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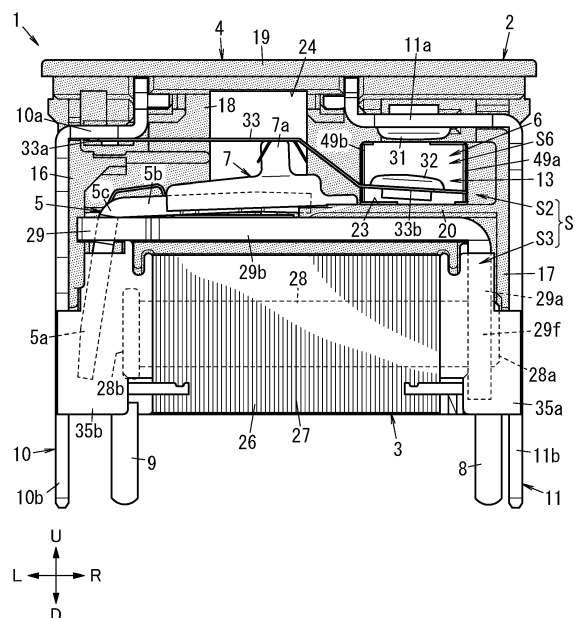
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(54) **CONTACT DEVICE AND ELECTROMAGNETIC RELAY**

(57) A contact device is provided which is configured to reduce damage caused to a case by an arc generated between a pair of contacts. A contact device (2) includes a contact unit (6), a case (12), a partition wall (18), and a shielding member (13). The contact unit (6) includes a pair of contacts (31, 32) and is configured to be switched to one of a closed state where the pair of contacts (31, 32) are in contact with each other and an open state where the pair of contacts (31, 32) are apart from each other. The case (12) accommodates the contact unit (6), the partition wall (18), and the shielding member (13). The partition wall (18) is provided at a location being offset from the contact unit (6) in an orthogonal direction orthogonal to a direction in which the pair of contacts (31, 32) face each other. The partition wall (18) partitions an interior of the case (12) into a first space (S1) in which the contact unit (6) is provided and a second space in which the contact unit (6) is not provided. The shielding member (13) is provided to the partition wall (18). The partition wall (18) has a first opening (23) connecting the first space (S1) to the second space (S5). The opening (23) overlaps a space (S6) between the pair of contacts (31, 32) in the open state in a direction parallel to the orthogonal direction.

FIG. 1



Description

Technical Field

[0001] The present disclosure generally relates to contact devices and electromagnetic relays and specifically, to a contact device and an electromagnetic relay which include a contact unit configured to alternatively be switched to one of a contact closed state and a contact open state.

Background Art

[0002] Patent Literature 1 (JP 2011-003308 A) describes an electromagnetic relay including a movable contact and a fixed contact (a pair of contacts), a base (a partition wall), and a cover (a case). The movable contact and the fixed contact are alternatively switched to one of a state where the movable contact is in contact with the fixed contact (a contact closed state) and a state where the movable contact is not in contact with the fixed contact (a contact open state). The base is provided with the movable contact and the fixed contact. The base has an opening through which the distance between the movable contact and the fixed contact is to be checked during manufacturing. The cover accommodates the base.

[0003] In the electromagnetic relay described in Patent Literature 1, an arc (a spark) generated when the movable contact comes into contact with the fixed contact passes through the opening in the base and comes into contact with the cover. This may damage the cover.

Summary of Invention

[0004] In view of the foregoing, it is an object of the present disclosure to provide a contact device and an electromagnetic relay which are configured to reduce damage caused to a case by an arc generated between a pair of contacts.

[0005] A contact device according to one aspect of the present disclosure includes a contact unit, a case, a partition wall, and a shielding member. The contact unit includes a pair of contacts and is configured to be switched to one of a contact closed state where the pair of contacts are in contact with each other and a contact open state where the pair of contacts are apart from each other. The case accommodates the contact unit. The partition wall is provided at a location being offset from the contact unit in a transverse direction transverse to a direction in which the pair of contacts face each other. The partition wall partitions an interior of the case into a first space in which the contact unit is provided and a second space in which the contact unit is not provided. The shielding member is provided to the partition wall. The partition wall has an opening connecting the first space to the second space. At least part of the opening overlaps a space in a direction parallel to the transverse direction, the space being between the pair of contacts in the contact open state. The

shielding member has a main part covering the at least part of the opening.

[0006] An electromagnetic relay according to one aspect of the present disclosure includes the contact device and an electromagnetic device. The electromagnetic device is configured to switch the pair of contacts to one of the contact open state and the contact closed state.

Brief Description of Drawings

[0007]

FIG. 1 is a front view illustrating an electromagnetic relay according to an embodiment with a case being omitted;

FIG. 2 is a back view illustrating the electromagnetic relay with the case being omitted;

FIG. 3 is a back view illustrating the electromagnetic relay without omitting the case;

FIG. 4 is a part of a cross sectional view taken along line A-A of FIG. 3;

FIG. 5 is a perspective view illustrating a shielding member of the electromagnetic relay viewed from the back;

FIG. 6A is a perspective view illustrating an example of a shielding member of an electromagnetic relay according to a first variation;

FIG. 6B is a perspective view illustrating another example of the shielding member of the electromagnetic relay according to the first variation;

FIG. 7 is a perspective view illustrating a shielding member of an electromagnetic relay according to a second variation;

FIG. 8 is a perspective view illustrating a shielding member of an electromagnetic relay according to a third variation;

FIG. 9 is a partial sectional view illustrating an electromagnetic relay according to a fourth variation;

FIG. 10 is a partially exploded perspective view illustrating the electromagnetic relay according to the fourth variation; and

FIG. 11 is a back view illustrating the electromagnetic relay according to the fourth variation with a case being omitted.

Description of Embodiments

[0008] An electromagnetic relay according to an embodiment will be described below. The embodiment described below is a mere example of various embodiments of the present disclosure. Various modifications may be made to the embodiment described below depending on design and the like as long as the object of the present disclosure is achieved. Moreover, front, rear, left, right, upward, and downward directions in the following description are used for illustration only for the sake of convenience and are not intended to limit directions in which the electromagnetic relay according to the embodiment is used. Note that in FIG. 1, a side facing the viewer is the front side and a side facing away from the viewer is the rear side. In FIGS. 2 and 3, a side facing away from the viewer is the front side and a side facing the viewer is the rear side.

[0009] With reference to FIGS. 1 to 5, an electromagnetic relay 1 according to the present embodiment will be described.

[0010] As illustrated in FIG. 1, the electromagnetic relay 1 according to the present embodiment is an electromagnetic relay and includes a contact device 2 and an electromagnetic device 3. The electromagnetic device 3 is a driving device which switches a pair of contacts 31 and 32 included in the contact device 2 to one of a contact open state and a contact closed state. The contact closed state is a state where the pair of contacts 31 and 32 are in contact with each other. The contact open state is a state where the pair of contacts 31 and 32 are apart from each other. The contact device 2 includes a base 4, an operation unit 5, a contact unit 6, a card 7, four terminals 8 to 11, a case 12 (FIG. 3), and a shielding member 13.

[0011] The base 4 is a member to which the electromagnetic device 3, the operation unit 5, the card 7, the contact unit 6, the four terminals 8 to 11, and the shielding member 13 are attached. The base 4 is made of an insulating material (e.g., a synthetic resin). The base 4 is, for example, in the shape of a hollow box which is a rectangular parallelepiped. The base 4 has a front surface and a lower surface which are open. The base 4 is accommodated in an interior of the case 12.

[0012] The base 4 includes a left wall 16, a right wall 17, a rear wall 18 (a partition wall, a first partition wall), an upper wall 19, and an intermediate wall 20. Each of the walls 16 to 20 has, for example, a rectangular plate shape. The left wall 16 and the right wall 17 protrude frontward respectively from left and right edges of the rear wall 18. The upper wall 19 protrudes frontward from an upper edge of the rear wall 18. The upper wall 19 has a left edge connected to an upper edge of the left wall 16. The upper wall 19 has a right edge connected to an upper edge of the right wall 17.

[0013] The intermediate wall 20 is disposed between the left wall 16 and the right wall 17. The intermediate wall 20 is disposed at an approximately intermediate level of the left wall 16 and the right wall 17 in the upward and

downward directions. The intermediate wall 20 extends from the right wall 17 to an intermediate position between the left wall 16 and the right wall 17. The intermediate wall 20 has a rear edge (in FIG. 1, an edge facing away from the viewer) connected to a front surface of the rear wall 18 (in FIG. 1, a surface facing the viewer). The intermediate wall 20 has a right edge connected to a left principal surface of the right wall 17. Note that the base 4 has an interior space S1 (a first space) in which a space located above the intermediate wall 20 is referred to as an upper space S2 and a space located below the intermediate wall 20 is referred to as a lower space S3.

[0014] The rear wall 18 has an opening 23 (first opening) and an opening 24. The opening 23 and the opening 24 are, for example, rectangular openings. The opening 23 and the opening 24 are provided to part of the rear wall 18, the part facing the upper space S2. The opening 23 and the opening 24 are aligned in a lateral direction (in the right direction or the left direction). Providing the opening 23 enables a gap (a space) S6 between the contacts 31 and 32 in the contact open state to be checked during manufacturing of the electromagnetic relay 1. Providing the opening 24 enables the arrangement of elastic pieces 33, which will be described later, of the contact unit 6 to be checked during manufacturing of the electromagnetic relay 1. The shielding member 13 is attached to the rear wall 18 to close the opening 23.

[0015] In the interior space S1 in the base 4, the contact unit 6, the operation unit 5, and the card 7 are disposed in the upper space S2, and the electromagnetic device 3 is disposed in the lower space S3. As illustrated in FIG. 4, the rear wall 18 is a wall partitioning an interior space S4 in the case 12 into the interior space (the first space) S1 and a gap space (a second space) S5 in the base 4. Note that the interior space S1 in the base 4 is a space in which the contact unit 6 is provided. The gap space S5 is a space which is located between the rear wall 18 of the base 4 and a rear wall 41 of the case 12 (between a rear surface 18k of the rear wall 18 and the case 12) and in which the contact unit 6 is not provided. Moreover, the opening 23 in the rear wall 18 is an opening which connects the interior space S1 to the gap space S5. That is, the interior space S1 is in communication with the gap space S5 through the opening 23.

[0016] The electromagnetic device 3 includes a bobbin 26, a coil 27, an iron core 28, and a yoke 29.

[0017] The bobbin 26 is made of an insulating material (e.g., a synthetic resin). The bobbin 26 has, for example, a cylindrical shape. The bobbin 26 is disposed in the lower space S3 in the base 4. The center axis of the bobbin 26 is parallel to the upper wall 19 and perpendicular to the left wall 16 and the right wall 17. The coil 27 is wound on an outer circumference of the bobbin 26.

[0018] The iron core 28 is made of a soft magnetic material (e.g., iron). The iron core 28 has, for example, a bar shape and is disposed to coincide with the center axis of the bobbin 26. The iron core 28 has left and right ends 28a and 28b which respectively protrude from left

and right ends of the bobbin 26.

[0019] The yoke 29 is made of a soft magnetic material (e.g., iron). The yoke 29 has, for example, an L-shape and includes an end plate section 29a and a side plate section 29b. The end plate section 29a is disposed along and parallel to a right end surface of the bobbin 26. The side plate section 29b is disposed along a side surface of the bobbin 26, the side surface facing the operation unit 5. The side plate section 29b extends from an upper end of the end plate section 29a in an orthogonal direction orthogonal (the left direction)(a transverse direction, a first transverse direction) to the end plate section 29a. The yoke 29 has one end 29f connected to the right end 28a of the iron core 28 protruding from the right end of the bobbin 26. The iron core 28 and the yoke 29 are included in a flux path of magnetic flux generated by the coil 27.

[0020] The yoke 29 includes two projections 29c and 29d (see FIG. 2). The two projections 29c and 29d protrude from a rear surface of the side plate section 29b of the yoke 29 through the rear wall 18. The two projections 29c and 29d are aligned to be spaced from each other on the rear surface of the side plate section 29b along a longitudinal direction (the left direction or the right direction). The two projections 29c and 29d are respectively fit in two pores 18a and 18b formed in the rear wall 18. The two projections 29c and 29d are respectively fit in the two pores 18a and 18b, thereby positioning the yoke 29 with respect to the base 4. Moreover, the two projections 29c and 29d are respectively exposed through the two pores 18a and 18b to the outer side of the rear wall 18. The projections 29c and 29d are hereinafter also referred to as exposition sections 29c and 29d.

[0021] The operation unit 5 is made of a magnetic material (e.g., iron). As illustrated in FIG. 1, the operation unit 5 has, for example, an L-shape and includes an end plate section 5a and a side plate section 5b. The end plate section 5a is disposed along a left end of the bobbin 26, and the side plate section 5b is disposed above the side plate section 29b of the yoke 29 to extend along the side plate section 29b. The side plate section 5b extends from an upper end of the end plate section 5a in an orthogonal direction orthogonal (a transverse direction, the right direction) to the end plate section 5a.

[0022] The operation unit 5 has a bent section 5c. The bent section 5c is a connection part between the end plate section 5a and the side plate section 5b of the operation unit 5. A portion in the vicinity of the bent section 5c of the operation unit 5 (e.g., a lower portion of the bent section 5c) is rotatably supported by a left end of the side plate section 29b of the yoke 29. The operation unit 5 is clockwise pivotable, or clockwise pivotable by a fixed angle, with the lower portion of the bent section 5c of the operation unit 5 as the center. The operation unit 5 is biased by a bias member (e.g., a spring) in a direction in which the side plate section 5b approaches the side plate section 29b of the yoke 29.

[0023] Thus, in an initial state (where the electromag-

netic device 3 is unexcited), the end plate section 5a of the operation unit 5 is apart from the left end 28b of the iron core 28 due to biasing force of the biasing member. Then, when the coil 27 is energized and the electromagnetic device 3 is excited, the end plate section 5a of the operation unit 5 is pulled to the left end 28b of the iron core 28, and the operation unit 5 pivots, with the lower portion of the bent section 5c as the center, by a fixed angle in a direction in which the side plate section 5b is apart from the side plate section 29b of the yoke 29. Moreover, when energizing of the coil 27 is interrupted, the electromagnetic device 3 is demagnetized, and the operation unit 5 returns to the initial state due to the biasing force applied by the bias member. Thus, the operation unit 5 is disposed in the base 4 to pivot by a fixed angle in a freely returnable manner by excitation of the electromagnetic device 3.

[0024] The contact unit 6 includes a fixed contact 31, a movable contact 32, and an elastic piece 33. The fixed contact 31 and the movable contact 32 are a pair of contacts. The fixed contact 31 and the movable contact 32 are hereinafter also referred to as a pair of contacts 31 and 32.

[0025] The fixed contact 31 is relatively fixed to the base 4. The movable contact 32 is disposed in the base 4 to be able to approach and come into contact with, or to be able to move apart from, the fixed contact 31. Specifically, the fixed contact 31 is fixed to the terminal 11 provided to the base 4, thereby being indirectly fixed to the base 4. The movable contact 32 is fixed to the elastic piece 33 attached to the base 4, thereby being disposed in the base 4 so as to be able to approach and come into contact with, or to be able to move apart from, the fixed contact 31. The fixed contact 31 is indirectly fixed to the base 4 via the terminal 11 in the present embodiment but may be directly fixed to the base 4 without using the terminal 11.

[0026] The fixed contact 31 and the movable contact 32 are disposed in a right-side space of the upper space S2 in the base 4. Specifically, the fixed contact 31 is disposed at an upper part in the right-side space (i.e., below the upper wall 19). The movable contact 32 is disposed at a lower part in the right-side space (i.e., above the intermediate wall 20). That is, the fixed contact 31 and the movable contact 32 are disposed apart from each other in a facing direction (in the upward direction or the downward direction) in which the fixed contact 31 and the movable contact 32 face each other. Note that in the initial state (where the electromagnetic device 3 is unexcited), a prescribed space (gap) is secured between the movable contact 32 and the fixed contact 31.

[0027] Note that as illustrated in FIG. 1, the rear wall 18 is provided at a location being offset from the disposition of the contact unit 6 in a transverse direction (e.g., the rearward direction) transverse (e.g., orthogonal) to a direction (the upward direction or the downward direction) in which the fixed contact 31 and the movable contact 32 face each other. Moreover, the rear wall 18 is

preferably disposed at a location where the rear wall 18 is touchable by an arc (a spark) generated at the time of separating the fixed contact 31 and the movable contact 32 from each other. At least part of the opening 23 in the rear wall 18 is formed in the rear wall 18 so as to overlap the space (the gap) S6 between the fixed contact 31 and the movable contact 32 in the contact open state in the forward direction or the rearward direction. Note that the forward direction or the rearward direction is a direction parallel to an orthogonal direction (the transverse direction) orthogonal (transverse) to the direction in which the pair of contacts 31 and 32 face each other. Note that "at least part of the opening 23" in the context that "at least part of the opening 23 overlaps the space S6" may be, but does not have to be, the same as "at least part of the opening 23" in the context that "the shielding member 13 covers at least part of the opening 23".

[0028] The elastic piece 33 is a leaf spring made of a conductive material and has a belt-like shape. The elastic piece 33 extends in the left direction and the right direction. The elastic piece 33 has a left end 33a relatively fixed to the base 4. Specifically, the left end 33a of the elastic piece 33 is fixed to the terminal 10 provided to the base 4, thereby being relatively fixed to the base 4. The elastic piece 33 has a right end 33b which is a free end and which is elastically displaceable in the upward direction or the downward direction. The right end 33b of the elastic piece 33 extends to a location where the movable contact 32 is located, and the movable contact 32 is provided on an upper principal surface of the right end 33b of the elastic piece 33. Elastically warping the elastic piece 33 upward and downward with the left end 33a as a supporting point causes displacement of the right end 33b of the elastic piece 33 in the upward direction or the downward direction. Due to the displacement, the movable contact 32 is displaced in the upward direction or the downward direction to approach and come into contact with, or to be separated from, the fixed contact 31.

[0029] The card 7 is a member configured to transmit to the elastic piece 33 upward and downward movements of the side plate section 5b of the operation unit 5. The card 7 is made of an insulating material (e.g., a synthetic resin). The card 7 is fixed above the side plate section 5b of the operation unit 5. The card 7 has an upper portion provided with a projection 7a. The projection 7a of the card 7 has a tip end abutting a lower surface of the elastic piece 33 at the center in the longitudinal direction.

[0030] The four terminals 8 to 11 are terminals serving as external connection terminals of the electromagnetic relay 1. The two terminals 8 and 9 are terminals via which a drive current is supplied to the electromagnetic device 3. Of the two terminals 8 and 9, the terminal 8 on the right is electrically connected to one end of the coil 27. The terminal 9 on the left is electrically connected to the other end of the coil 27. The bobbin 26 has left and right ends to which cover members 35a and 35b are respectively attached. The terminal 9 on the left is fixed to the cover member 35b on the left and protrudes downward from

the vicinity of a front left corner of the lower surface of the base 4. The terminal 8 on the right is fixed to the cover member 35a on the right and protrudes downward from the vicinity of a front right corner of the lower surface of the base 4. For example, when a current is input to the terminal 8 and a current is output from the terminal 9, the coil 27 is energized, thereby generating a magnetic field to excite the electromagnetic device 3.

[0031] The two terminals 10 and 11 are terminals for inputting or outputting a current that flows between the pair of contacts 31 and 32 in the contact closed state. Of the two terminals 10 and 11, the terminal 10 on the left is fixed to an outer surface of the left wall 16 of the base 4. The terminal 10 on the left has an upper portion 10a. The upper portion 10a is bent, is pulled in the base 4, and is electrically connected to the left end 33a of the elastic piece 33. The terminal 10 on the left has a lower portion 10b protruding downward from the vicinity of a rear left corner of the lower surface of the base 4. Of the two terminals 10 and 11, the terminal 11 on the right is fixed to an outer surface of the right wall 17 of the base 4. The terminal 11 on the right has an upper portion 11a. The upper portion 11a is bent, is pulled in the base 4, and is electrically connected to the fixed contact 31. The fixed contact 31 is fixed to a lower surface of the upper portion 11a of the terminal 11 on the right. The terminal 11 on the right has a lower portion 11b protruding downward from the vicinity of a rear right corner of the lower surface of the base 4.

[0032] In the electromagnetic relay 1, when exciting the electromagnetic device 3 causes a pivot of the operation unit 5 by a fixed angle, the pivot of the operation unit 5 is transmitted via the card 7 to the elastic piece 33, and the elastic piece 33 warps toward the fixed contact 31 so that the movable contact 32 and the fixed contact 31 come into contact with each other. Then, when the electromagnetic device 3 is de-energized, the elastic piece 33, together with the operation unit 5, returns to the initial state, and the movable contact 32 and the fixed contact 31 are separated from each other.

[0033] As illustrated in FIG. 4, the case 12 is a member which accommodates the base 4. The case 12 is made of, for example, an insulating material (e.g., a synthetic resin). The case 12 is, for example, in the shape of a hollow box which is a rectangular parallelepiped. The case 12 has an opening at, for example, the front surface. The case 12 has a front wall, the rear wall 41, a left wall 42, a right wall 43, and a bottom wall 44. The bottom wall 44 has four through holes. Each of the terminals 8 to 11 corresponds to and penetrates through an associated one of the four through holes. The four through holes are provided at respective four corners of the bottom wall 44.

[0034] The base 4 is accommodated into the case 12 through the opening at the upper surface of the case 12. In this state, the four terminals 8 to 11 protrudes under the case 12 from the four through holes in the bottom wall 44 of the case 12, respectively. The front wall of the case 12 covers the front surface, which is open, of the

base 4. The rear wall 41, the left wall 42, and the right wall 43 of the case 12 respectively cover the rear wall 41, the left wall 16, and the right wall 17 of the base 4. In this state, the opening 23 and the opening 24 in the base 4, the shielding member 13, and the exposition sections 29a and 29d of the yoke 29 are covered with the rear wall 41 of the case 12.

[0035] As illustrated in FIG. 2, the shielding member 13 is a member covering at least part of the opening 23 in the rear wall 18 of the base 4. In the present embodiment, the shielding member 13 covers the entirety of the opening 23. The shielding member 13 covers the opening 23 to suppress an arc (a spark) generated when the fixed contact 31 and the movable contact 32 come into contact with each other from going out through the opening 23 to come into contact with the rear wall 41 of the case 12.

[0036] The shielding member 13 has, for example, a flat plate shape. The shielding member 13 is made of, for example, a metal material. Examples of the metal material include copper or a copper alloy (e.g., zirconium copper and phosphor bronze). The heat resistance of the shielding member 13 is preferably higher than the heat resistance of the rear wall 18 (the base 4). Thus, it is possible to suppress the shielding member 13 from being melted by heat of the arc generated between the pair of contacts 31 and 32. Moreover, the thermal conductivity of the shielding member 13 is desirably higher than the thermal conductivity of the rear wall 18. This enables the heat dissipation characteristic of the shielding member 13 to be improved. The shielding member 13 may be made of the same material as the base 4. Note that the shielding member 13 is made of a metal material in the present embodiment but may be made of ceramic.

[0037] As illustrated in FIG. 2, the shielding member 13 is disposed on the rear surface 18k of the rear wall 18 of the base 4. Thus, it is possible to attach the shielding member 13 from the rear side of the rear wall 18 (i.e., the outer side of the base 4). Moreover, in the present embodiment, the base 4 is accommodated in the case 12, and therefore, as illustrated in FIG. 4, the shielding member 13 is disposed in the space (a gap space) S5 between the case 12 and the rear surface 18k (a surface facing the case 12) of the rear wall 18. Thus, the shielding member 13 is sandwiched between the rear wall 18 and the case 12, which enables positioning of the shielding member 13 in a direction in which the rear wall 18 faces the case 12.

[0038] As illustrated in FIG. 5, the shielding member 13 includes a main part 47, two first projections 48a and 48b, and two second projections 49a and 49b.

[0039] The main part 47 is a part which is to cover the opening 23 in the rear wall 18 of the base 4 (see FIG. 2). The main part 47 has a plate shape (i.e., a rectangular plate shape) having the same shape and the same size as the opening 23.

[0040] The first projections 48a and 48b are portions which overlap an area around the opening 23 in the rear wall 18 in the forward direction or the rearward direction.

The forward direction or the rearward direction is a direction parallel to the orthogonal direction orthogonal to the direction in which the pair of contacts 31 and 32 face each other. The first projections 48a and 48b increase the thermal capacity of the shielding member 13, and it is thus possible to improve the heat dissipation characteristic of the shielding member 13.

[0041] The first projections 48a and 48b protrude from an outer perimeter of the main part 47 to be away from the outer perimeter of the main part 47 and to be parallel to the main part 47. Specifically, each of the first projections 48a and 48b has, for example, a rectangular plate shape. The first projection 48a is provided, for example, at an upper edge 47a of the main part 47 in a section from the left end to a central right part and protrudes upward. Note that the first projection 48a has a size which does not interfere with a peripheral portion 19s of the upper wall 19. The central right part is a location rightward from the center of the upper edge 47a of the main part 47. The first projection 48b is provided, for example, at a lower edge 47b of the main part 47 in a section from the right end to a central left part and protrudes downward. That is, the shielding member 13 has a shape including respective rectangular cut-out sections 50 at the upper right corner and the lower left corner of a rectangular shape in plan view. The shielding member 13 is thus point-symmetric about a center PI of the main part 47 when the main part 47 is viewed in plan.

[0042] As described above, the shielding member 13 is disposed on the rear surface 18k of the rear wall 18 (see FIG. 2). Accordingly, the main part 47 and the first projections 48a and 48b are disposed on the rear surface 18k of the rear wall 18. Note that the rear surface 18k of the wall 18 is a principal surface of the rear wall 18 on an opposite side from the pair of contacts 31 and 32. Moreover, as described above, the shielding member 13 is disposed in the gap space S5 between the rear surface 18k of the rear wall 18 and the case 12 (see FIG. 4). Accordingly, the main part 47 and the first projections 48a and 48b are disposed in the gap space S5 between the rear surface 18k of the rear wall 18 and the case 12. Note that the rear surface 18k is a surface of the rear wall 18 and faces the case 12.

[0043] The second projections 49a and 49b are portions which come into contact with an inner perimeter of the opening 23 in the rear wall 18 of the base 4 (see FIG. 1). The second projections 49a and 49b come into contact with the inner perimeter of the opening 23, thereby positioning the shielding member 13 on the rear surface of the rear wall 18 of the base 4. As illustrated in FIG. 5, the second projections 49a and 49b protrude in the forward direction from the outer perimeter (e.g., left and right edges) of the main part 47 of the shielding member 13. The forward direction is a direction opposite to the orthogonal direction (transverse direction, the rearward direction) orthogonal (transverse) to the direction (the upward direction or the downward direction) in which the pair of contacts 31 and 32 face each other. The second

projection 49a is provided to extend through the right edge 47c of the main part 47, and the second projection 49b is provided to extend through the left edge 47d of the main part 47. The second projections 49a and 49b each have, for example, a rectangular shape.

[0044] Note that in order to limit a temperature rise due to heat of an arc generated between the pair of contacts 31 and 32, the shielding member 13 desirably has as large a volume (e.g., thickness or area) as possible so as to increase thermal capacity. That is, the first projections 48a and 48b are desirably formed as large as possible. Moreover, the shielding member 13 is disposed in a region other than metal members (e.g., exposition sections 29c and 29d of a member such as the yoke 29 included in the electromagnetic device 3) exposed from the rear wall 18 and the peripheral portion 19s of the upper wall 19 (see FIG. 2). Moreover, the shielding member 13 preferably has a shape point-symmetric about the center PI of the main part 47 in plan view so that upward, downward, left, and right orientations of the shielding member 13 do not have to be taken into consideration when the shielding member 13 is attached to the rear wall 18 (see FIG. 1 and FIG. 5). These conditions are taken into account to determine the shape of the shielding member 13 in plan view.

[0045] In the present embodiment, the shielding member 13 is formed by bending a flat metal plate. Recesses 13s shown in FIG. 5 are bend relief portions in a case where the second projections 49a and 49b are formed by bending. The recesses 13s are hereinafter also referred to as bend relief portions 13s. The bend relief portions 13s are recesses which prevent the occurrence of breakage in portions on both base ends of the second projections 49a and 49b when the second projections 49a and 49b are bent to be orthogonal to the main part 47. Note that in the present embodiment, the shielding member 13 is formed by bending, but a method for fabricating the shielding member 13 is not limited to a method including the bending.

[0046] The shielding member 13 is attached to the rear wall 18 as described below. That is, as illustrated in FIG. 2, the shielding member 13 is attached from behind the rear wall 18 of the base 4 to the rear surface of the rear wall 18 to cover the opening 23. In an attached state, the second projections 49a and 49b are in the opening 23 and about the inner perimeter of the opening 23 (see FIG. 1). Thus, the shielding member 13 is attached to the opening 23. Moreover, the second projections 49a and 49b about the inner perimeter of the opening 23, thereby positioning the shielding member 13 on the rear surface of the rear wall 18 (see FIG. 1). Specifically, the second projections 49a and 49b come into contact with left and right edges of the inner perimeter of the opening 23, thereby determining the location of the shielding member 13 on the rear wall 18 in the left direction and the right direction (see FIG. 1). Moreover, both upper and lower ends of the second projections 49a and 49b come into contact with the upper and lower edges of the opening

23, thereby determining the location of the shielding member 13 on the rear wall 18 in the upward direction and the downward direction (see FIG. 1).

[0047] Moreover, as illustrated in FIG. 2, in the attached state, the main part 47 covers the entirety of the opening 23. Moreover, the first projections 48a and 48b come into contact with the periphery of the opening 23 in the rear surface of the rear wall 18. At this time, the cut-out sections 50 of the shielding member 13 enable the first projection 48b of the shielding member 13 to be disposed in a region on the rear surface of the rear wall 18 other than the exposition section 29c exposed from the pore 18a in the rear wall 18. Moreover, the first projection 48a is disposed not to come into contact with the peripheral portion 19s of the upper wall 19 of the base 4.

[0048] Note that the shape of the shielding member 13 in plan view is point-symmetric about the center PI of the main part 47. Thus, when the shielding member 13 is attached to the rear wall 18, the shielding member 13 may be rotated upside down or left to right, the shape of the shielding member 13 in plan view is identical. Thus, it is possible to attach the shielding member 13 to the rear surface of the rear wall 18 of the shielding member 13 without taking the top, bottom, left, and right of the shielding member 13 into consideration. This enables work efficiency of attaching the shielding member 13 to the rear wall 18 to be improved.

[0049] As described above, according to the contact device 2 and the electromagnetic relay 1 of the embodiment, the shielding member 13 suppresses an arc (a spark) generated between the pair of contacts 31 and 32 from passing through the opening 23 to come into contact with the case 12 outside the opening 23. This reduces damage caused to the case 12 by the arc. It is also possible to reduce scattering of the content of the case 12 due to the damage to the case 12. Thus, it is possible to reduce deposition of the content between the pair of contacts 31 and 32, and thus, it is possible to reduce contact failure between the pair of contacts 31 and 32.

[0050] Note that in the present embodiment, the contact device 2 includes one pair of contacts 31 and 32 but may include a plurality of pairs of contacts 31 and 32. That is, the contact device 2 according to the present embodiment includes at least one pair of contacts 31 and 32.

[0051] Moreover, in the present embodiment, the contact device 2 includes one elastic piece 33 but may include a plurality of elastic pieces 33. In this case, each elastic piece 33 may be provided with one or more movable contacts 32.

[0052] In the present embodiment, the movable contact 32 and the elastic piece 33 are members separated from each other, but the movable contact 32 and the elastic piece 33 may be an integrally formed single member. That is, the movable contact 32 may be part (e.g., a projection) of the elastic piece 33.

[0053] In the present embodiment, the fixed contact 31 and the terminal 11 are members separated from each

other, but the fixed contact 31 and the terminal 11 may be an integrally formed single member. That is, the fixed contact 31 may be a part (e.g., a projection) of the terminal 11.

[0054] In the present embodiment, the contact device 2 includes two first projections 48a and 48b. However, it is sufficient if the contact device 2 includes at least one first projection. Alternatively, the contact device 2 does not have to include the first projection. In the present embodiment, the contact device 2 includes the two second projections 49a and 49b. However, it is sufficient if the contact device 2 includes at least one second projection. Alternatively, the contact device 2 does not have to include the second projection.

[0055] In the present embodiment, the shielding member 13 covers the entirety of the opening 23 of the rear wall 18. However, it is sufficient if the shielding member 13 covers at least part of the opening 23.

[0056] Moreover, in the present embodiment, the pair of contacts are the fixed contact 31 and the movable contact 32, but both of the pair of contacts may be movable contacts.

(Variation)

[0057] Variations of the embodiment will be described below. The variations described below may be implemented in combination with each other. Note that in the following description of the variations, components the same as those in the embodiment are denoted by the same reference signs, and the description thereof may be omitted.

(First Variation)

[0058] In the embodiment, since the exposition sections 29c and 29d of the yoke 29 are exposed from the rear surface 18k of the rear wall 18 (see FIG. 2), the shielding member 13 has the cut-out sections 50 so as not to overlap the exposition sections 29c and 29d. However, when exposition sections 29c and 29d of a yoke 29 are not exposed from a rear surface 18k of a rear wall 18, a shielding member 13 does not have to have cut-out sections 50 as illustrated in FIG. 6A or FIG. 6B. The shielding member 13 shown in each of FIGS. 6A and 6B has a rectangular shape in plan view. This is, in other words, the case where first projections 48a and 48b may be provided to the entirety of an upper edge 47a and the entirety of a lower side section 47b of a main part 47. Note that FIG. 6A shows a case where a bend relief portion 13s is provided, and FIG. 6B shows a case where the bend relief portion 13s is not provided.

(Second Variation)

[0059] In the embodiment, since the shape of the shielding member 13 is point-symmetric about the center PI of the main part 47 in plan view, the shielding member

13 has the cut-out sections 50 at two locations, namely, the upper right corner and the lower left corner. However, the shape of the shielding member 13 in plan view is not limited to the shape point-symmetric about the center PI of the main part 47. Alternatively, as illustrated in FIG. 7, a shielding member 13 may have a shape having one cut-out section 50 at a lower left corner. In this case, a first projection 48a is provided to the entirety of an upper edge 47a of a main part 47, and as in the case of the first embodiment, a first projection 48b is provided in an area from a right end of a lower side section 47b to a central left part of the main part 47.

(Third Variation)

[0060] In the embodiment, the shielding member 13 has the cut-out sections 50 at two locations, namely, the upper right corner and the lower left corner. Note that the locations where the cut-out sections 50 are provided are not limited to the two locations, namely, the upper right corner and the lower left corner. As illustrated in FIG. 8, a shielding member 13 may have respective cut-out sections 50 at four corners (an upper right corner, a lower right corner, an upper left corner, and a lower left corner).

(Fourth Variation)

[0061] In the present variation, as illustrated in FIG. 9, a right wall 17 of a base 4 further has an opening 70. The opening 70 is covered with a terminal 11 (shielding member).

[0062] As illustrated in FIG. 9, the right wall 17 is a partition wall (second partition wall) which partitions an interior space S4 in a case 12 into an interior space (first space) S1 and a gap space (third space, second space) S7 in the base 4. The interior space S1 in the base 4 is a space in which a contact unit 6 is provided. The gap space S7 is a space which is located between the right wall 17 of the base 4 and a right wall 43 of the case 12 (i.e., between a right surface of the right wall 17 and the case 12) and in which the contact unit 6 is not provided.

[0063] As illustrated in FIG. 9, the right wall 17 is provided at a location being offset from the disposition of the contact unit 6 in a transverse direction (e.g., the right direction) (a second transverse direction) transverse (e.g., orthogonal) to a direction (the upward direction or the downward direction) in which a fixed contact 31 and a movable contact 32 face each other. The right wall 17 is provided at a location in a direction (the second transverse direction) transverse to the right direction with respect to a facing direction of the fixed contact 31 and the movable contact 32 which are paired. The rear wall 18 is provided at a location in a direction (a first transverse direction) transverse to the rearward direction with respect to the facing direction of the pair of contacts 31 and 32. That is, the right wall 17 is provided at a location in the second transverse direction (the right direction) different from the first transverse direction (the rearward

direction). The right wall 17 is preferably disposed at a location where the right wall 17 is touchable by an arc (a spark) generated at the time of separating the fixed contact 31 and the movable contact 32 from each other.

[0064] As illustrated in FIG. 9, the opening 70 is an opening which allows the right wall 17 to be away from the arc generated when the fixed contact 31 and the movable contact 32 comes out of contact with each other. The opening 70 is provided in the right wall 17 above an intermediate wall 20. At least part of the opening 70 is formed in the right wall 17 so as to overlap a space (gap) S6 between the fixed contact 31 and the movable contact 32 in the contact open state in the right direction or the left direction.

[0065] The opening 70 is provided at a portion of the right wall 17, wherein the arc reaches the portion. Providing the opening 70 to such a portion enables the opening 70 to keep the right wall 17 away from the arc. Thus, it is possible to reduce damage caused to the right wall 17 by the arc. The opening 70 has, for example, a rectangular shape. The opening 70 connects the interior space S1 to the gap space S7. That is, the interior space S1 is in communication with the gap space S7 through the opening 70.

[0066] As illustrated in FIG. 10, the right wall 17 has a slit 17a through which the terminal 11 passes. The slit 17a rearwardly extends from an upper portion of a front edge of the right wall 17. The slit 17a connects the interior space S1 (see FIG. 9) to the gap space S7 (see FIG. 9) in the base 4.

[0067] As illustrated in FIG. 11, the terminal 11 is disposed on an outer side principal surface of the right wall 17 and is electrically connected to the one contact (fixed contact 31) of the contact unit 6 (see FIG. 9). As illustrated FIG. 10, the terminal 11 includes a main part 111, an external connector 112, and a contact supporting part 113.

[0068] As illustrated in FIG. 10, the main part 111 has, for example, an inverse-triangular flat plate shape and is a portion for covering the opening 70. In the present variation, the main part 111 covers the entirety of the opening 70 (see FIG. 11), but it is sufficient if the main part 111 covers at least part of the opening 70. Thus, it is possible to suppress the arc from going out of the base 4 through the opening 70 and from damaging the case 12. That is, the terminal 11 serves as a shielding member which shields the arc. The external connector 112 is a portion which comes into electrical contact with an external circuit. The external connector 112 has, for example, a belt-like bar shape and extends downward from a lower end of the main part 111.

[0069] The contact supporting part 113 is a portion which supports the fixed contact 31 (see FIG. 9). As illustrated in FIG. 10, the contact supporting part 113 has, for example, a rectangular plate shape and protrudes from an upper end of the main part 111 on a side of an inner side principal surface of the main part 111. The contact supporting part 113 has a lower side principal

surface provided with the fixed contact 31 (see FIG. 9). The contact supporting part 113 has a left end 113a which is bent upward. At a connection portion between the main part 111 and the contact supporting part 113, a cut-out 114 extends from a rear end toward the front of the connection portion. Note that the contact supporting part 113 corresponds to the upper portion 11a of the embodiment (see FIG. 1).

[0070] As illustrated in FIG. 11, the terminal 11 is attached to the right wall 17 from a front edge side of the right wall 17 such that the cut-out 114 and the slit 17a engage with each other. In the attached state, the main part 111 and the external connector 112 are arranged on the outer side principal surface of the right wall 17. Moreover, the main part 111 covers at least part of the opening 70. In the present variation, the main part 111 covers the entirety of the opening 70. The lower end of the external connector 112 protrudes downward from the lower portion of the base 4. The contact supporting part 113 is disposed in the interior of the base 4 and is disposed along a lower side principal surface of an upper wall 19 (see FIG. 9). The contact supporting part 113 has a left end which is fit in and fixed to a groove 19a provided to the upper wall 19 (see FIG. 9).

[0071] As described above, the present variations enable the opening 70 in the right wall 17 to reduce the damage caused to the right wall 17 by an arc generated when the fixed contact 31 and the movable contact 32 comes out of contact with each other. Moreover, the terminal 11 covers the opening 70, and therefore, it is possible to suppress the arc from passing through the opening 70 and damaging the case 12 located outside the opening 70.

[0072] Note that in the present variation, the base 4 has two openings 23 and 70, but it is sufficient if the base 4 has at least one of the two openings 23 or 70.

(Summary)

[0073] A contact device (2) of a first aspect includes a contact unit (6), a case (12), a partition wall (18; 17), and a shielding member (13; 11). The contact unit (6) includes a pair of contacts (31, 32) and is configured to be switched to one of a contact closed state where the pair of contacts (31, 32) are in contact with each other and a contact open state where the pair of contacts (31, 32) are apart from each other. The case (12) accommodates the contact unit (6). The partition wall (18; 17) is provided at a location being offset from the pair of contacts (31, 32) in a transverse direction transverse to a direction in which the pair of contacts (31, 32) face each other. The partition wall (18; 17) partitions an interior (S4) of the case (12) into a first space (S1) in which the contact unit (6) is provided and a second space (S5; S7) in which the contact unit (6) is not provided. The shielding member (13; 11) is provided to the partition wall (18; 17). The partition wall (18; 17) has an opening (23; 70) connecting the first space (S1) to the second space (S5; S7). At least part of the

opening (23; 70) overlaps a space (S6) in a direction parallel to the transverse direction, the space (S6) being between the pair of contacts (31, 32) in the contact open state. The shielding member (13; 11) has a main part (47; 111) covering the at least part of the opening (23; 70).

[0074] According to this configuration, the shielding member (13; 11) suppresses an arc (a spark) generated between the pair of contacts (31, 32) from passing through the opening (23; 70) to come into contact with the case (12) located outside the opening (23; 70). This reduces damage caused to the case (12) by the arc.

[0075] In a contact device (2) of a second aspect referring to the first aspect, the shielding member (13) has a heat resistance higher than a heat resistance of the partition wall (18).

[0076] With this configuration, it is possible to reduce degradation of the shielding member (13) due to the arc generated between the pair of contacts (31, 32).

[0077] In a contact device (2) of a third aspect referring to the first or second aspect, the shielding member (13) has a thermal conductivity higher than a thermal conductivity of the partition wall (18).

[0078] This configuration enables the heat dissipation characteristic of the shielding member (13) to be improved. This enables the degradation of the shielding member (13) caused by the arc to be reduced also when the arc generated between the pair of contacts (31, 32) heats the shielding member (13).

[0079] In a contact device (2) of a fourth aspect referring to any one of the first to third aspects, the shielding member (13) is provided at a location where the shielding member (13) is touchable by an arc generated from the contact unit (6).

[0080] In a contact device (2) of a fifth aspect referring to any one of the first to fourth aspects, the shielding member (13) further includes a first projection (48a; 48b) protruding from the main part (47). The first projection (48a; 48b) overlaps an area around the opening (23) in the partition wall (18) in a direction parallel to the transverse direction.

[0081] With this configuration, the first projections (48a, 48b) enable the volume of the shielding member (13) to be increased. This enables the thermal capacity of the shielding member (13) to be increased, and it is possible to reduce degradation of the shielding member (13) caused by a temperature rise also when the shielding member (13) is heated by heat of the arc.

[0082] In a contact device (2) of a sixth aspect referring to the fifth aspect, the first projection (48a; 48b) is disposed on a principal surface (18k) of the partition wall (18) on an opposite side from the pair of contacts (31, 32).

[0083] This configuration enables the partition wall (18) to be disposed between the first projection (48a; 48b) and the contact unit (6). Thus, the partition wall (18) suppresses the arc generated from the contact unit (6) from coming into contact with the first projection (48a; 48b). This enables the heat dissipation characteristic of the shielding member (13) to be improved.

[0084] In a contact device (2) of a seventh aspect referring to the sixth aspect, the first projection (48a; 48b) is disposed between the principal surface (18k) of the partition wall (18) and the case (12), the principal surface (18k) facing the case (12).

[0085] This configuration enables positioning of the shielding member (13) to be performed by the case (12) and the partition wall (18).

[0086] In a contact device (2) of an eighth aspect referring to any one of the fifth to seventh aspects, the partition wall (18) has a principal surface (18k) which is on an opposite side from the pair of contacts (31, 32) and from which a metal member (a yoke 29) is exposed, and the first projection (48b) is disposed in a region other than an exposition section (29c) of the metal member (29), the exposition section (29c) being exposed from the principal surface.

[0087] With this configuration, it is possible to reduce electrical connection between the shielding member (13) and the exposition section (29c) of the metal member (29).

[0088] In a contact device (2) of a ninth aspect referring to any one of the first to eighth aspects, the shielding member (13) includes a second projection (49a; 49b) protruding from the main part (47) in a direction (forward direction) opposite to the transverse direction (rearward direction). The second projection (49a; 49b) is in contact with an inner perimeter of the opening (23).

[0089] With this configuration, the second projection (49a; 49b) is in contact with the inner perimeter of the opening (23), thereby positioning the shielding member (13) on the partition wall (18).

[0090] In a contact device (2) of a tenth aspect referring to any one of the first to ninth aspects, the main part (47) is disposed in the second space (S5).

[0091] This configuration enables the main part (47) of the shielding member (13) to be attached to the partition wall (18) from an outer side of the partition wall (18) (from an opposite side from the contact unit (6)). This enables work efficiency of attaching the shielding member (13) to the partition wall (18) to be improved.

[0092] In a contact device (2) of an eleventh aspect referring to any one of the first to tenth aspects, the shielding member (13) is made of metal.

[0093] With this configuration, a non-destructive inspection (overcurrent formula sensor or X-ray inspection device) performed on the contact device (2) enables an easy checking of whether or not the contact device (2) is provided with the shielding member (13).

[0094] A contact device (2) of a twelfth aspect referring to any one of the first to fourth aspects further includes a terminal (11). The terminal (11) is disposed on an outer side principal surface of the partition wall (17) and is electrically connected to the contact (31) of the pair of contacts (31, 32). The terminal (11) serves as the shielding member.

[0095] With this configuration, the opening (70) reduces damage caused to the partition wall (17) by the arc

generated when the pair of contacts (31, 32) are open to be separated. Moreover, since the terminal (11) covers the opening (70), it is possible to suppress the arc from passing through the opening (70) and damaging the case (12) located outside the opening (70).

[0096] In a contact device (2) of a thirteenth aspect referring to any one of the first to eleventh aspects, the partition wall (18) is a first partition wall (18), the opening (23) is a first opening (23), and the transverse direction is a first transverse direction. The contact device (2) includes a second partition wall (17) and a terminal (11). The second partition wall (17) is provided at a location being offset from the contact unit (6) in a second transverse direction which is different from the first transverse direction and which is transverse to the direction in which the pair of contacts (31, 32) face each other. The second partition wall (17) partitions the interior (S4) of the case (12) into the first space (S1) in which the contact unit (6) is provided and a third space (S7) in which the contact unit (6) is not provided. The terminal (11) is disposed on an outer side principal surface of the second partition wall (17) and is electrically connected to the contact (31) of the pair of contacts (31, 32). The second partition wall (17) has a second opening (70) connecting the first space (S1) to the third space (S7). At least part of the second opening (70) overlaps the space (S6) between the pair of contacts (31, 32) in the contact open state in a direction parallel to the second transverse direction. The terminal (11) includes the main part (111) covering the at least part of the second opening (70).

[0097] With this configuration, the second opening (70) reduces damage caused to the second partition wall (17) by an arc generated when the pair of contacts (31, 32) are open to be separated. Moreover, the terminal (11) covers the second opening (70), and therefore, it is possible to suppress the arc from passing through the second opening (70) and damaging the case (12) located outside the second opening (70).

[0098] An electromagnetic relay (1) of a fourteenth aspect includes: the contact device (2) of any one of the first to thirteenth aspect; and an electromagnetic device (3). The electromagnetic device (3) switches the pair of contacts (31, 32) to one of the open state and the closed state.

[0099] With this configuration, it is possible to provide an electromagnetic relay (1) having an effect of the contact device (2).

Reference Signs List

[0100]

1	ELECTROMAGNETIC RELAY
2	CONTACT DEVICE
6	CONTACT UNIT
12	CASE
13	SHIELDING MEMBER
17	RIGHT WALL (SECOND PARTITION

	WALL)
18	REAR WALL (FIRST PARTITION WALL, PARTITION WALL)
18k	REAR SURFACE (PRINCIPAL SURFACE)
5 23	OPENING (FIRST OPENING)
31	FIXED CONTACT (CONTACT)
32	MOVABLE CONTACT (CONTACT)
47	MAIN PART
48a, 48b	FIRST PROJECTION
10 49a, 49b	SECOND PROJECTION
70	OPENING (SECOND OPENING)
111	MAIN PART
S1	INTERIOR SPACE (FIRST SPACE)
S4	INTERIOR SPACE
15 S5	GAP SPACE (SECOND SPACE)
S6	SPACE
S7	GAP SPACE (THIRD SPACE, SECOND SPACE)

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Claims

1. A contact device (2), comprising:

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a contact unit (6) including a pair of contacts (31, 32) and being configured to be switched to one of a contact closed state where the pair of contacts (31, 32) are in contact with each other and a contact open state where the pair of contacts (31, 32) are apart from each other;
a case (12) which accommodates the contact unit (6);

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a partition wall (17; 18) provided at a location being offset from the contact unit (6) in a transverse direction transverse to a direction in which the pair of contacts (31, 32) face each other, the partition wall (17; 18) partitioning an interior (S4) of the case (12) into a first space (S1) in which the contact unit (6) is provided and a second space (S5; S7) in which the contact unit (6) is not provided; and

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a shielding member (11; 13) provided to the partition wall (17; 18),
the partition wall (17; 18) having an opening (70; 23) connecting the first space (S1) to the second space (S5; S7),

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at least part of the opening (23; 70) overlapping a space (S6) in a direction parallel to the transverse direction, the space (S6) being between the pair of contacts (31, 32) in the contact open state,

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the shielding member (13; 11) having a main part (47; 111) covering the at least part of the opening (23; 70).

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2. The contact device (2) of claim 1, wherein the shielding member (13) has a heat resistance higher than a heat resistance of the partition wall

- (18).
3. The contact device (2) of claim 1 or 2, wherein the shielding member (13) has a thermal conductivity higher than a thermal conductivity of the partition wall (18).
 4. The contact device (2) of any one of claims 1 to 3, wherein the shielding member (13) is provided at a location where the shielding member (13) is touchable by an arc generated from the contact unit (6).
 5. The contact device (2) of any one of claims 1 to 4, wherein the shielding member (13) further includes a first projection (48a; 48b) protruding from the main part (47), and the first projection (48a; 48b) overlaps an area around the opening (23) in the partition wall (18) in a direction parallel to the transverse direction.
 6. The contact device (2) of claim 5, wherein the first projection (48a; 48b) is disposed on a principal surface (18k) of the partition wall (18) on an opposite side from the pair of contacts (31, 32).
 7. The contact device (2) of claim 6, wherein the first projection (48a; 48b) is disposed between the principal surface (18k) of the partition wall (18) and the case (12), the principal surface (18k) facing the case (12).
 8. The contact device (2) of any one of claims 5 to 7, wherein the partition wall (18) has a principal surface (18k) which is on an opposite side from the pair of contacts (31, 32) and from which a metal member (29) is exposed, and the first projection (48a; 48b) is disposed in a region other than an exposition section (29c) of the metal member (29), the exposition section (29c) being exposed from the principal surface (18k).
 9. The contact device (2) of any one of claims 1 to 8, wherein the shielding member (13) includes a second projection (49a; 49b) protruding from the main part (47) in a direction opposite to the transverse direction, and the second projection (49a; 49b) is in contact with an inner perimeter of the opening (23).
 10. The contact device (2) of any one of claims 1 to 9, wherein the main part (47) is disposed in the second space (S5).
 11. The contact device (2) of any one of claims 1 to 10, wherein the shielding member (13) is made of metal.
 12. The contact device (2) of any one of claims 1 to 4, further comprising a terminal (11) disposed on an outer side principal surface of the partition wall (17), the terminal (11) being electrically connected to one of the pair of contacts (31, 32), wherein the terminal (11) serves as the shielding member (13).
 13. The contact device (2) of any one of claims 1 to 11, wherein the partition wall (18) is a first partition wall (18), the opening (23) is a first opening (23), and the transverse direction is a first transverse direction, the contact device (2) includes a second partition wall (17) provided at a location being offset from the contact unit (6) in a second transverse direction which is different from the first transverse direction and which is transverse to the direction in which the pair of contacts (31, 32) face each other, the second partition wall (17) partitioning the interior (S4) of the case (12) into the first space (S1) in which the contact unit (6) is provided and a third space (S7) in which the contact unit (6) is not provided, and a terminal (11) disposed on an outer side principal surface of the second partition wall (17), the terminal (11) being electrically connected to the contact (31) of the pair of contacts (31, 32), the second partition wall (17) having a second opening (70) connecting the first space (S1) to the third space (S7), at least part of the second opening (70) overlapping the space (S6) between the pair of contacts (31, 32) in the contact open state in a direction parallel to the second transverse direction, the terminal (11) including a main part (111) covering the at least part of the second opening (70).
 14. An electromagnetic relay (1), comprising: the contact device (2) of any one of claims 1 to 13; and an electromagnetic device (3) configured to switch the pair of contacts (31, 32) to one of the contact open state and the contact closed state.

FIG. 1

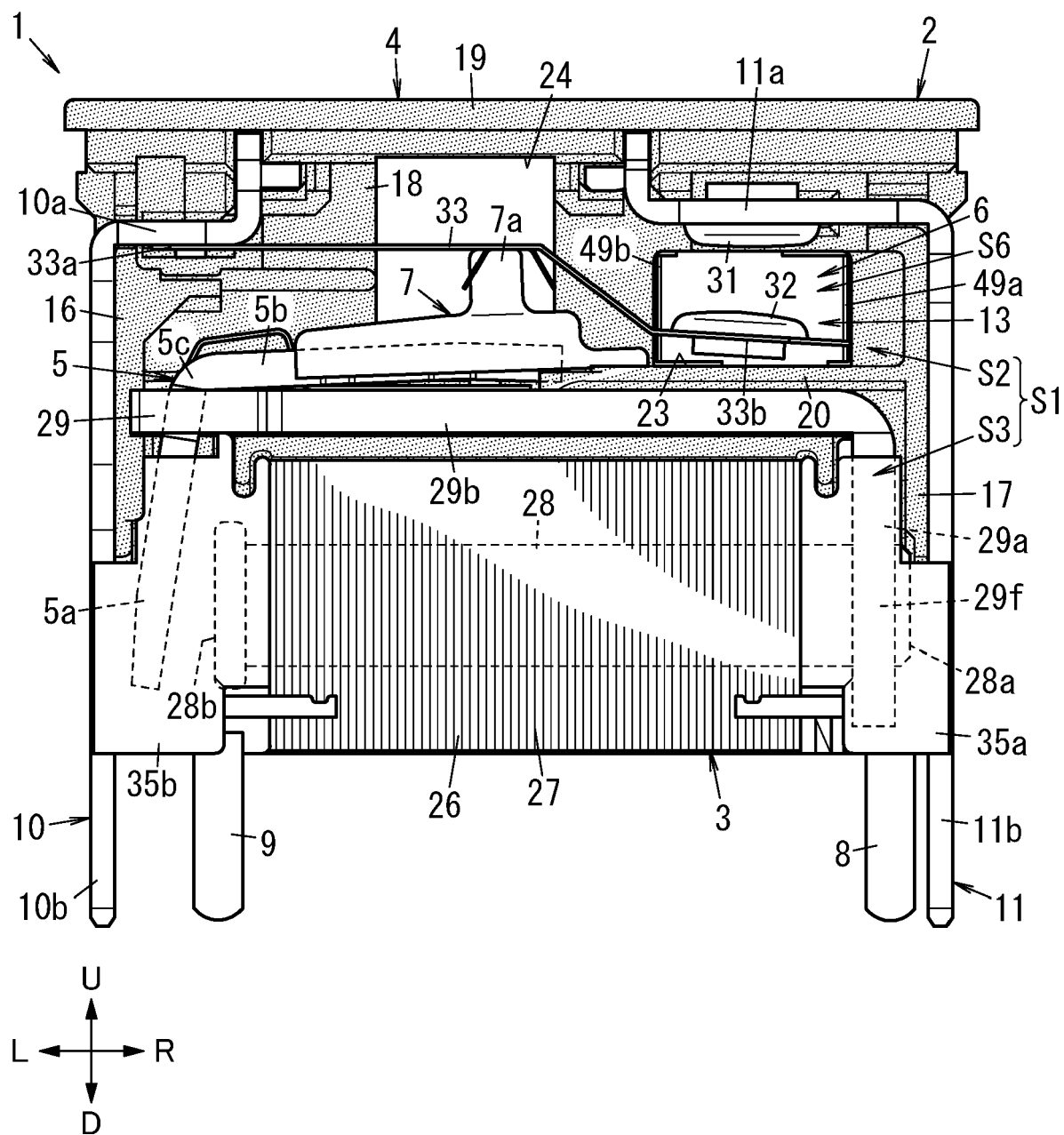


FIG. 2

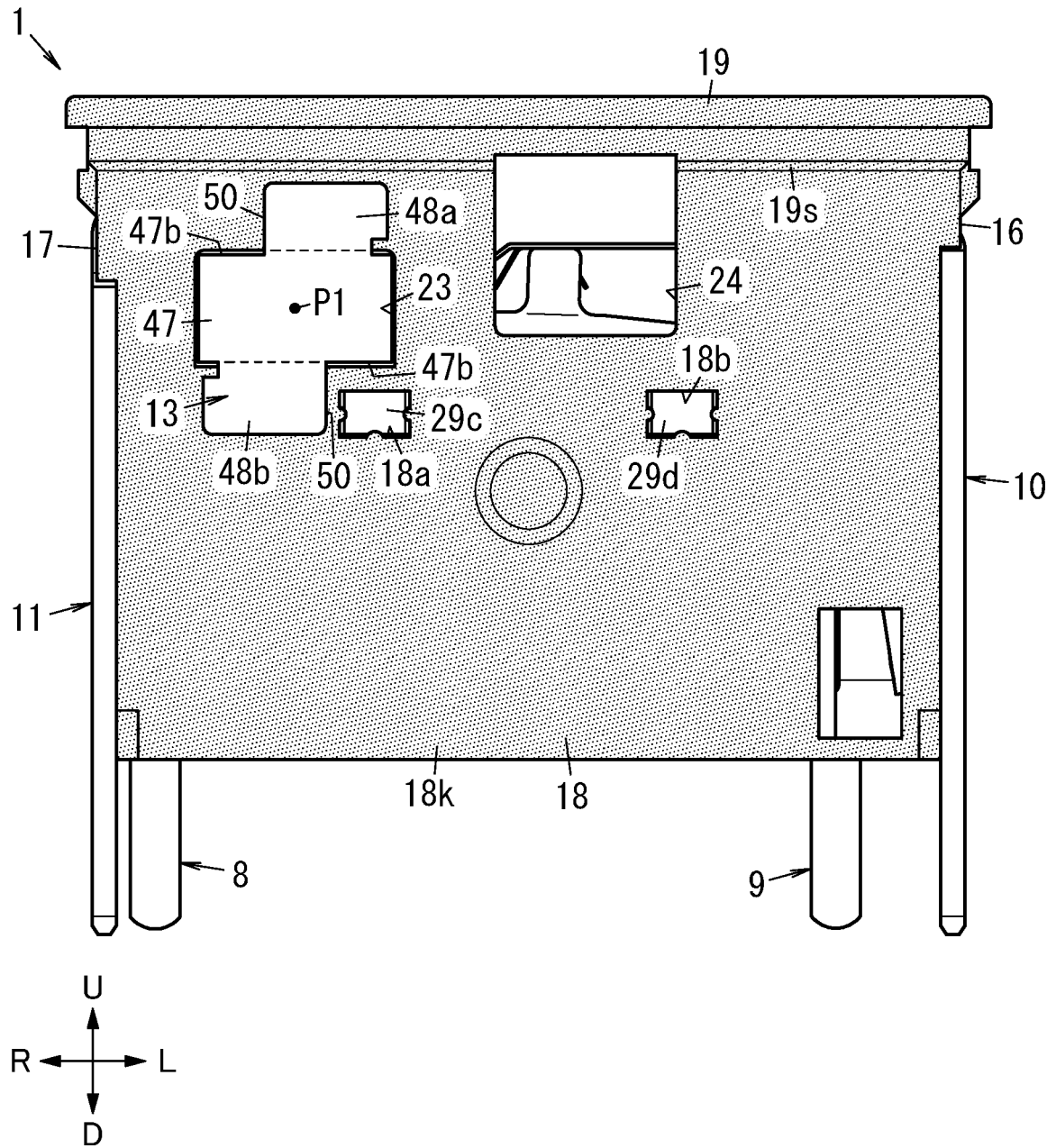


FIG. 3

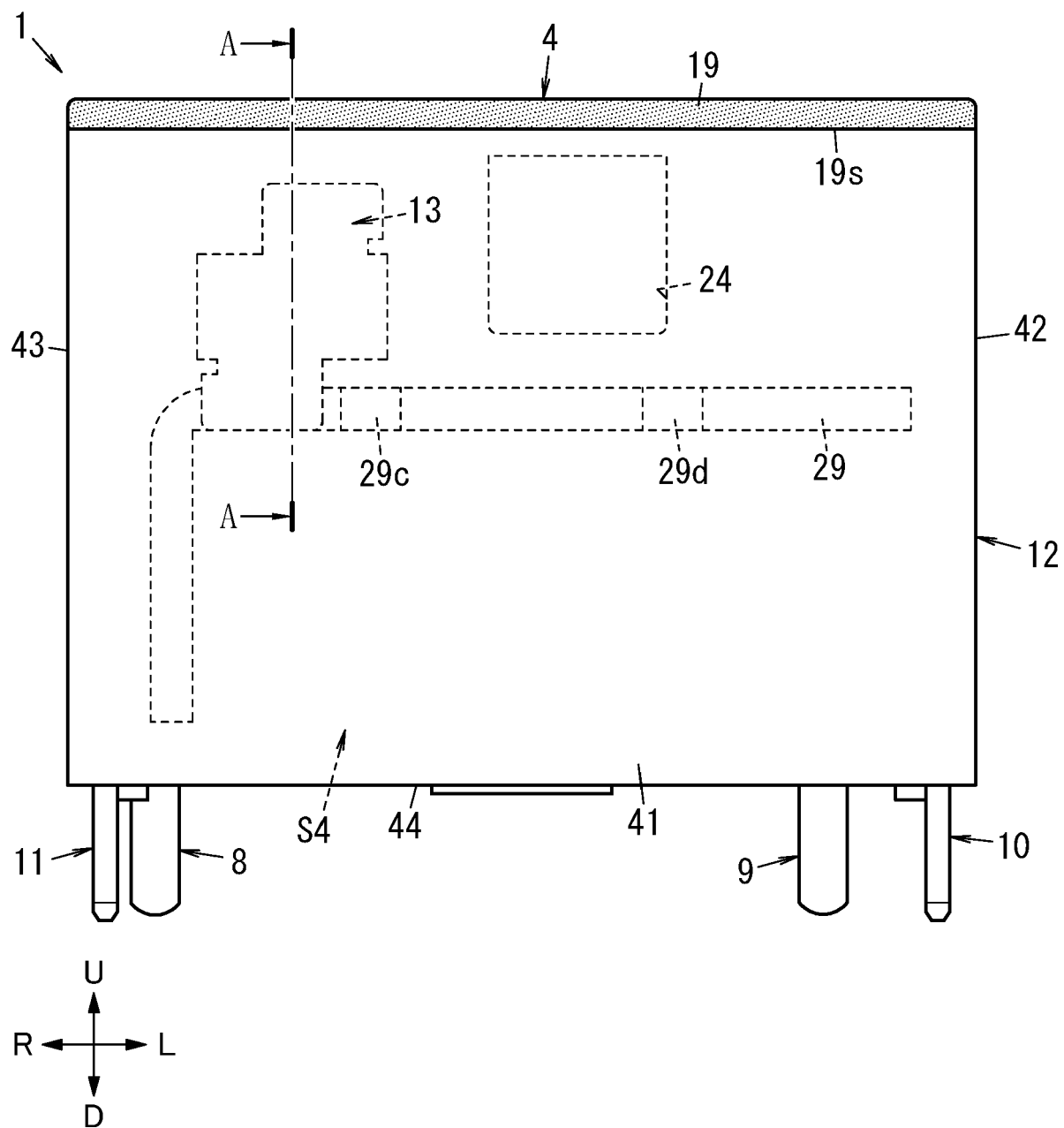


FIG. 4

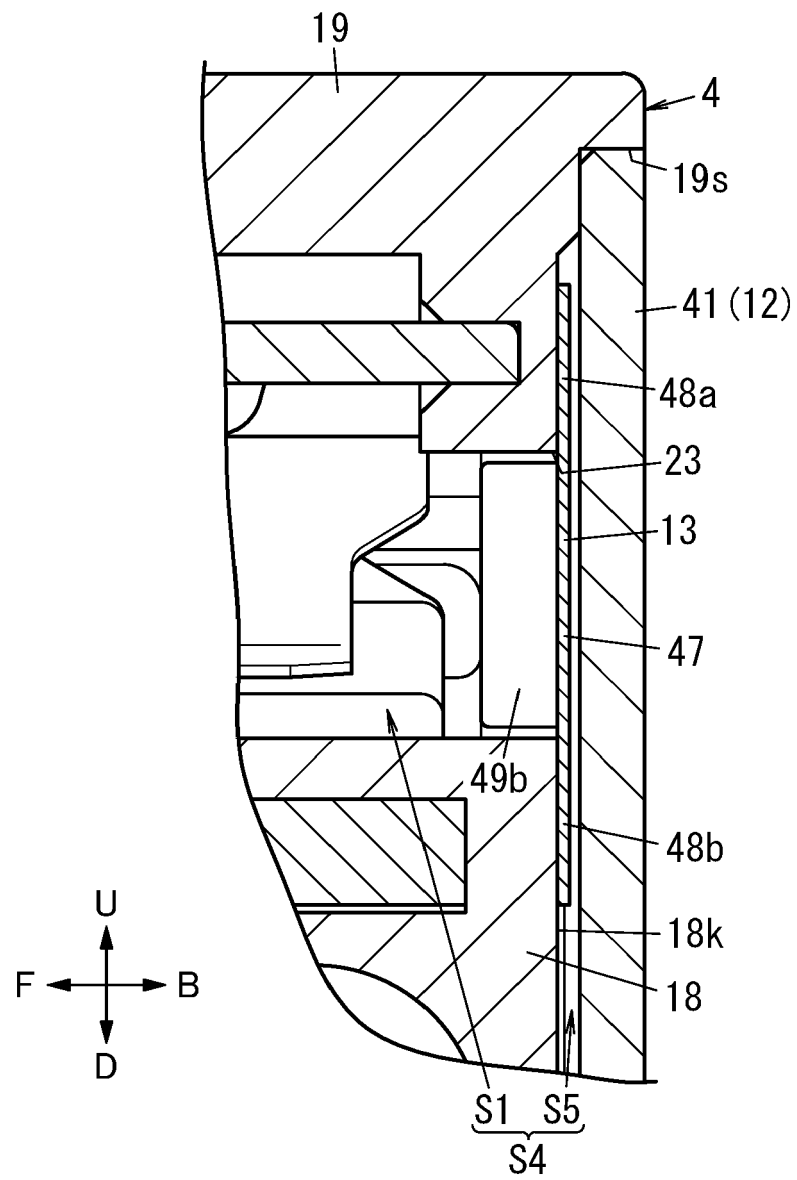


FIG. 5

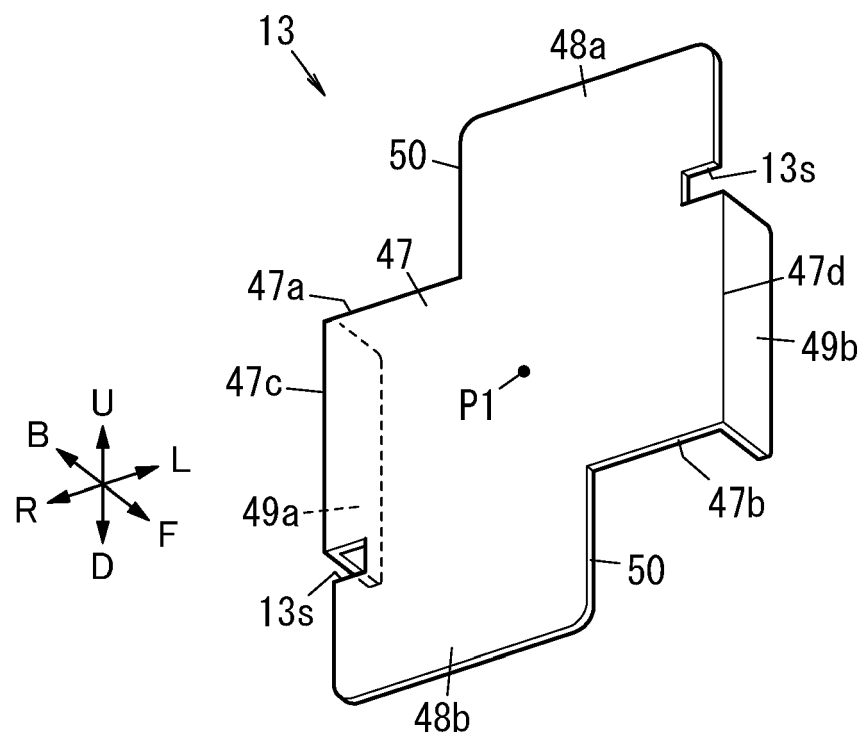


FIG. 6A

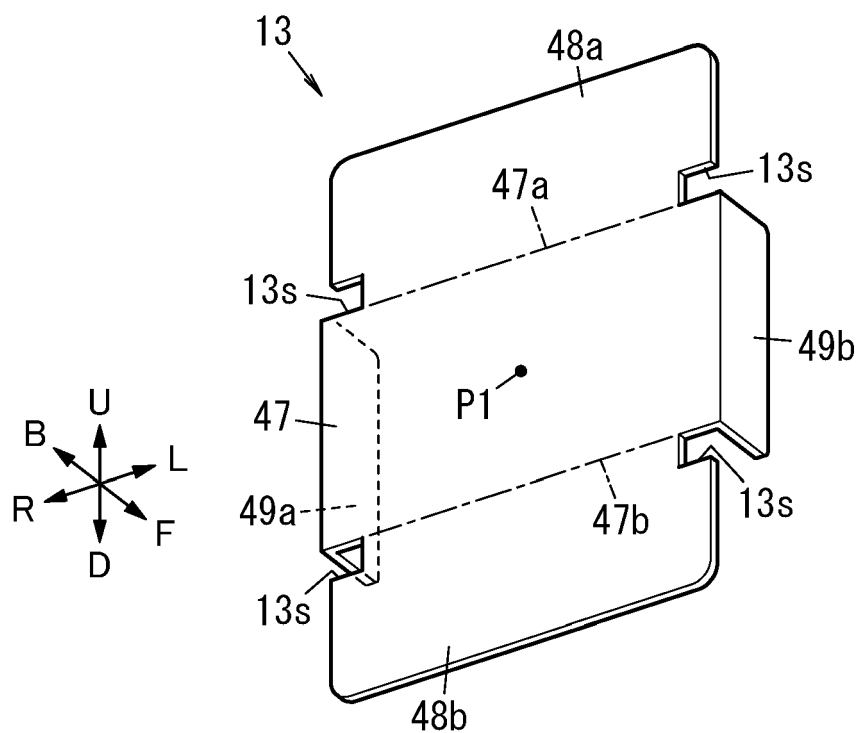


FIG. 6B

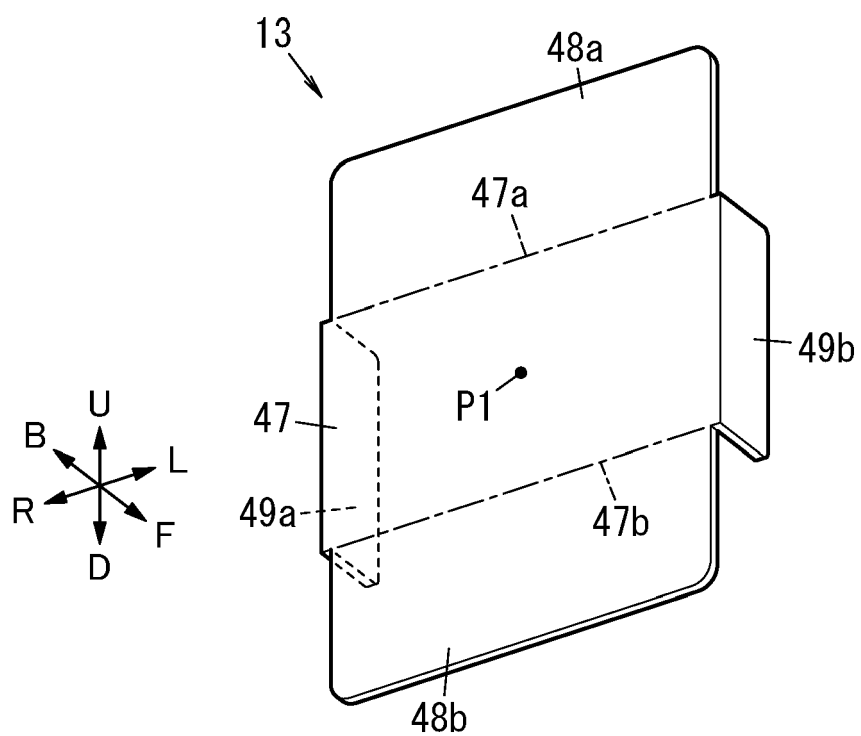


FIG. 7

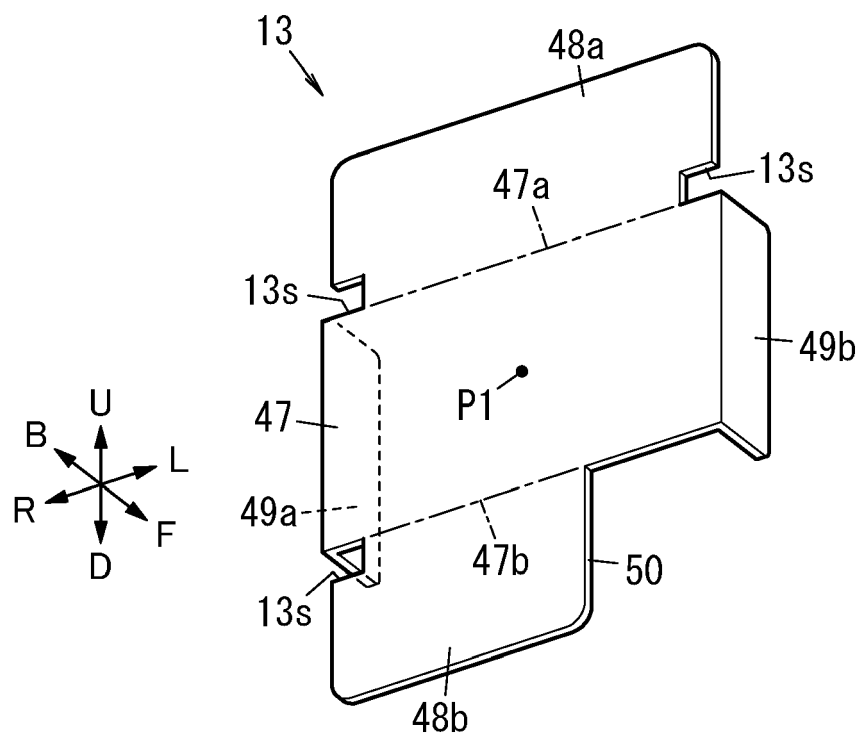


FIG. 8

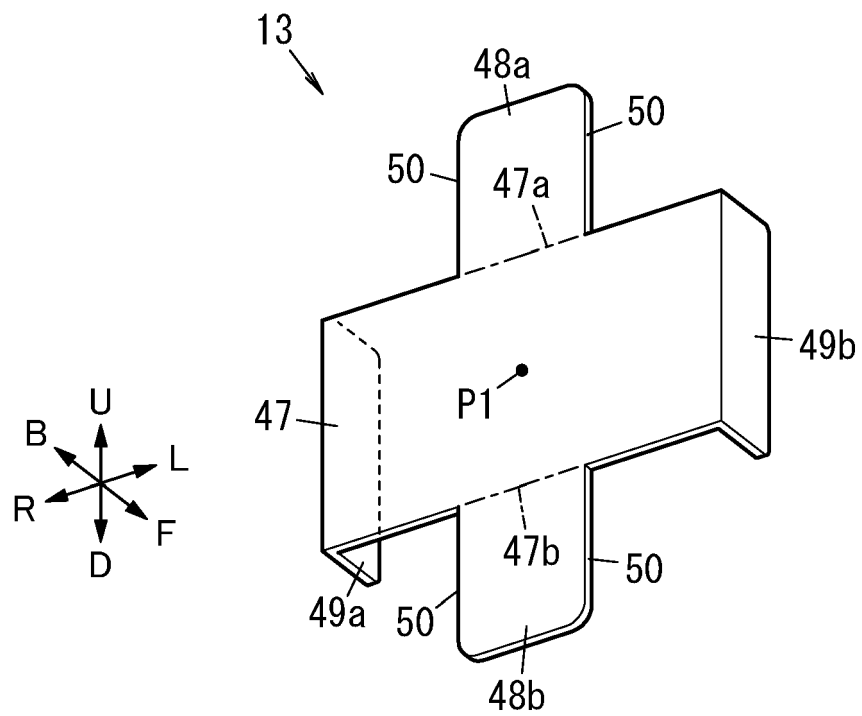


FIG. 9

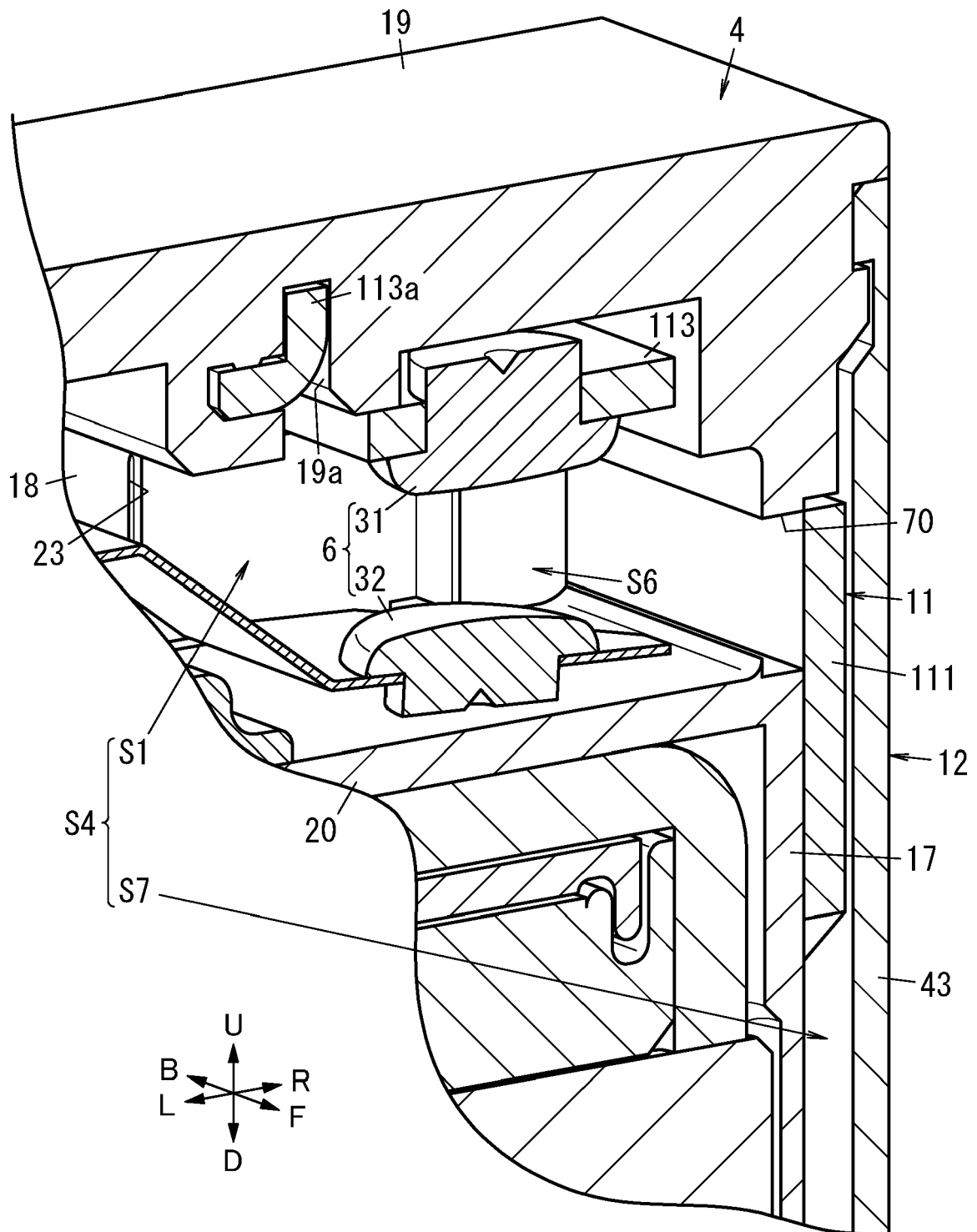


FIG. 10

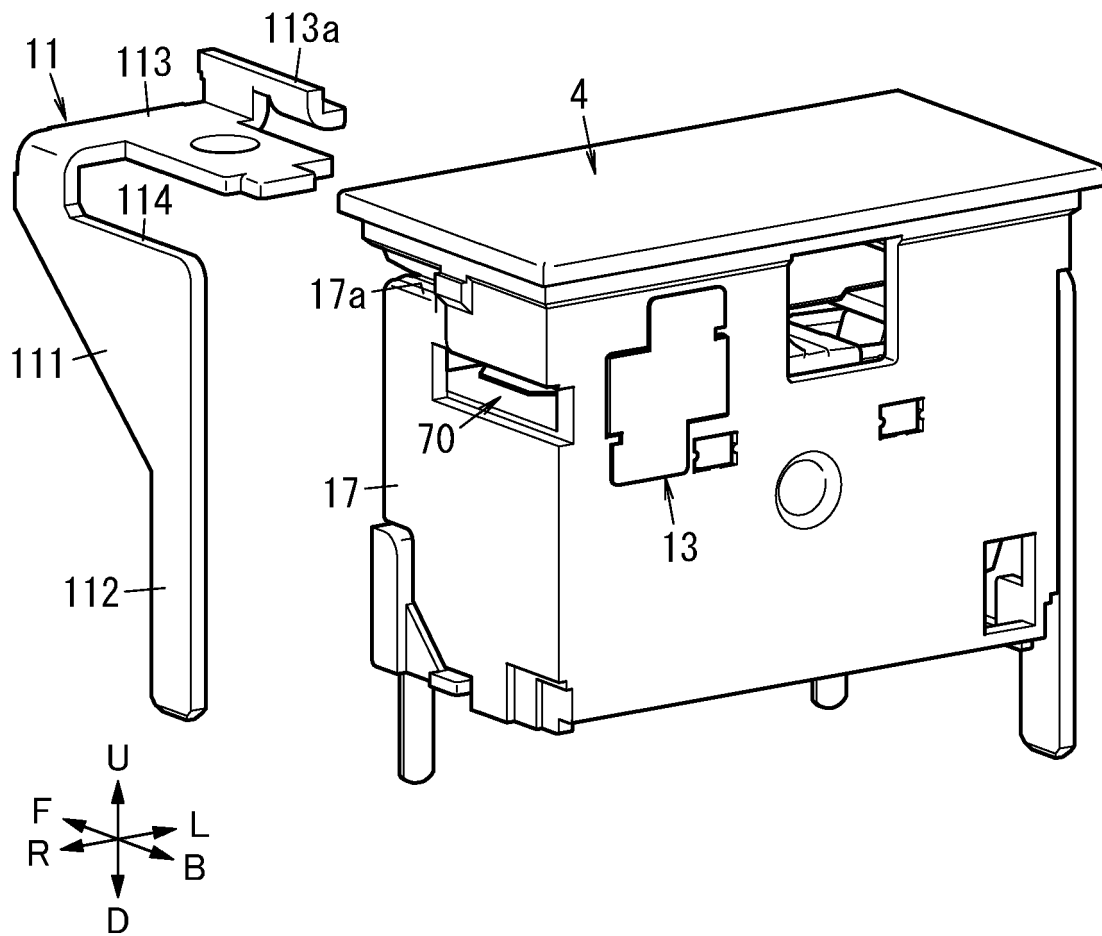
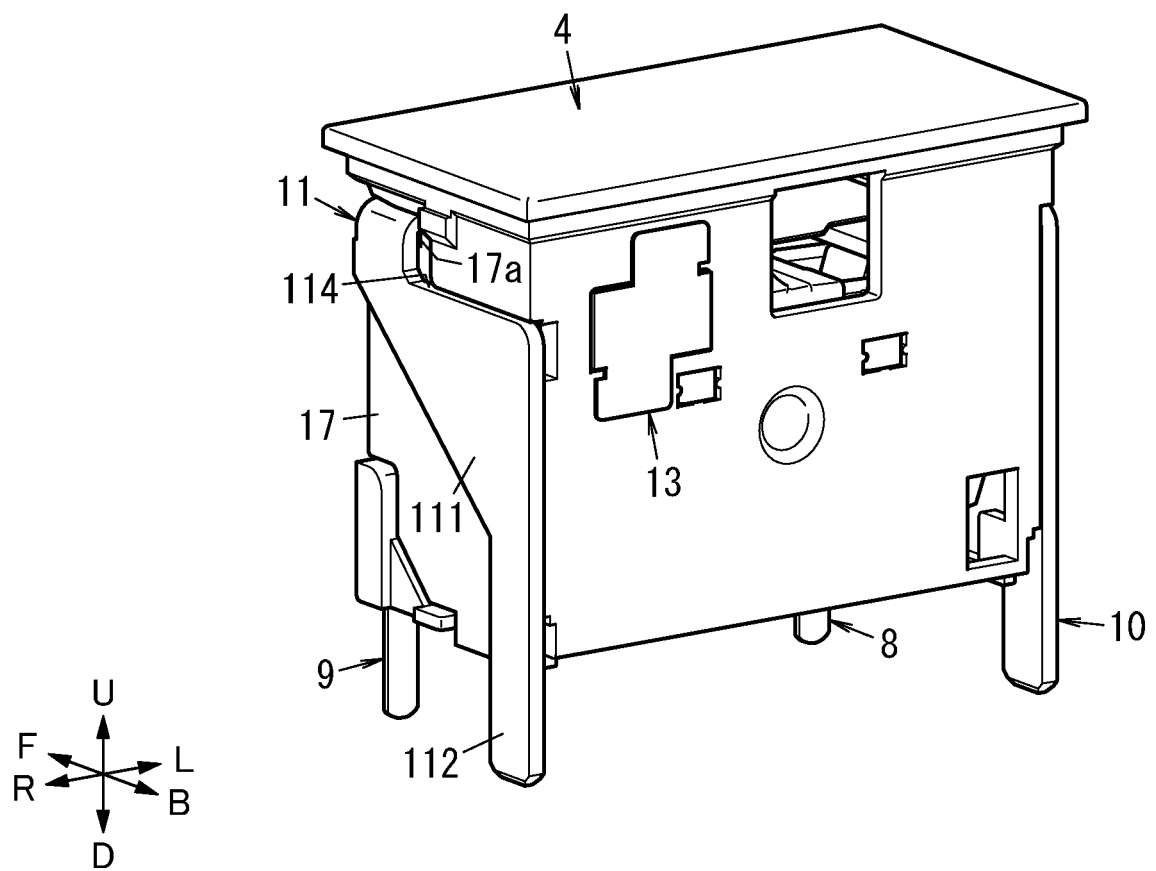


FIG. 11



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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