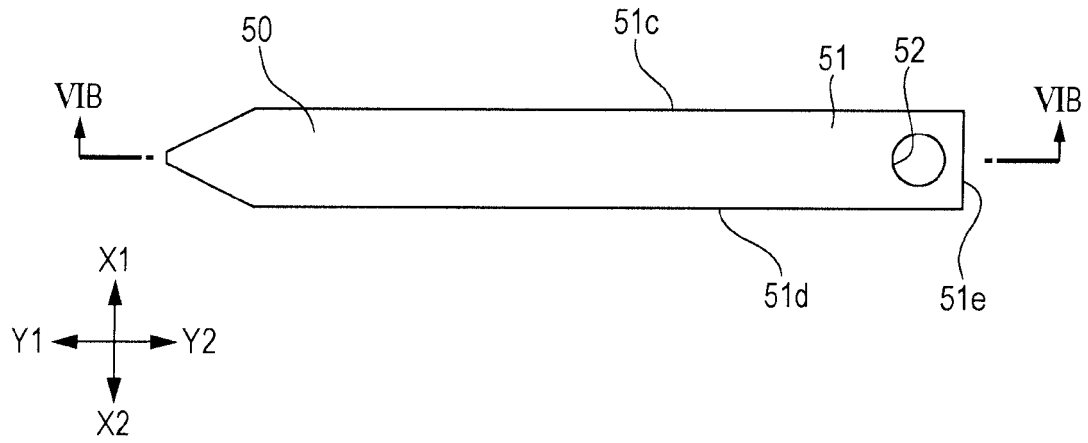

50
51c
51
52
VIB
VIB
51d
51e
X1
Y1
Y2
X2

FIG. 6B

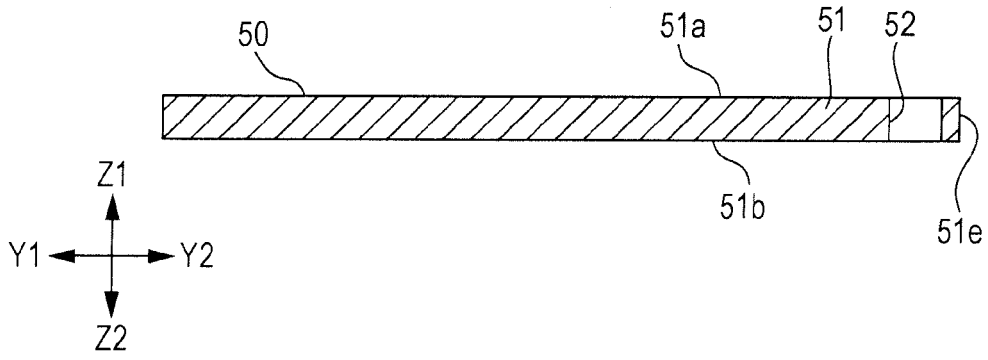

50
51a
51
52
51b
51e
Z1
Y1
Y2
Z2

FIG. 7A

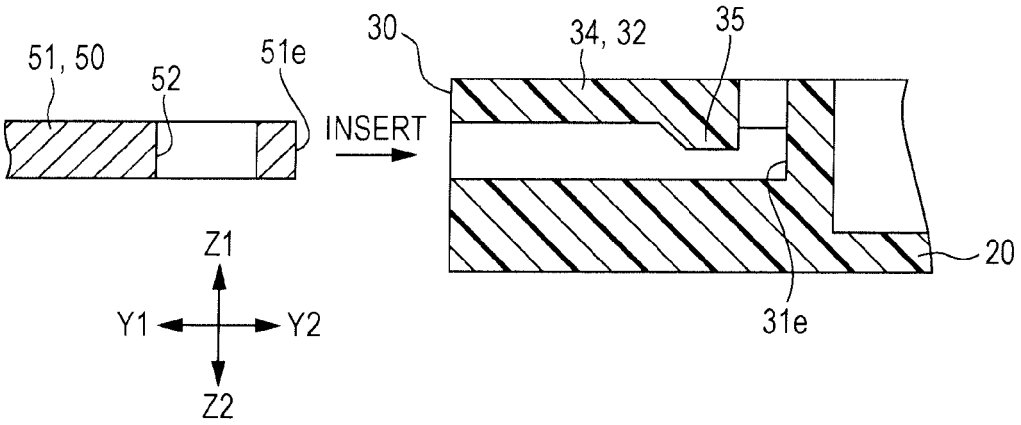


FIG. 7B

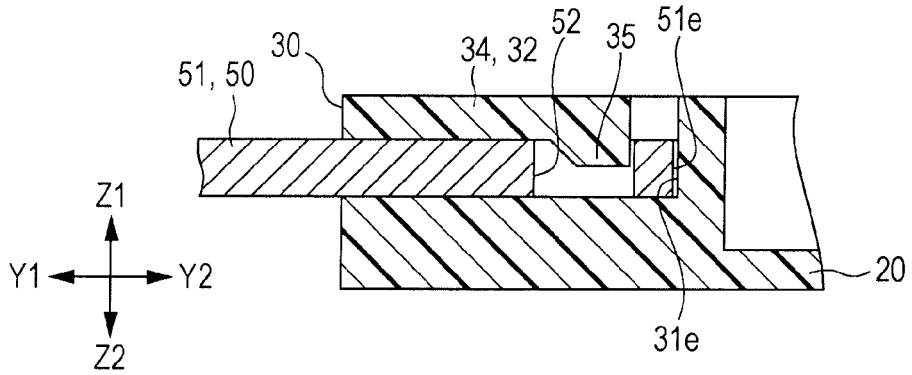


FIG. 7C

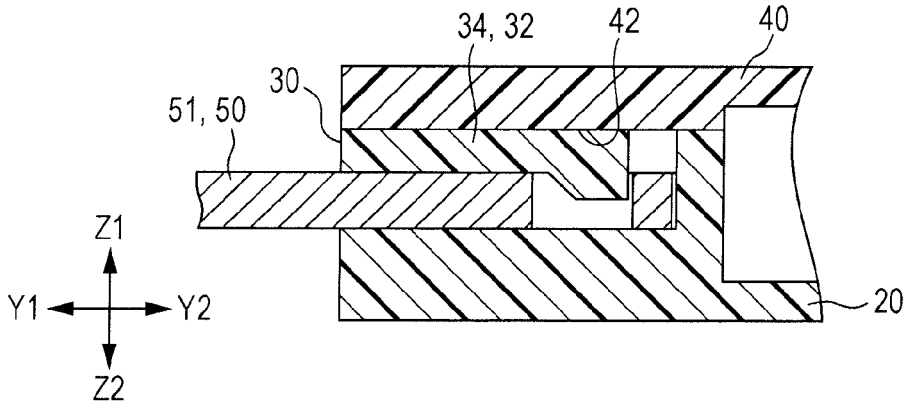


FIG. 8

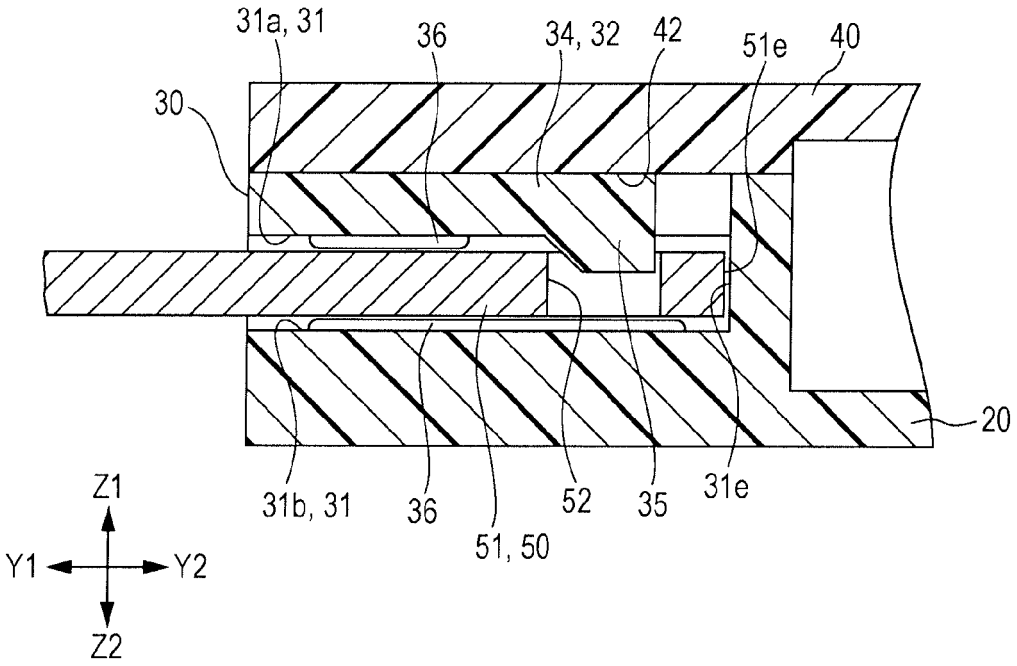


FIG. 9

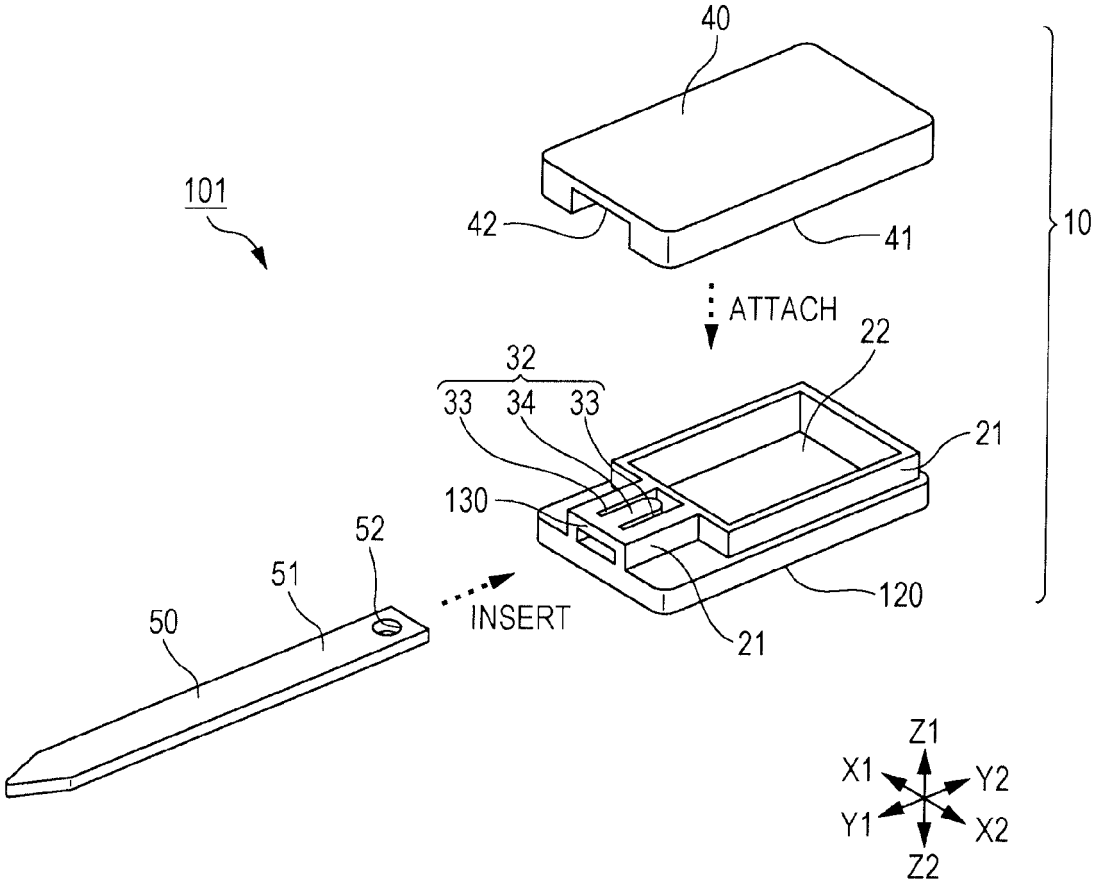

40
101
42
41
10
ATTACH
22
32
33
34
33
21
130
52
51
50
INSERT
120
21
Z1
X1
Y2
Y1
X2
Z2

FIG. 10A

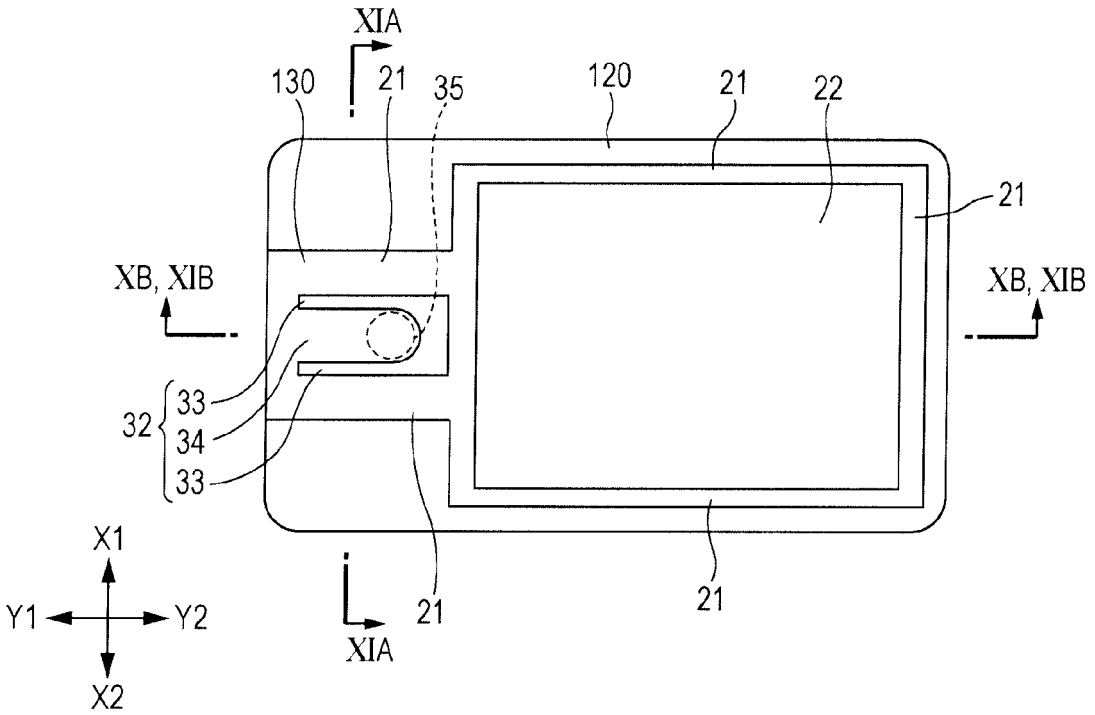


FIG. 10B

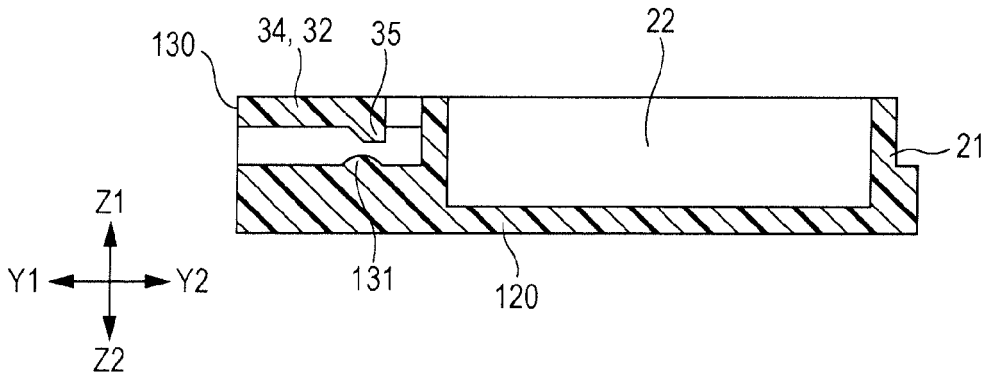


FIG. 11A

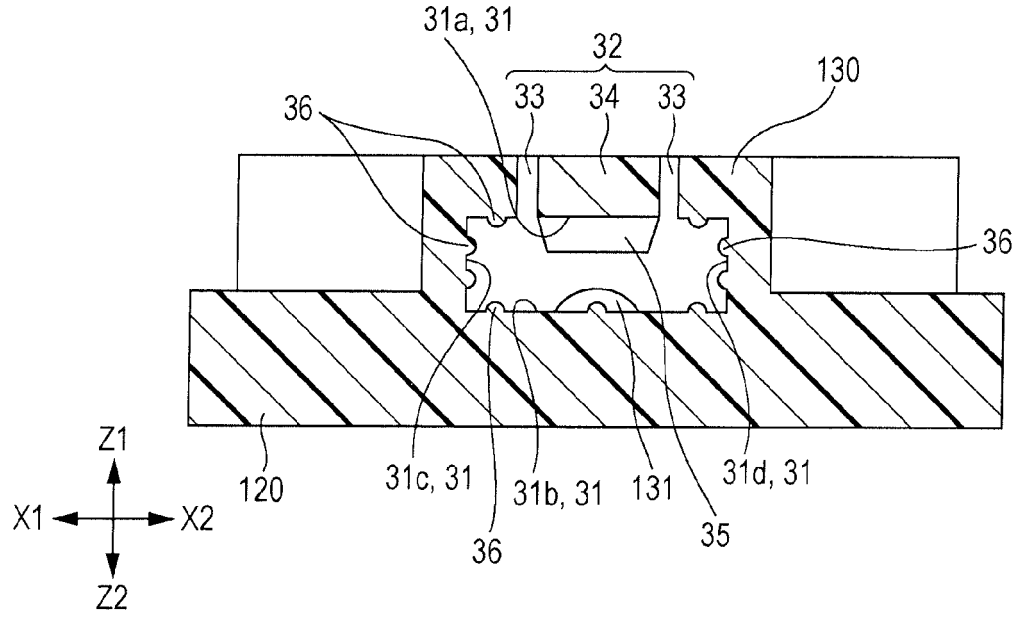


FIG. 11B

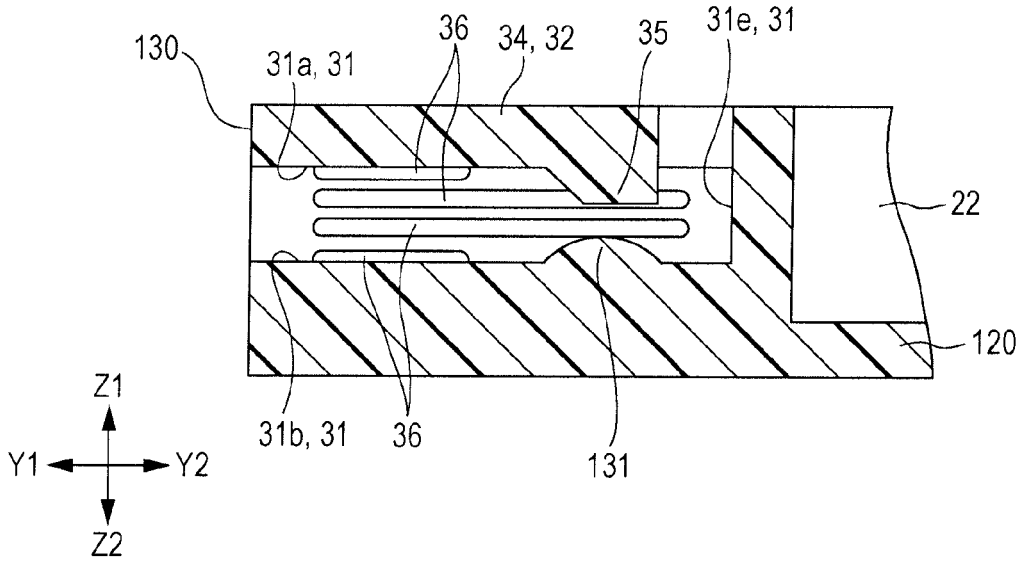


FIG. 12A

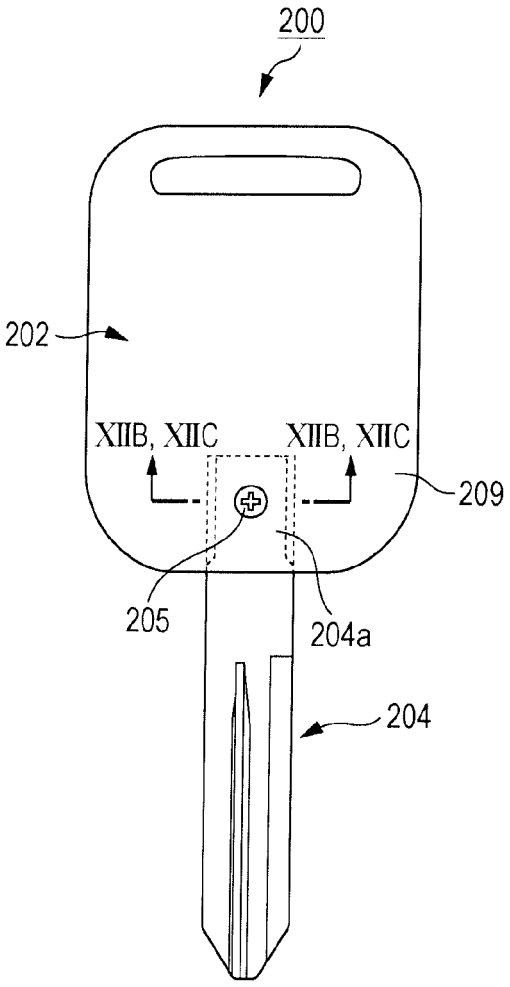


FIG. 12B

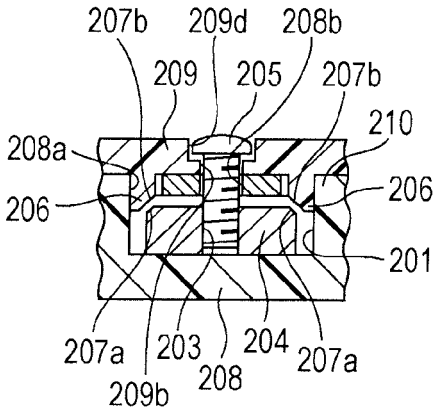
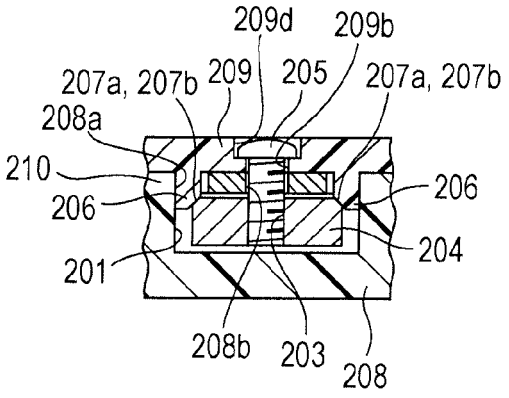


FIG. 12C



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Patent documents cited in the description

- JP 2007297775 A **[0003] [0009]**