(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 528 080 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
17.12.2014 Bulletin 2014/51

(21) Application number: **12168480.7**

(22) Date of filing: **18.05.2012**

(51) Int Cl.:
H01H 50/58 *(2006.01)* ***H01H 50/04*** *(2006.01)*
H01H 50/26 *(2006.01)*

(54) **Electromagnetic relay**

Elektromagnetisches Relais

Relais électromagnétique

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **24.05.2011 JP 2011116167**

(43) Date of publication of application:
28.11.2012 Bulletin 2012/48

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Printed by Jouve, 75001 PARIS (FR)

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an electromagnetic relay.

[0002] Heretofore, as disclosed in Japanese Patent Laid-Open Publication No. 2005-293952 (hereinafter, referred to as Patent Literature 1), an electromagnetic relay has been known, which includes: an armature reciprocated by excitation and non-excitation of an electromagnet block; a card swinging with movement of the armature; and a contact unit switched on and off according to the swing of the card.

[0003] In this Patent Literature 1, the card includes a shaft portion at an end thereof which is swingably attached to a base by causing the shaft portion to be fit and supported onto the base.

SUMMARY OF THE INVENTION

[0004] However, in such a conventional electromagnetic relay to cause the shaft portion of the card to be fit and supported on the base, the shaft portion is inserted sideways to a shaft bearing recess of the base.

[0005] The shaft portion of the card therefore could drop out of the bearing recess during assembly of the electromagnetic relay. Such detachment of the card from the base degrades the smooth assembly operation.

[0006] JP-A-9-320441 discloses an electromagnetic relay according to the preamble of claim 1.

[0007] An object of the present invention is to provide an electromagnetic relay with the assembly operation further improved.

[0008] A first feature of the present invention is summarized to be an electromagnetic relay including: an electromagnet block mounted on a base; an armature reciprocated by excitation and non-excitation of the electromagnet block; a card swingably attached to the base through a pivot shaft and configured to swing with movement of the armature; and a contact unit switched on and off according to the swing of the card, wherein the pivot shaft includes at least one shaft portion rotatably engaged with the base and at least one large-diameter portion having a larger diameter than that of the at least one shaft portion, the base includes: at least one shaft bearing portion which is opened at the surface side of the base and is configured to receive the at least one shaft portion; and at least one large-diameter bearing portion configured to receive the at least one large-diameter portion, and opening width of the at least one shaft bearing portion is smaller than the diameter of the at least one shaft portion at an insertion port side through which the at least one shaft bearing portion receives the at least one shaft portion, while at an internal side of the base, the at least one shaft bearing portion is larger than the diameter of the at least one shaft portion and smaller than the width of the at least one large-diameter portion.

[0009] A second feature of the present invention is summarized in that the at least one large-diameter portion is provided adjacent to the at least one shaft portion in an axial direction of a central axis of the at least one shaft portion.

[0010] A third feature of the present invention is summarized in that the at least one shaft portion are arranged at both ends of the pivot shaft in the axial direction of the central axis thereof, and the at least one large-diameter portion is provided at the center of the pivot shaft in the axial direction of the central axis thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 is a cross-sectional view of an electromagnetic relay according to an embodiment of the present invention.

Fig. 2 is a perspective view showing a state where a case is separated from the electromagnetic relay shown in Fig. 1.

Fig. 3 is a perspective view showing a state where the card is to be assembled to the base.

Fig. 4 is a perspective view showing a state where the card is assembled to the base.

Fig. 5 is a side view showing the state where the card is assembled to the base.

Figs. 6(a) and 6(b) are views showing an attachment portion between the card and the base, Fig. 6(a) being a schematic perspective view of a pivot shaft, Fig. 6(b) being a schematic perspective view of a shaft bearing portion.

Figs. 7(a) and 7(b) are views showing the attachment portion between the card and the base, Fig. 7(a) being a schematic perspective view of a pivot shaft, Fig. 7(b) being a schematic perspective view of a shaft bearing portion.

Figs. 8(a) and 8(b) are views showing a modification of the attachment portion between the card and the base, Fig. 8 (a) being a schematic perspective view of a pivot shaft, Fig. 8 (b) being a schematic perspective view of a shaft bearing portion.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] A description is made below in detail of embodiments of the present invention while referring to the drawings.

[0013] An electromagnetic relay 1 according to the embodiment includes a base 2, an electromagnet block 3, an armature 4, a card 5, a contact unit 6, and a case 7.

[0014] The base 2 is made of synthetic resin which is an insulating material and has a substantially rectangular shape with its overall planer shape having a longitudinal direction and a transverse direction and has a certain thickness.

[0015] The electromagnet block 3 is mounted on an end of the base 2 in the longitudinal direction and includes: a bobbin 32 with a coil 31 wound thereon; an iron core 33; and a substantially L-shaped yoke 34 connected to a lower end of the iron core 33. A pair of coil terminals 31a arranged in the transverse direction of the base 2 are protruded downward from the base 2. Portions of the yoke 34 stood from the base 2 sandwich a permanent magnet 35.

[0016] The armature 4 is made of a soft magnetic material and has a bent portion 4a to form a substantially L-shape. An end portion of the armature 4 forms a horizontal portion 4b facing the upper surface of the bobbin 32, and the other end portion thereof forms a vertical portion 4c extending along a side surface of the yoke 34 opposite to the bobbin 32. The armature 4 is arranged so that the bent portion 4a is supported on the upper end of the yoke 34 while the top of the horizontal portion 4b faces the upper end surface of the iron core 33 with a proper distance therebetween.

[0017] When the armature 4 is positioned as shown in Fig. 1, if current is applied to the coil 31 in a predetermined direction to excite the electromagnet block 3, the horizontal portion 4b is attracted by the iron core 33, and the vertical portion 4c of the armature 4 rotates counterclockwise (Fig. 1) about the bent portion 4a as a fulcrum in a direction away from the yoke 34.

[0018] If the energization of the coil 31 is stopped in such a state, the armature 4 is held at that position (a position in which the vertical portion 4c of the armature 4 is rotated counterclockwise in Fig. 1 about the bent portion 4a as a fulcrum so as to be shifted in a direction away from the yoke 34) by attraction of the permanent magnet 35.

[0019] If current is applied to the coil 31 in the opposite direction to excite the electromagnet block 3 with the armature 4 being rotated counterclockwise in Fig. 1, the horizontal portion 4b is separated from the iron core 33, and the vertical portion 4c of the armature 4 rotates clockwise in Fig. 1 about the bent portion 4a as a fulcrum so as to move toward the yoke 34.

[0020] If the energization to the coil 31 is stopped in this state, the position of the armature 4 is maintained (at the position shown in Fig. 1) by attraction of the permanent force 35.

[0021] The armature 4 is provided with a hinge spring 41, which prevents the armature 4 from being displaced by reciprocation.

[0022] As described above, the electromagnetic relay 1 according to the embodiment is a so-called latch type in which the armature 4 is reciprocated by changing the direction of the current applied to the coil 31.

[0023] The card 5 is placed between the vertical portion 4c of the armature 4 and the contact unit 6 provided at the other end of the base 2 in the longitudinal direction and is swingably attached to the base 2 through a pivot shaft 51 provided at its lower end. The direction of swing at this time is in the longitudinal direction of the base 2 as indicated by arrow b of Fig. 1.

[0024] One side 5a of the card 5 facing the vertical portion 4c of the armature 4 is provided with a first protrusion 52. The first protrusion 52 is provided substantially at the middle of the card 5 in the vertical direction and is configured to come into contact with the vertical portion 4c of the armature 4. The other side 5b of the card 5 facing the contact unit 6 is provided with a second protrusion 53 which is located above the first protrusion 52.

[0025] When the vertical portion 4c of the reciprocating armature 4 moves in a direction away from the yoke 34 with the excitation of the electromagnet block 3 (energization of the coil 31 in a predetermined direction), the force of this movement is inputted through the first protrusion 52 to the card 5 to swing the card 5 toward the contact unit 6.

[0026] The contact unit 6 includes: a fixed terminal 61 having a fixed contact unit 61a; and a movable spring 62 having a movable contact unit 62a. The fixed terminal 61 and movable spring 62 are located such that the movable spring 62 is located at the card 5 side whereas the fixed terminal 61 is located at the side away from the card 5 respectively, and face each other in the longitudinal direction of the base 2 so as to stand from the base 2 with the respective lower ends supported by the base 2. The fixed terminal 61 and movable spring 62 have terminals 61b and 62b protruded downward from the base 2.

[0027] In this embodiment, the contact unit 6 is configured to serve as a contact in which the fixed contact unit 61a and movable contact unit 62a are separated from each other when the horizontal portion 4b is not attracted by the iron core 33 and come into contact with each other if the electromagnet block 3 is excited so that the horizontal portion 4b is attracted by the iron core 33.

[0028] In other words, the movable spring 62 is positioned in contact with or is close to the second protrusion 53 of the card 5 when the horizontal portion 4b is not attracted by the iron core 33. When the card 5 swings with excitation of the electromagnet block 3 (energization of the coil 31 in the predetermined direction), the second protrusion 53 presses the movable spring 62, which is then bent. When the movable spring 62 bends, the movable contact unit 62a comes into contact with the fixed contact unit 61a, turning on the contact unit 6.

[0029] On the other hand, if the vertical portion 4c of the armature 4 moves clockwise in Fig. 1 with excitation of the electromagnet block 3 (energization of the coil 31 in the direction opposite to the predetermined direction), the card 5 swings toward the armature 4 by spring force of the movable spring 62. The movable contact unit 62a is then separated from the fixed contact unit 61a, turning off the contact unit 6.

[0030] In such a manner, the contact unit 6 is switched on and off according to the swing of the card 5.

[0031] The contact unit 6 may have such a structure that the contact unit 6 is on when the horizontal portion 4b is not attracted by the iron core 33 or may have a

contact structure including both of a contact which is on while the horizontal portion 4b is not attracted by the iron core 33 and a contact which is off while the horizontal portion 4b is not attracted by the iron core 33.

[0032] The lower end of the contact unit 6 is supported on the base 2 on which the electromagnet block 3 is mounted. In this embodiment, the base 2 is made of an insulating material and thus can increase the electrical insulation between the coil 31 and the contact unit 6.

[0033] As shown in Fig. 2, the case 7 has a rectangular solid housing form opened downward as a whole. A bottom opening 7a is configured to fit into substantially close contact with a step portion 2a formed in the periphery of the base 2. Inside the case 7, a partition wall 71 to be positioned between the vertical portion 4c of the armature 4 and the card 5 is provided. The partition wall 71 includes a cutout portion 71a allowing the first protrusion 52 to penetrate the partition wall 71. The partition wall 71 thus has a gate shape.

[0034] At the bottom of a sidewall on each side of the case 7 in the transverse direction, an engagement hole 72 is located substantially at the center in the longitudinal direction. The engagement holes 72 are engaged with engagement protrusions 21 protruding from the step portion 2a of the base 2 to prevent the case 7 from being detached.

[0035] As shown in Figs. 3, 6(a), and 7(a), the pivot shaft 51 of the card 5 includes shaft portions 51a rotatably engaged with the base 2 and a large-diameter portion 51b provided adjacent thereto in the axial direction of a central axis C of the shaft portion 51a . The large-diameter portion 51b is wider than the shaft portions 51a. In this embodiment, the shaft portions 51a are provided at both ends of the pivot shaft 51 in the axial direction of the central axis C, and the large-diameter portion 51b is provided between the shaft portions 51a (at the center of the pivot shaft 51 in the axial direction of the central axis C) . Figs. 6 (a) and 7 (a) schematically show only the pivot shaft 51 for explanation.

[0036] On the other hand, as shown in Figs. 3, 6(b), 7(b), at the base 2 to which the pivot shaft 51 of the card 5 is swingably attached, a pair of shaft bearing portions 22 configured to receive the shaft portions 51a are formed so that the shaft portions 51a rotate inside the base 2. The pair of shaft bearing portions 22 are provided at the positions corresponding to the shaft portions 51a provided at both ends of the pivot shaft 51 in the axial direction of the central axis C. Between the pair of shaft bearing portions 22, a large-diameter bearing portion 23 receiving the large-diameter portion 51b of the pivot shaft 51 is formed. Figs. 6(b) and 7 (b) schematically show only the shaft bearing portions 22 and large-diameter bearing portion 23 for explanation. In the example shown in this embodiment, the shaft bearing portions 22 in which the outer ends of the shaft bearing portions 22 in the axial direction of the central axis C are opened. However, the outer ends of the shaft bearing portions 22 in the axial direction of the central axis C may also be closed.

[0037] The shaft bearing portions 22 and the large-diameter bearing portion 23 are opened to the surface side (the top surface side in Fig. 1) of the base 2 to receive the pivot shaft 51 perpendicularly from above the surface side of the base 2. The opening portion of each shaft bearing portion 22 is an insertion port 22a through which one of the shaft portions 51a is accepted. In this embodiment, the surface side (the top surface side in Fig. 1) of the base 2 is the near side in the direction of insertion of the card 5.

[0038] Accordingly, in this embodiment, to attach the card 5 to the base 2, as indicated by arrows K in Fig. 3, the pivot shaft 51 is pressed from above into the shaft bearing portions 22 and large-diameter bearing portion 23. When the pivot shaft 51 is pressed from above into the shaft bearing portions 22 and large-diameter bearing portion 23 in such a manner, as shown in Figs. 4 and 5, the shaft portions 51a are fit into the shaft bearing portions 22, and the large-diameter portion 51b is fit into the large-diameter bearing 23. The card 5 is thus attached to the base 2 so as to freely swing in a direction b.

[0039] As shown in Figs. 7(a) and 7(b), an opening width a1 of each shaft bearing portion 22 on the insertion portion 22a side (the near side of the shaft bearing portion 22 in the insertion direction of the card 5) is made smaller than a diameter A1 of the shaft portion 51a ($a1 < A1$). A diameter a2 of the shaft bearing portion 22 on the internal side of the base 2 (on the remote side of the shaft bearing portion 22 in the insertion direction of the card 5) is made larger than the diameter A1 of the shaft portion 51a and smaller than a width A2 of the large-diameter portion 51b ($A1 < a2 < A2$). A width a3 of the large-diameter bearing 23 only needs to be larger than the width A2 of the large-diameter portion 51b ($a3 > A2$).

[0040] In such a structure, since the opening width a1 of the insertion port 22a is made smaller than the diameter A1 of the shaft portion 51a, to cause the shaft portions 51a of the pivot shaft 51 to fit into (to be received by) the shaft bearing portions 22, the shaft portions 51a are press-fit to the shaft bearing portions 22. Accordingly, it is preferable that the difference (A1-a1) between the diameter A1 of the shaft portions 51a and the opening width a1 is set so as to allow for press fitting of the shaft portions 51a.

[0041] By press fitting of the shaft portions 51a into the shaft bearing portions 22 in such a manner, the shaft portions 51a can be prevented from dropping out of the shaft bearing portions 22 by external impact. The card 5 can be therefore prevented from being easily detached from the base 2.

[0042] In the embodiment, the shaft portions 51a and large-diameter portion 51b of the pivot shaft 51 are concentrically formed to have circular cross-sections, and the width A2 of the large-diameter portion 51b can be replaced with a diameter A2. However, the large-diameter portion 51b does not necessarily have a circular cross-section. To be specific, the large-diameter portion 51b needs to be configured such that the width A2 of the

large diameter portion 51b is larger than the diameter A1 of the shaft portions 51a and each end face 51c of the large-diameter portion 51b in the axial direction of the central axis C abuts a step surface 24 between one of the shaft bearing portions 22 and the large-diameter bearing portion 23.

[0043] Reference numeral 25 in Figs. 3 and 4 indicates a support recess in which the bottom of the movable spring 62 is inserted. Reference numeral 26 indicates a support recess in which the bottom of the fixed terminal 61 is inserted. Reference numeral 27 indicates support notches into which the both side portions of the cutout portion 71a of the partition wall 71 of the case 7 are fit.

[0044] Such a structure allows the electromagnetic relay 1 to operate as follows.

[0045] First, in a state shown in Fig. 1, or in a state where the horizontal portion 4b is not attracted by the iron core 33, the armature 4 is positioned with the vertical portion 4c shifted to the yoke 34 side. In this state, the card 5 is swung and located on the armature 4 side by spring force of the movable spring 62, and the contact unit 6 is turned off with the fixed contact unit 61a being separated from the movable contact unit 62.

[0046] If current is applied to the coil 31 in the predetermined direction to excite the electromagnet block 3, the horizontal portion 4b of the armature 4 is attracted by the iron core 33 to cause the armature 4 to rotate counterclockwise in Fig. 1 around the bent portion 4a, and the vertical portion 4c causes the card 5 to swing toward the contact unit 6. The card 5 then bends the movable spring 62 toward the fixed terminal 61 against the spring force of the movable spring 62 to bring the movable contact unit 62a into contact with the fixed contact unit 61a for electrical conduction. The contact unit 6 is thus turned on.

[0047] In this state, if the energization of the coil 31 is stopped, attraction of the permanent magnet 35 maintains the position of the armature 4 unchanged (the state rotated counterclockwise in Fig. 1) to maintain the on state of the contact unit 6.

[0048] Next, if current is applied to the coil 31 in a direction opposite to the predetermined direction to excite the electromagnet block 3, the armature 4 rotates clockwise in Fig. 1 around the bent portion 4a, and the vertical portion 4c moves toward the yoke 34 . The card 5 is thus swung by the spring force of the movable spring 62 toward the armature 4 to turn off the contact unit 6.

[0049] If energization of the coil 31 is then stopped, the position of the armature 4 is maintained (at the position shown in Fig. 1) by attraction of the permanent magnet 35 to keep the contact unit 6 off.

[0050] Incidentally, the card 5 swings around the pivot shaft 51 but substantially swings in such a manner that the shaft portions 51a of the pivot shaft 51 rotate relative to the shaft bearing portions 22 of the base 2. As such, since the card 5 operates with the shaft portion 51a as the fulcrum of swing, it becomes easy to ensure a stable swing operation.

[0051] Moreover, the pivot shaft 51 is provided with the large-diameter portion 51b adjacent to the shaft portions 51a on the central axis C. Accordingly, the large-diameter portion 51b can abut the step surfaces 24 between the shaft bearing portions 22 and the large-diameter bearing portion 23. This can prevent the card 5 from being shifted in the transverse direction of the base 2.

[0052] As described above, in this embodiment, the pivot shaft 51 which allows the card 5 to be swingably attached to the base 2 includes the shaft portions 51a and the large-diameter portion 51b having a diameter larger than that of the shaft portions 51a. The shaft portions 51a are configured to be received by the shaft bearing portions 22 of the base 2, and the large-diameter portion 51b is configured to be received by the large-diameter bearing portion 23.

[0053] Furthermore, the opening of each shaft bearing portion 22 is configured such that the opening width a1 on the insertion port 22a side which is opened on the surface side of the base 2 is made smaller than the diameter A1 of the shaft portions 51a. This can prevent the shaft portions 51a received through the insertion ports 22a into the shaft bearing portions 22 from easily dropping out from the insertion ports 22a.

[0054] The diameter (opening width) a2 of the shaft bearing portions 22 receiving the shaft portions 51a on the internal side of the base 2 is made larger than the diameter A1 of the shaft portions 51a. This allows for smooth rotation of the shaft portions 51a, that is, smooth swing of the card 5.

[0055] Furthermore, the opening width of the shaft bearing portions 22 is made smaller than the width A2 of the large-diameter portion 51b, and the large-diameter portion 51b is provided adjacent to the shaft portions 51a in the axial direction of the central axis C. Thus, the end surfaces 51c of the large-diameter portion 51b can abut the step surface 24 thereby preventing the large-diameter portion 51b from entering the shaft bearing portions 22. This can further ensure positioning of the pivot shaft 51 in the axial direction and can reliably prevent the pivot shaft 51 from being shifted from the shaft bearing portions 22 in the axial direction of the central axis C, thus reliably preventing the card 5 from being detached from the base 2.

[0056] According to the embodiment, the pivot shaft 51 can be prevented from easily dropping out of the shaft bearing portions 22. This can prevent the card 5 from being easily detached after the card 5 is assembled to the base 2 at the assembly of the electromagnetic relay 1, thus further improving the assembly operation of the electromagnetic relay.

[0057] Moreover, according to the embodiment, the shaft portions 51a are provided at both ends of the pivot shaft 51 in the axial direction of the central axis C, and the large-diameter portion 51b is provided between the shaft portions 51a provided at the both ends (at the center of the pivot shaft 51 in the axial direction of the central axis C) . It is therefore possible to increase the supporting

span of the shaft portions 51a while preventing the width of the pivot shaft 51 from increasing. Thus, the pivot shaft 51 can be more stably attached to the base 2, thus allowing for more stable swing of the card 5.

[0058] Next, a modification of the embodiment will be explained based on Fig. 8. In the example shown by the aforementioned embodiment, the pair of shaft portions 51a are provided at the both ends in the axial direction of the central axis C, and the large-diameter portion 51b is provided between the both shaft portions 51a. However, in this modification, as shown in Fig. 8 (a), a shaft portion 51a is provided in the middle of the pivot shaft 51 in the axial direction of the central axis C, and a pair of large-diameter portions 51b are provided on both sides of the shaft portion 51a. In this case, as shown in Fig. 8 (b), the shaft bearing portion 22 is provided at the center corresponding to the shaft portion 51a, and the large-diameter bearing portions 23 are provided on both sides of the shaft baring portion 22 corresponding to the pair of large-diameter portions 51b. In this modification also, the opening width a1 at an insertion portion 22a side of the shaft bearing portion 22 which is provided at the center is made smaller than the diameter A1 of the shaft portion 51a.

[0059] Moreover, the opening width of the shaft bearing portion 22 on the internal side of the base 2 is made larger than the diameter A1 of the shaft portion 51a and is made smaller than the width A2 of the large-diameter portions 51b. This allows the shaft portion 51a to smoothly rotate and allows the pivot shaft 51 to be positioned in the axial direction.

[0060] According to the above modification also, it is possible to provide operations and effects substantially similar to those of the aforementioned embodiment.

[0061] The preferred embodiments of the present invention are described above, but the present invention is not limited to the embodiments and can be variously modified.

[0062] For example, the aforementioned embodiments show a so-called latch type electromagnetic relay. However, the vertical portion of the armature may be configured to reciprocate in directions away from and toward the yoke by excitation and non-excitation of the electromagnetic block.

[0063] To be specific, the electromagnetic relay may be configured such that the horizontal portion of the armature is biased by a hinge spring in a direction away from the iron core and the vertical portion of the armature moves in a direction toward the yoke by the hinge spring when the electromagnet block is demagnetized.

[0064] Moreover, the detailed specifications (including the shape, size, layout, and the like) of the base, electromagnet block, armature, and others also can be properly changed.

Claims

1. An electromagnetic relay (1), comprising:

   an electromagnet block (3) mounted on a base (2);
   an armature (4) reciprocated by excitation and non-excitation of the electromagnet block (3);
   a card (5) swingably attached to the base (2) through a pivot shaft (51) and configured to swing with movement of the armature (4); and
   a contact unit (6) switched on and off according to the swing of the card (5), wherein
   the pivot shaft (51) includes at least one shaft portion (51a) rotatably engaged with the base,
   the base including at least one shaft bearing portion (22) which is opened at the surface side of the base (2) and is configured to receive the at least one shaft portion (51a) **characterized in that** the shaft includes at least one large-diameter portion (51b) having a larger diameter than that of the at least one shaft portion (51a and **in that** the base includes at least one large-diameter bearing portion (23) configured to receive the at least one large-diameter portion (51b);
   the opening width of the at least one shaft bearing portion (22) being smaller than the diameter of the at least one shaft portion (51a) at an insertion port (22a) side through which the at least one shaft bearing portion (22) receives the at least one shaft portion (51a) , while at an internal side of the base (2), the at least one shaft bearing portion (22) is larger than the diameter of the at least one shaft portion (51a) and smaller than the width of the at least one large-diameter portion (51b) .

2. The electromagnetic relay (1) according to claim 1, wherein the at least one large-diameter portion (51b) is provided adjacent to the at least one shaft portion (51a) in an axial direction of a central axis (C) of the at least one shaft portion (51a).

3. The electromagnetic relay (1) according to claim 1 or 2, wherein the at least one shaft portion (51a) are arranged at both ends of the pivot shaft (51) in the axial direction of the central axis (C) thereof, and
   the at least one large-diameter portion (51b) is provided at the center of the pivot shaft (51) in the axial direction of the central axis (C) thereof.

Patentansprüche

1. Elektromagnetisches Relais (1) mit:

   einem Elektromagneten (3), der auf einem Sockel (2) befestigt ist;

einem Anker (4), der sich durch Anregung und Nicht-Anregung des Elektromagneten (3) hin- und herbewegt;
einer Karte (5), die schwingbar an dem Sockel (2) über eine Drehachse (51) befestigt ist und ausgebildet ist, um mit einer Bewegung des Ankers (4) zu schwingen; und
einer Verbindungseinheit (6), die entsprechend zu der Schwingbewegung der Karte (5) an- und ausgeschaltet wird,
wobei die Drehachse (51) zumindest einen Achsenabschnitt (51a) umfasst, der drehbar mit dem Sockel in Eingriff steht, wobei der Sockel zumindest einen Achsenhalteabschnitt (22) umfasst, der an einer Oberflächenseite des Sockels (2) geöffnet ist und ausgebildet ist, um den zumindest einen Achsenabschnitt (51a) zu empfangen, **dadurch gekennzeichnet, dass** die Achse zumindest einen vergrößerten Abschnitt (51b) umfasst, der einen größeren Durchmesser aufweist als der zumindest eine Achsenabschnitt (51 a)
und dadurch, dass der Sockel zumindest einen vergrößerten Halteabschnitt (23) aufweist, der ausgebildet ist, um den zumindest einen vergrößerten Achsenabschnitt (51 b) zu empfangen;
wobei die Öffnungsbreite des zumindest einen Achsenhalteabschnittes (22) kleiner ist als der Durchmesser des zumindest einen Achsenabschnittes (51 a) an einer Einsatzöffnungsseite (22a), durch welche der zumindest eine Achsenhalteabschnitt (22) den zumindest einen Achsenabschnitt (51 a) empfängt, während an einer inneren Seite des Sockels (2) der zumindest eine Achsenhalteabschnitt (22) größer ist als der Durchmesser des zumindest einen Achsenabschnittes (51 a) und kleiner ist als die Breite des zumindest einen vergrößerten Abschnittes (51b).

2. Elektromagnetisches Relais (1) nach Anspruch 1, wobei der zumindest eine vergrößerte Abschnitt (51 b) benachbart zu dem zumindest einen Achsenabschnitt (51 a) in einer axialen Richtung der Mittelachse (C) des zumindest einen Achsenabschnittes (51a) ausgebildet ist.

3. Elektromagnetisches Relais (1) nach Anspruch 1 oder 2, wobei der zumindest eine Achsenabschnitt (51a) an beiden Enden der Drehachse (51) in der axialen Richtung von deren Mittelachse (C) ausgebildet ist, und
der zumindest eine vergrößerte Abschnitt (51 b) in der Mitte der Drehachse (51) in der axialen Richtung von deren Mittelachse (C) ausgebildet ist.

Revendications

1. Relais électromagnétique (1), comprenant :

un bloc d'électroaimant (3) monté sur une base (2) ;
un induit (4) déplacé en va et vient par l'excitation et la non excitation du bloc d'électroaimant (3) ;
une carte (5) attachée de manière pivotante à la base (2) par l'intermédiaire d'un arbre de pivotement (51) et configurée pour pivoter avec le mouvement de l'induit (4) ; et
une unité de contacts (6) activée et désactivée conformément au pivotement de la carte (5), dans lequel
l'arbre de pivotement (51) comprend au moins une partie d'arbre (51a) en prise en rotation avec la base, la base comprenant au moins une partie de support d'arbre (22) qui est ouverte du côté de surface de la base (2) et qui est configurée pour recevoir ladite au moins une partie d'arbre (51a), **caractérisé en ce que** l'arbre comprend au moins une partie de grand diamètre (51b) ayant un diamètre plus grand que celui de ladite au moins une partie d'arbre (51a),
et **en ce que** la base comprend au moins une partie de support de grand diamètre (23) configurée pour recevoir ladite au moins une partie de grand diamètre (51 b) ;
la largeur d'ouverture de ladite au moins une partie de support d'arbre (22) étant plus petite que le diamètre de ladite au moins une partie d'arbre (51a) d'un côté d'un orifice d'insertion (22a) à travers lequel ladite au moins une partie de support d'arbre (22) reçoit ladite au moins une partie d'arbre (51a), tandis que d'un côté interne de la base (2), ladite au moins une partie de support d'arbre (22) est plus grande que le diamètre de ladite au moins une partie d'arbre (51a) et plus petite que la largeur de ladite au moins une partie de grand diamètre (51b).

2. Relais électromagnétique (1) selon la revendication 1, dans lequel ladite au moins une partie de grand diamètre (51b) est prévue adjacente à ladite au moins une partie d'arbre (51a) dans une direction axiale d'un axe central (C) de ladite au moins une partie d'arbre (51a).

3. Relais électromagnétique (1) selon la revendication 1 ou 2, dans lequel ladite au moins une partie d'arbre (51a) est agencée aux deux extrémités de l'arbre de pivotement (51) dans la direction axiale de l'axe central (C) de celui-ci, et
ladite au moins une partie de grand diamètre (51b) est prévue au centre de l'arbre de pivotement (51) dans la direction axiale de l'axe central (C) de celui-ci.

FIG. 1

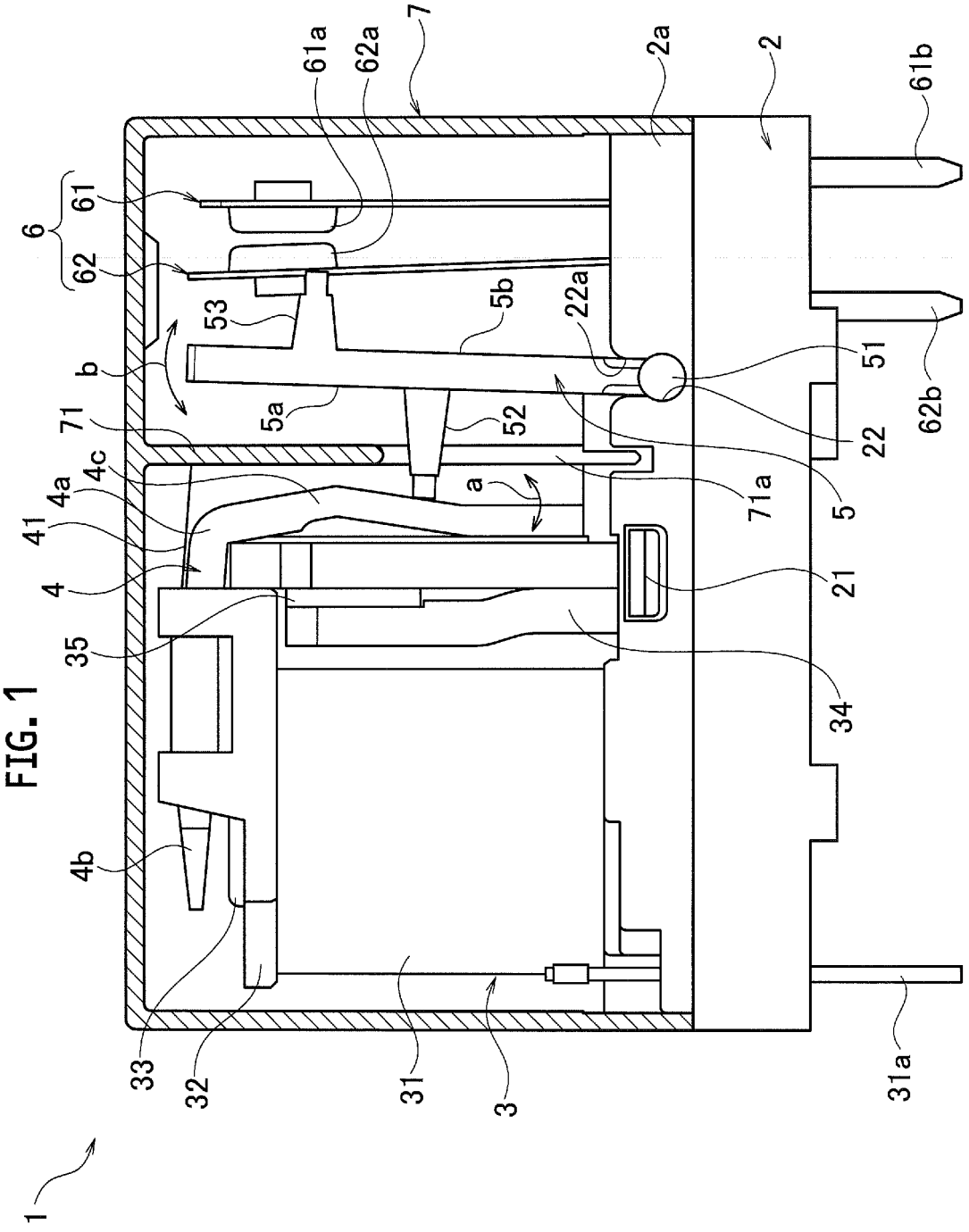

1
2
2a
3
4
4a
4b
4c
5
5a
5b
6
7
21
22
22a
31
31a
32
33
34
35
41
51
52
53
61
61a
61b
62
62a
62b
71
71a
a
b

FIG. 2

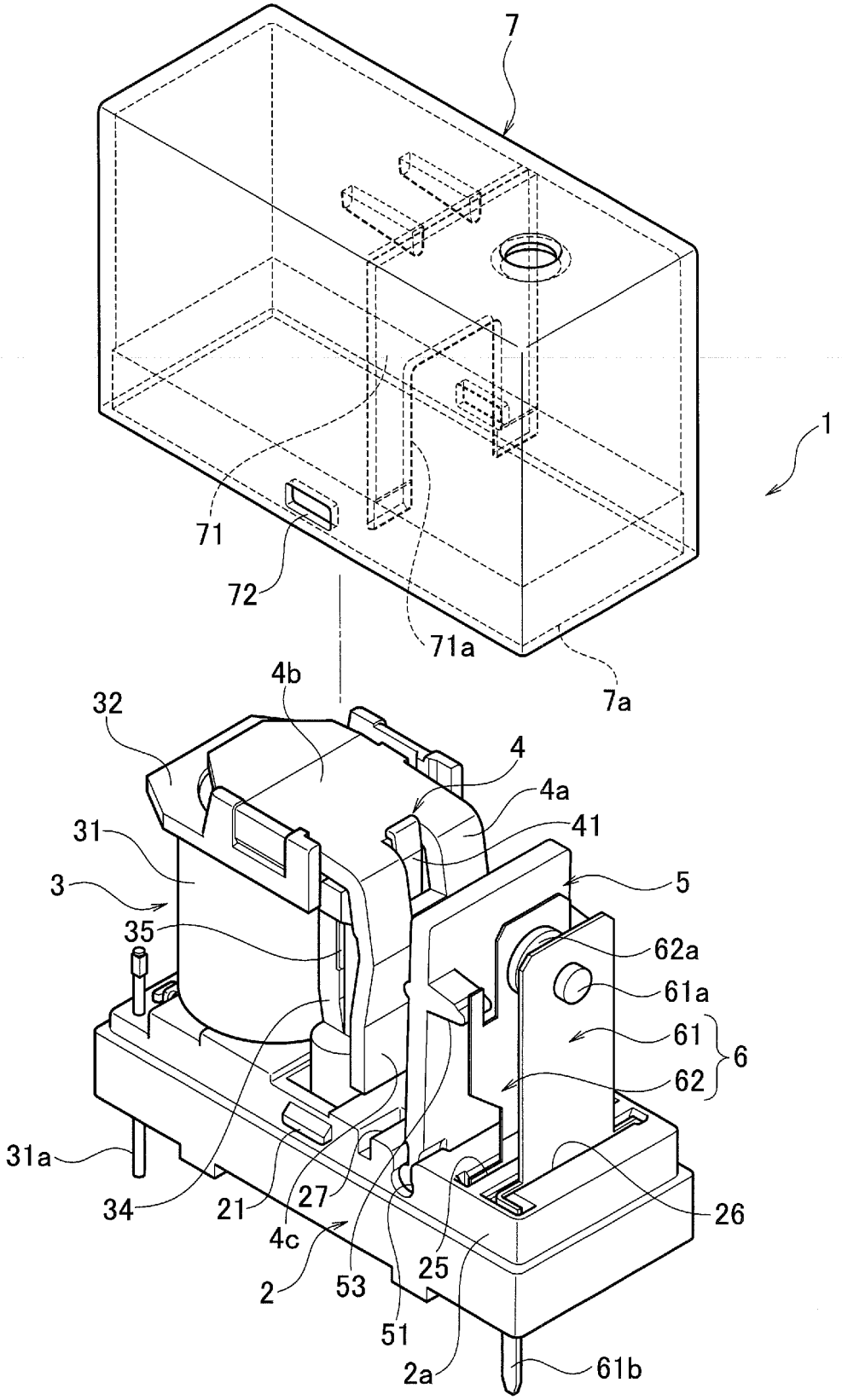

7
1
71
72
71a
7a
4b
32
4
4a
41
31
5
3
35
62a
61a
61
6
62
31a
34
21
27
26
4c
25
2
53
51
2a
61b

FIG. 3

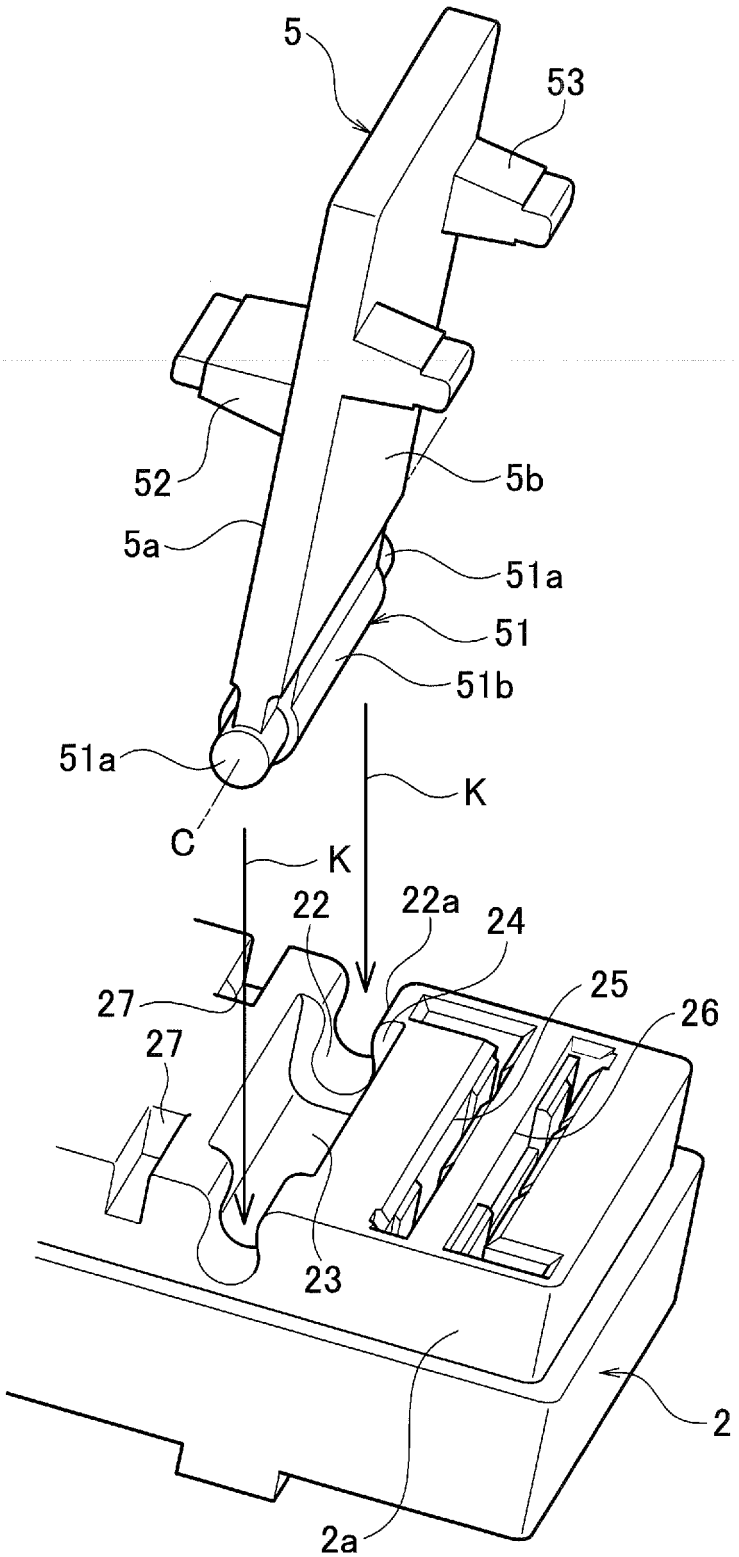


FIG. 4

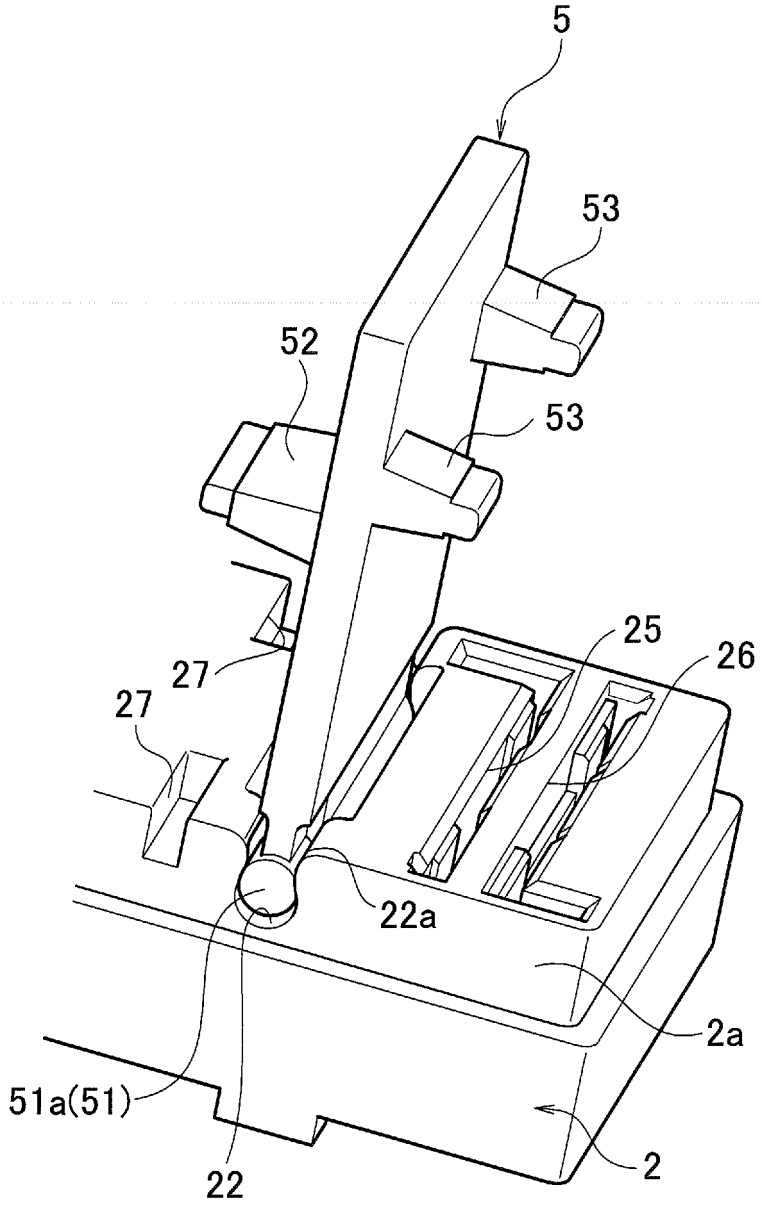


FIG. 5

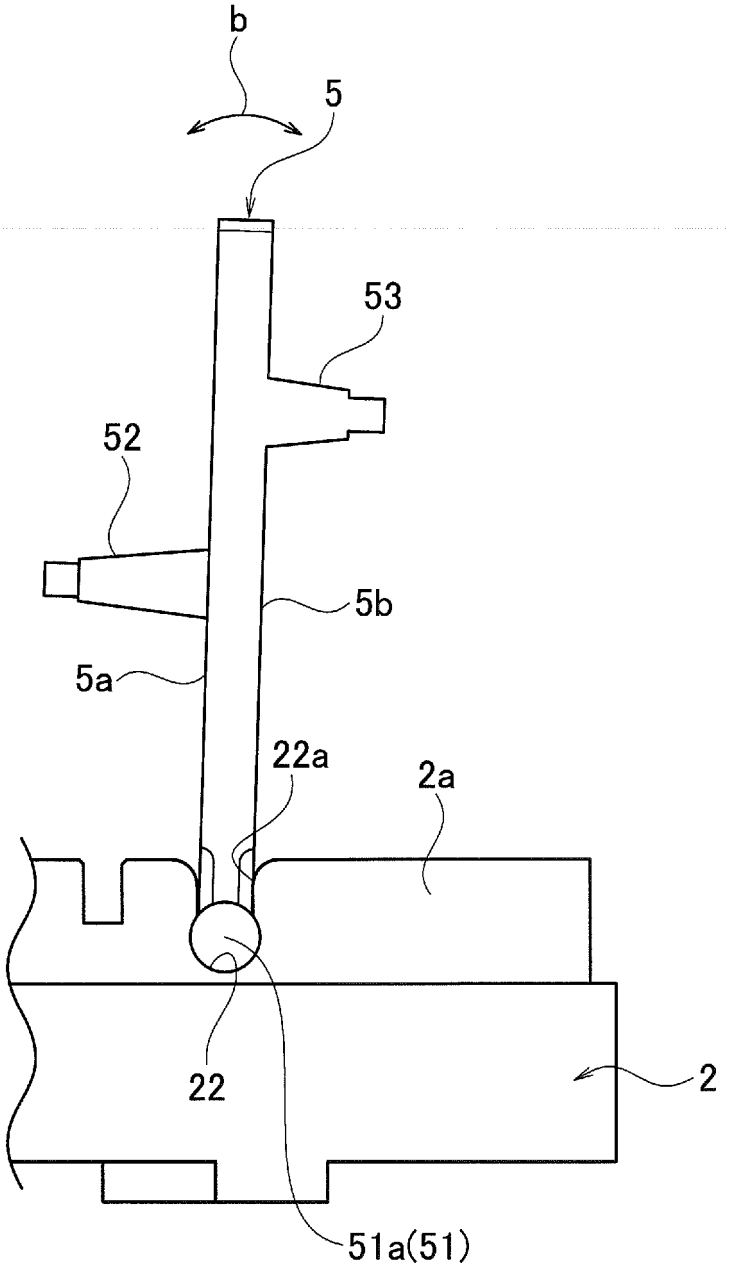


FIG. 6

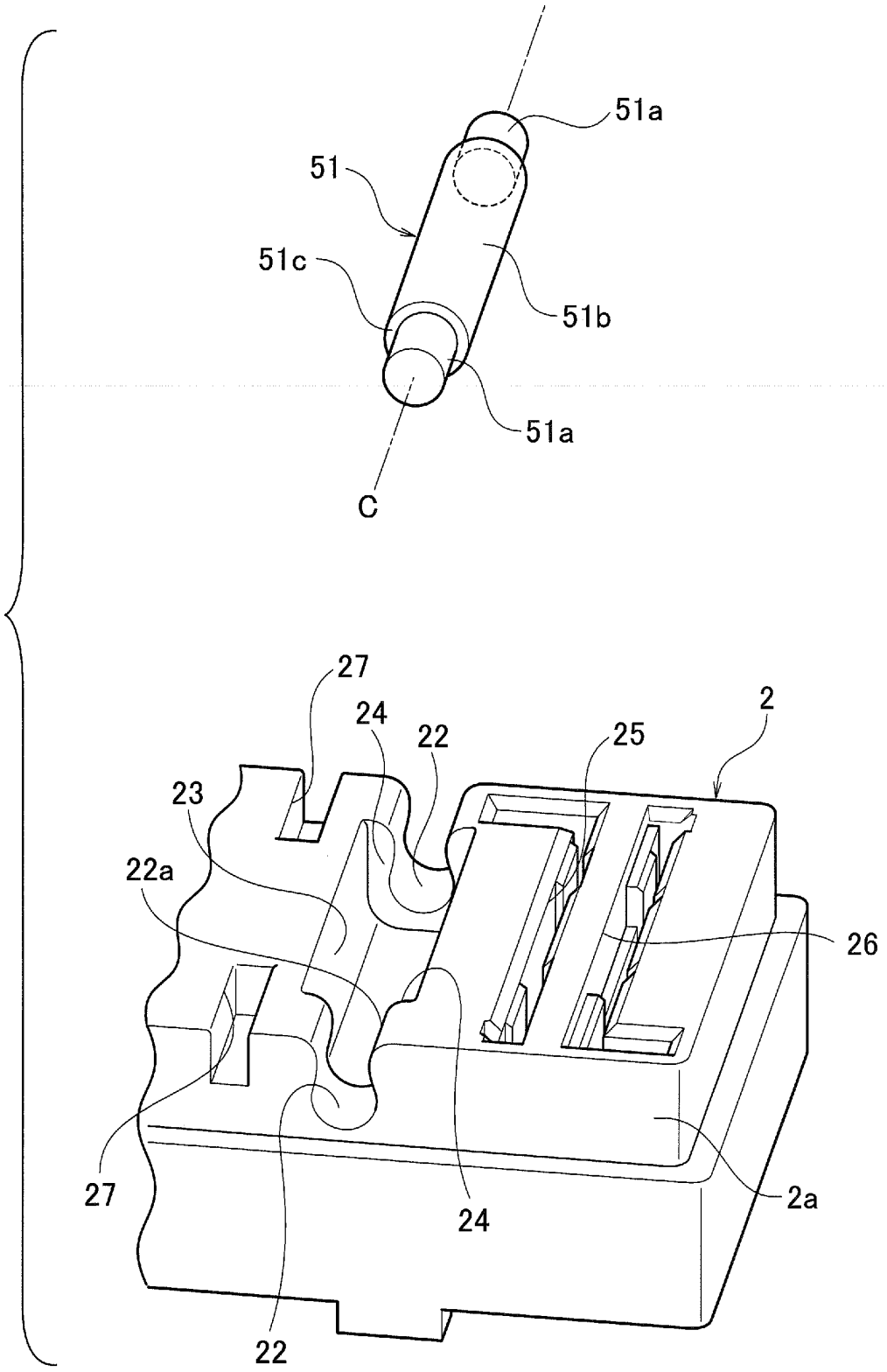


FIG. 7

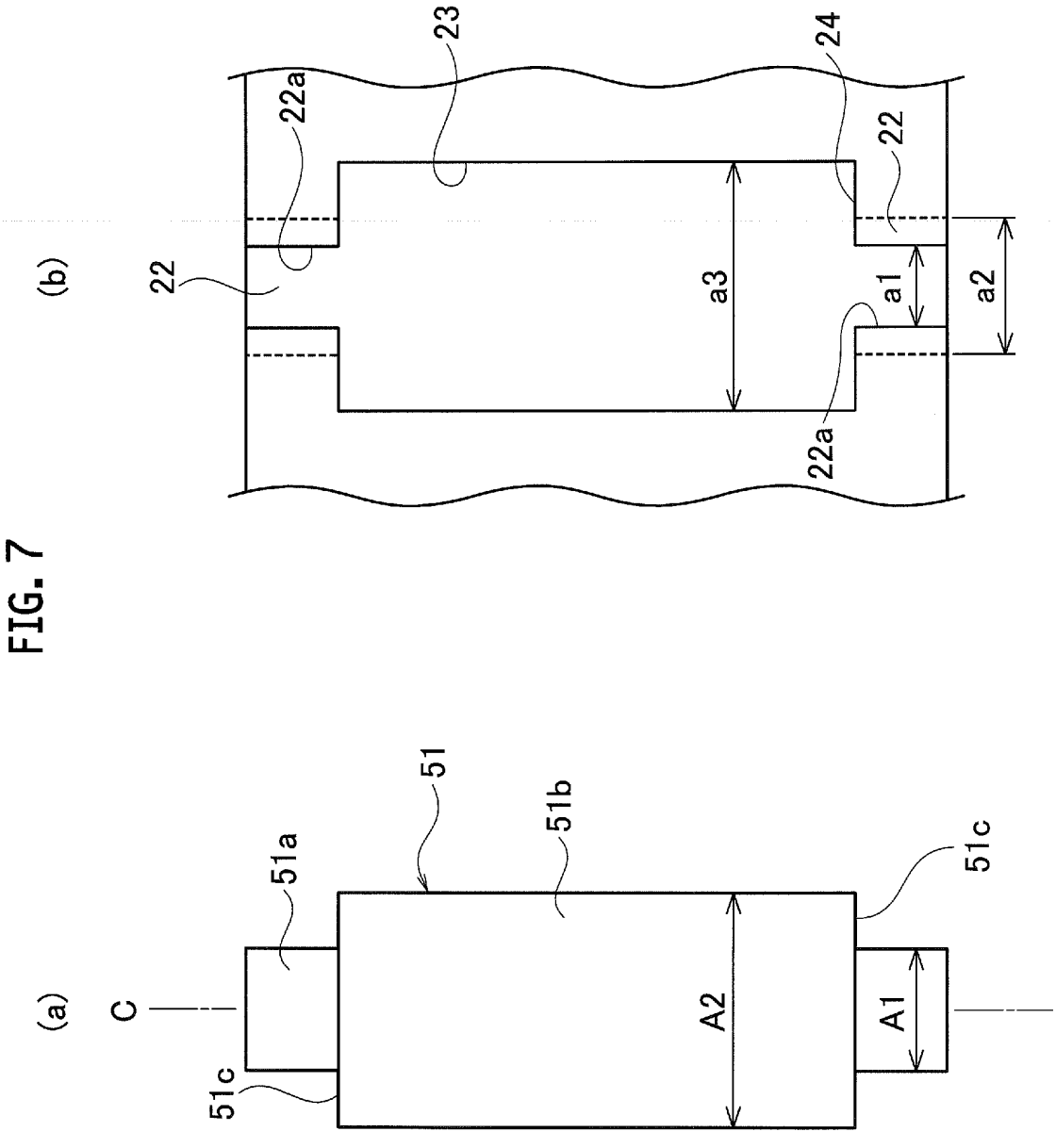
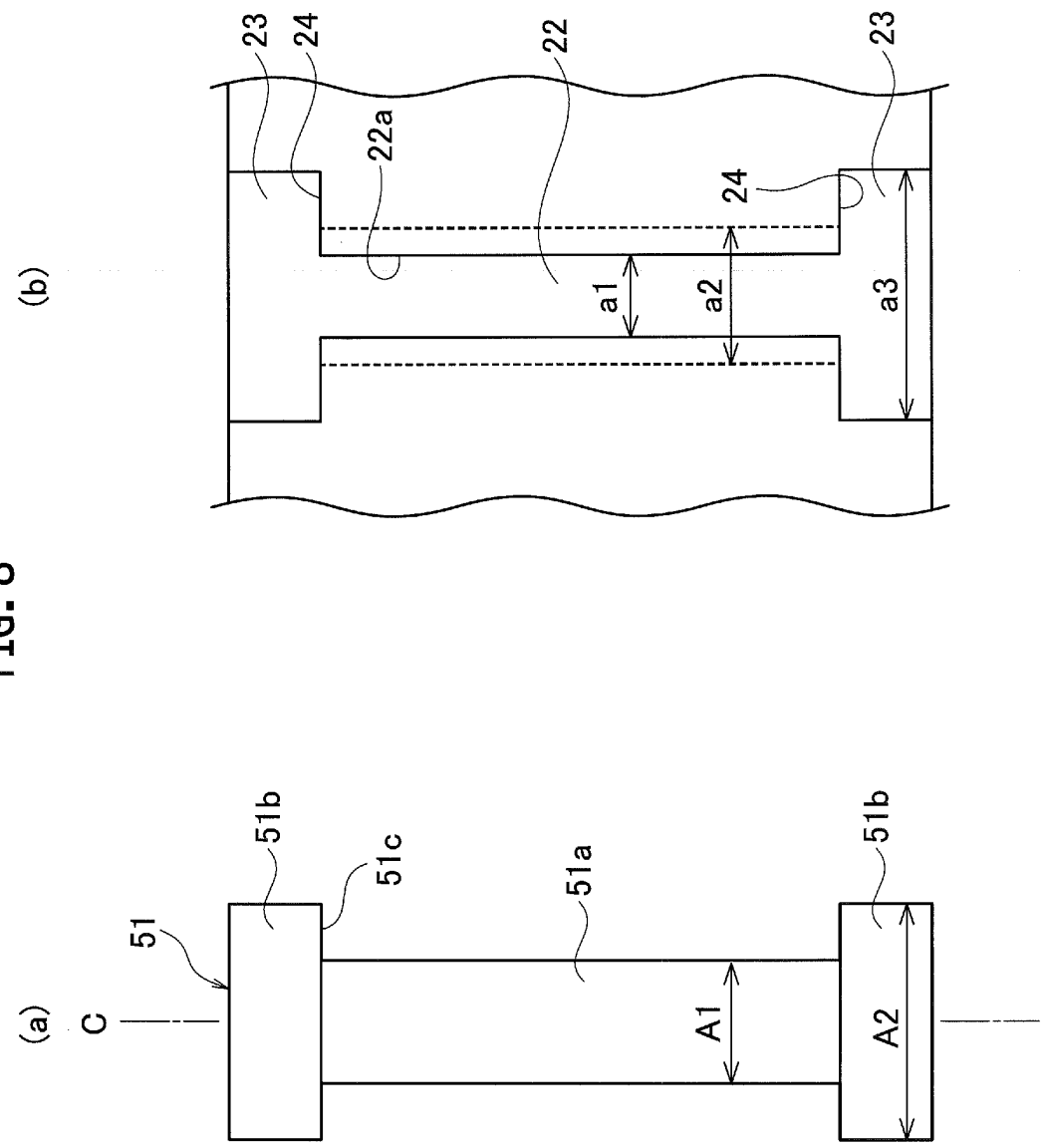


FIG. 8



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Patent documents cited in the description

- JP 2005293952 A **[0002]**
- JP 9320441 A **[0006]**