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(54) ELECTROMAGNETIC CONTACTOR

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(57) **ABSTRACT**

To provide an electromagnetic contactor that allows the extension space for arcs to be enlarged without having to enlarge the size in a direction in which a main contact mechanism housing chamber and an auxiliary contact mechanism housing chamber are arranged. An electromagnetic contactor includes a partitioning wall for partitioning a main contact mechanism housing chamber and an auxiliary contact mechanism housing chamber. The partitioning wall has a pair of arc extension recesses that is formed by indenting the partitioning wall toward the side of the auxiliary contact mechanism housing chamber.

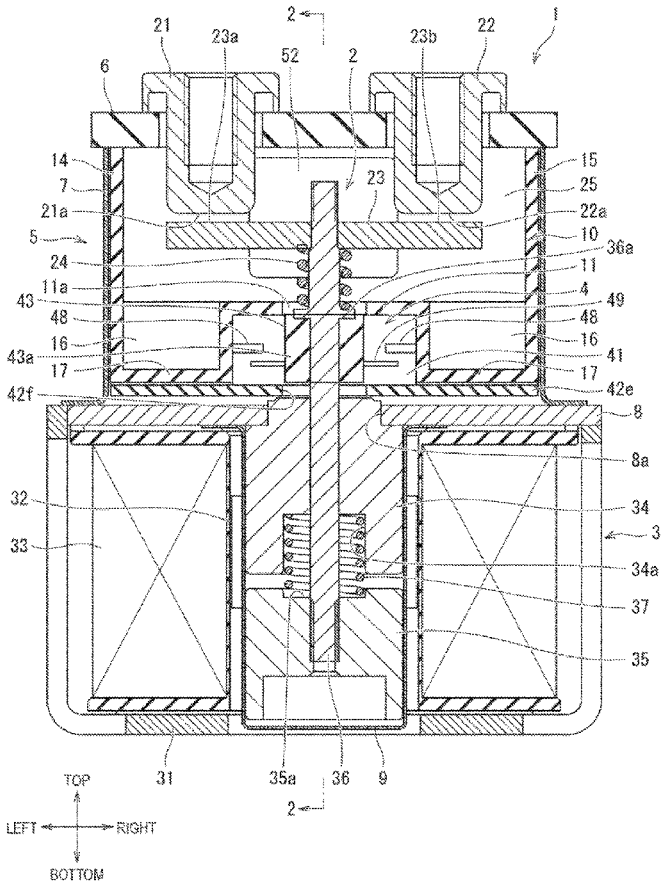

FIG. 1

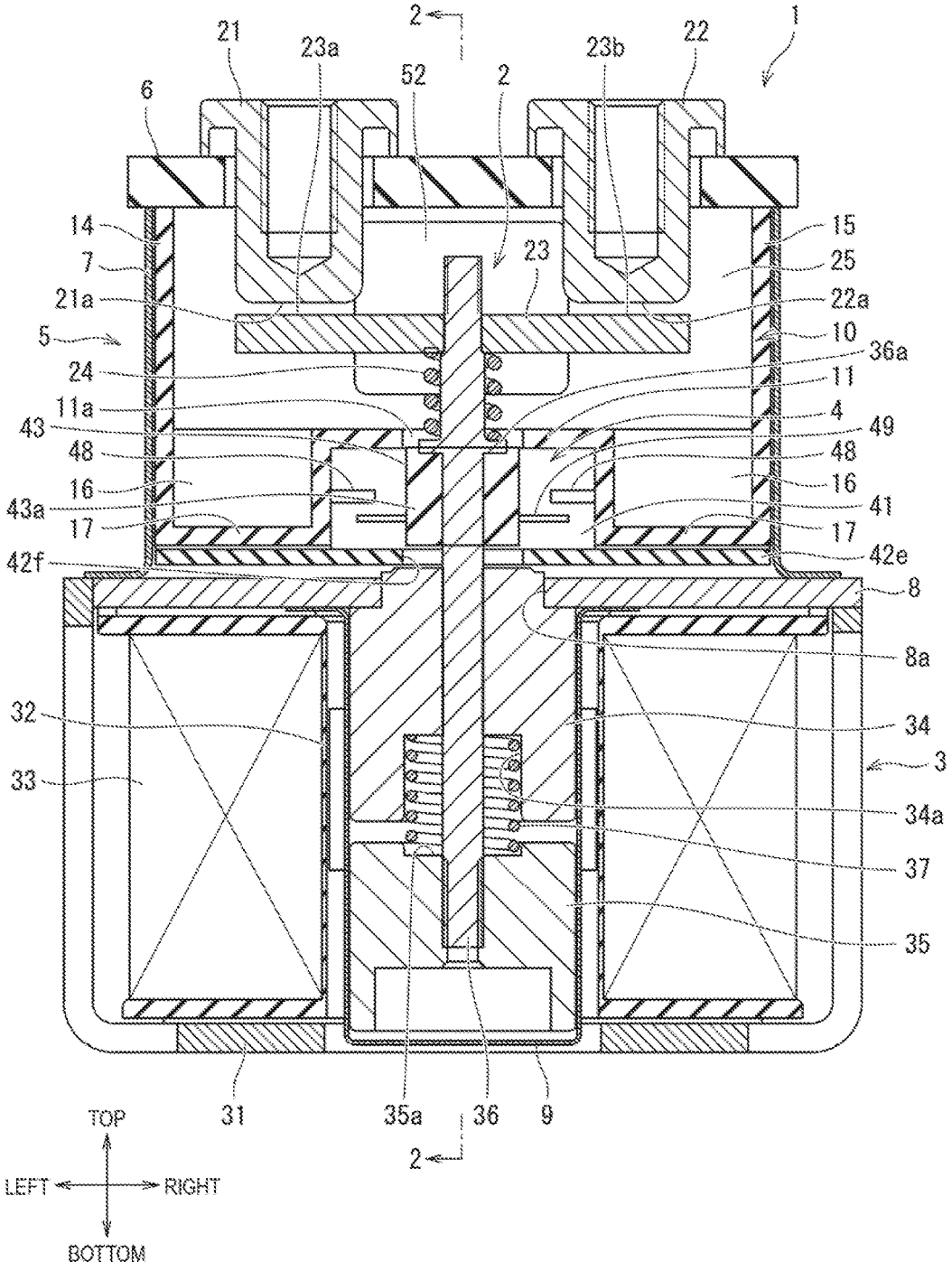
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FIG. 2

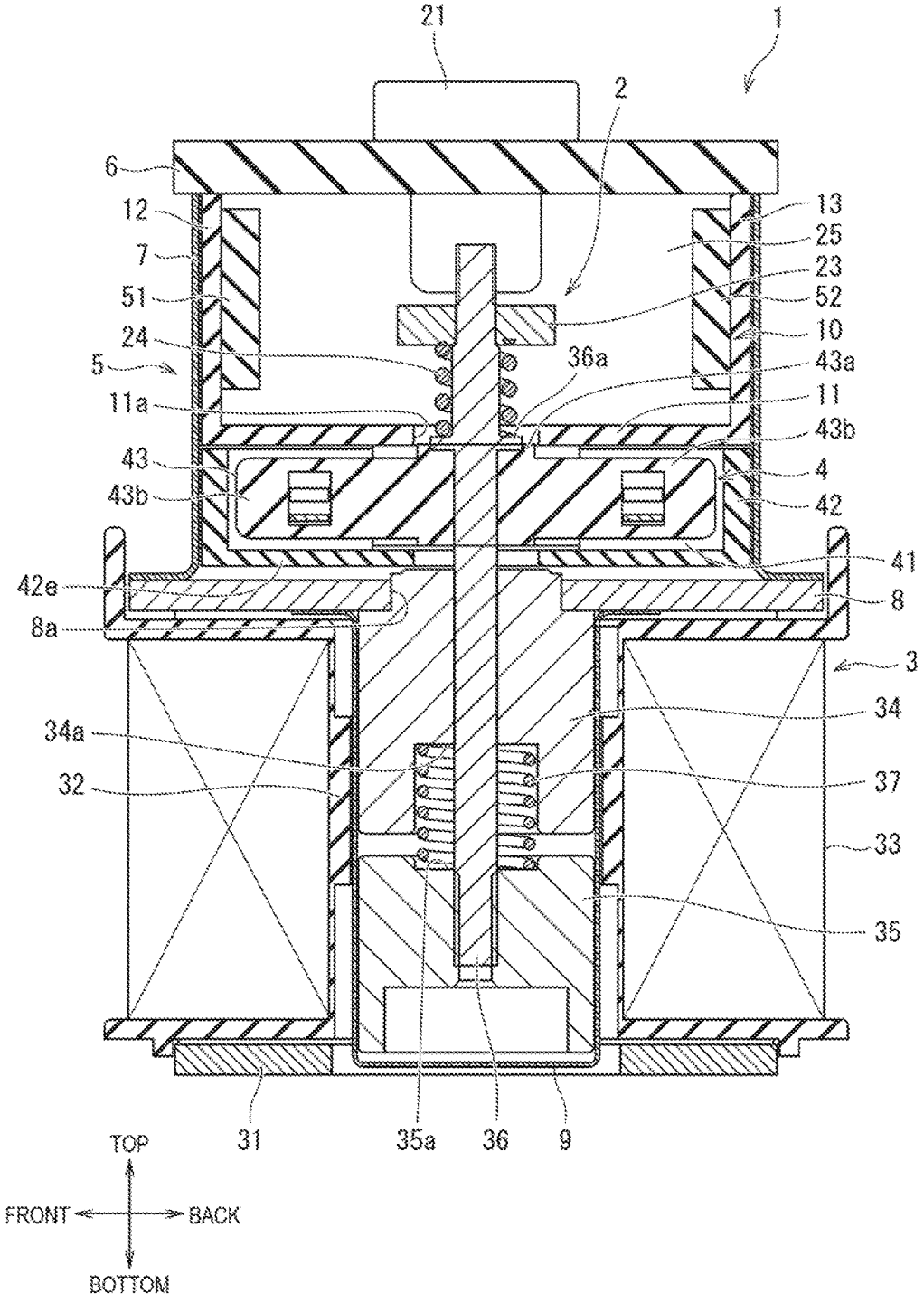
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FIG. 3

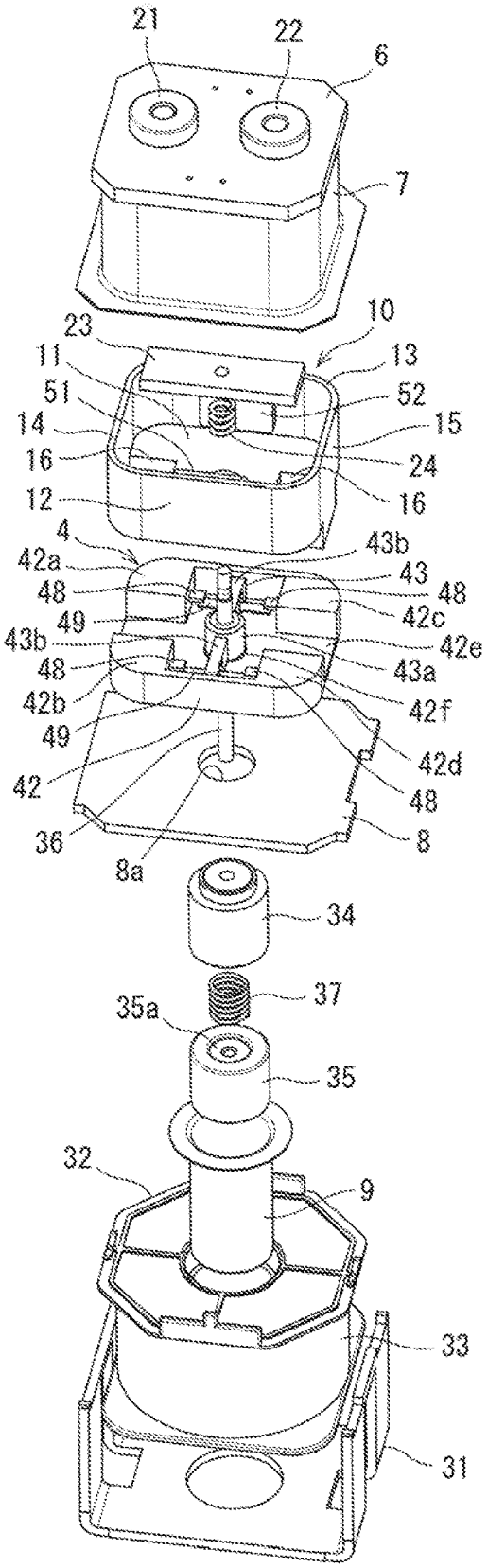
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FIG. 4A

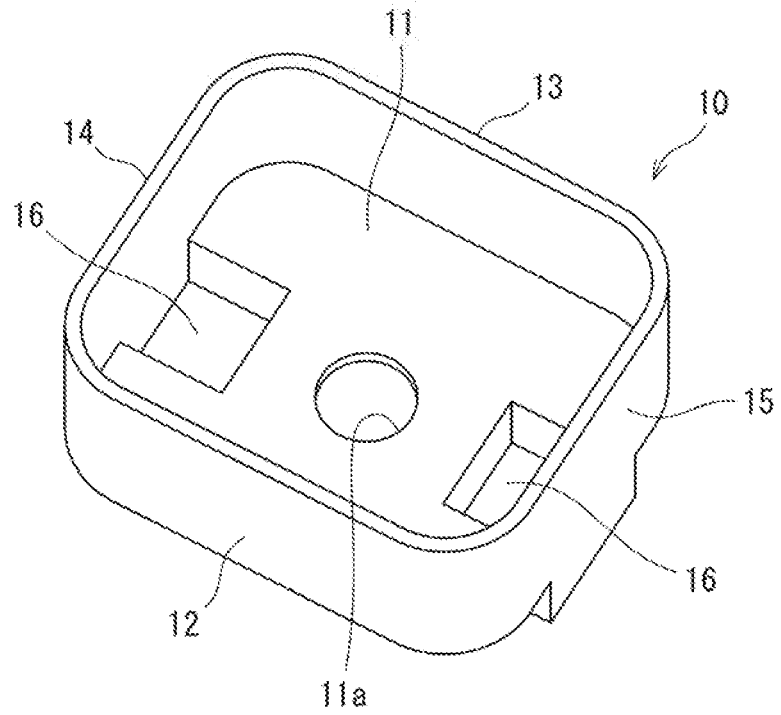

FIG. 4B

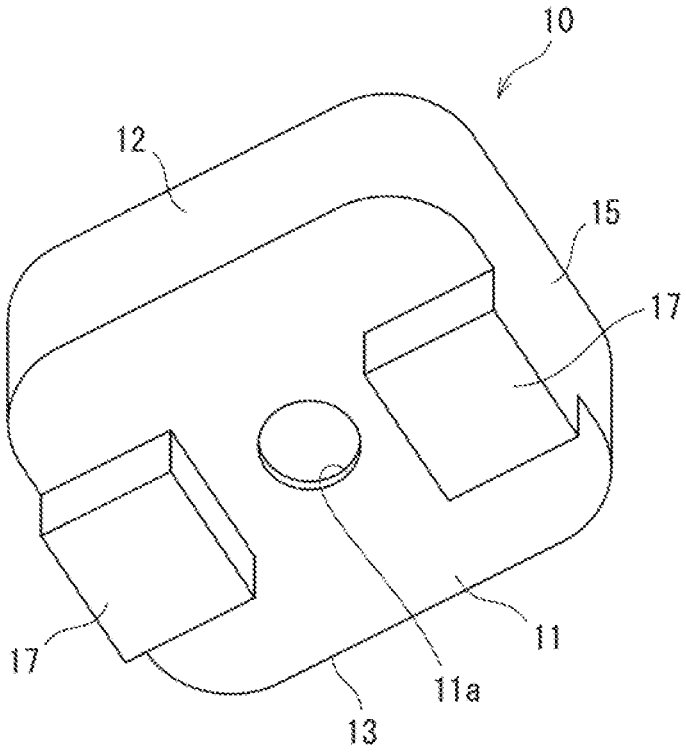

FIG. 5

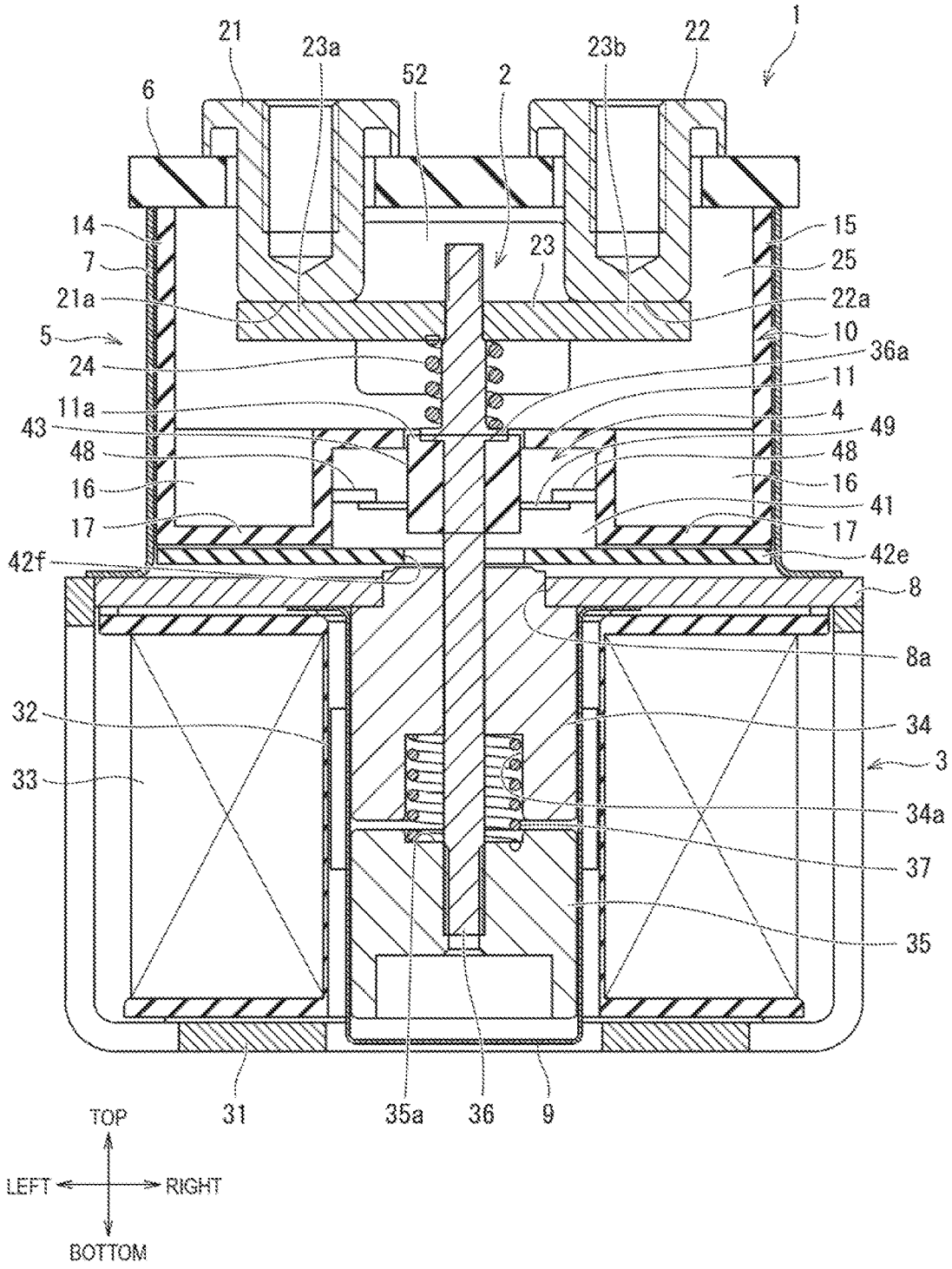
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FIG. 6

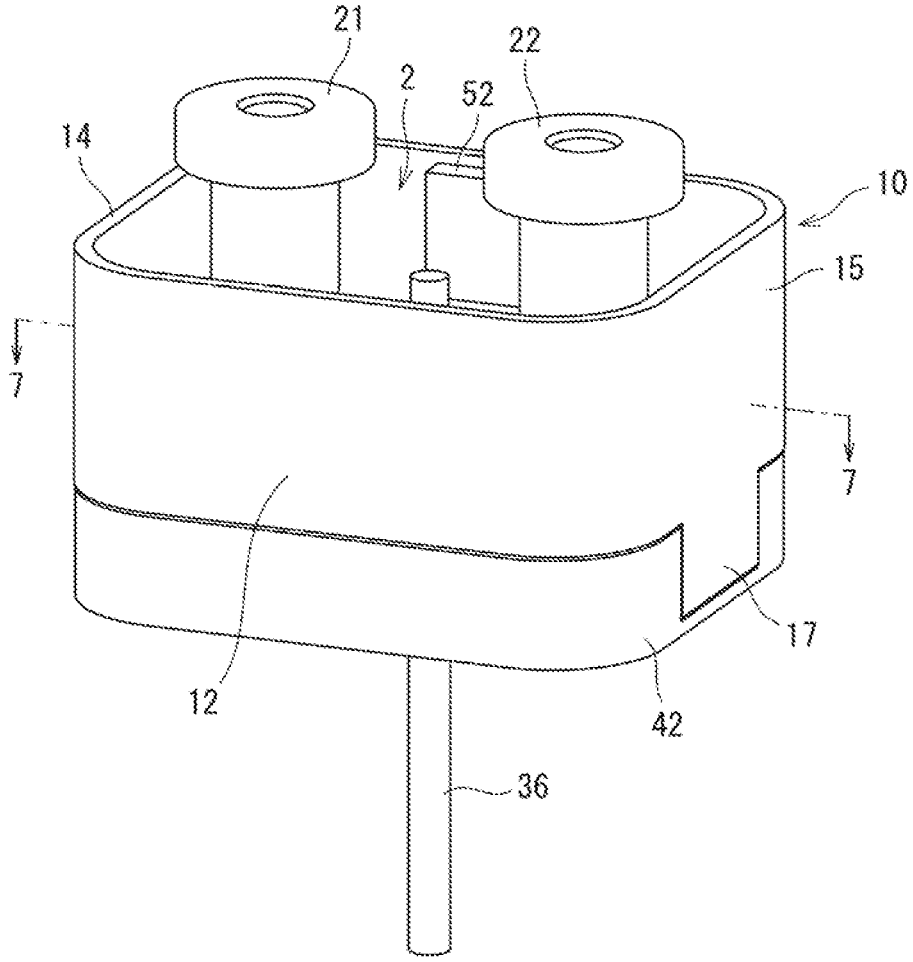

FIG. 7

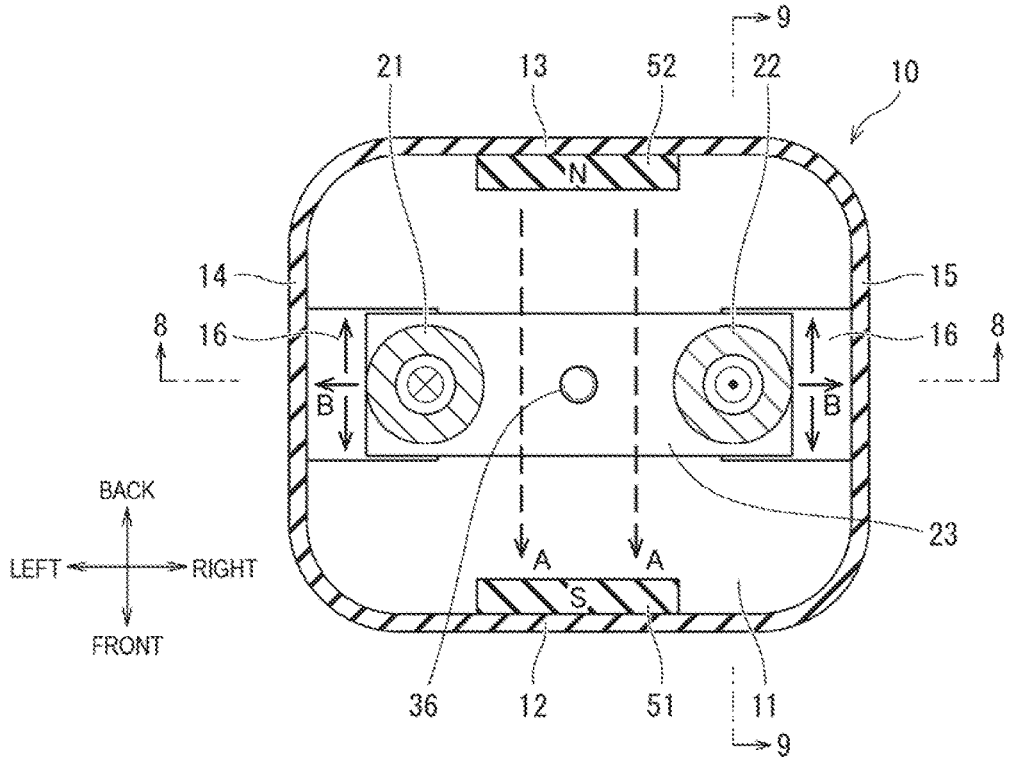
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FIG. 8

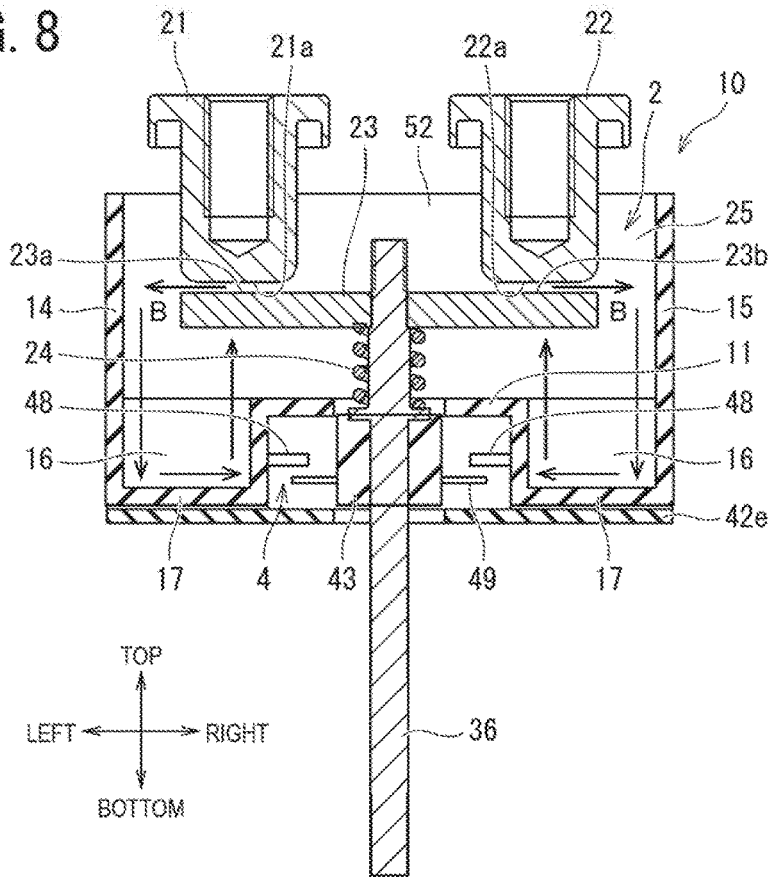
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FIG. 9

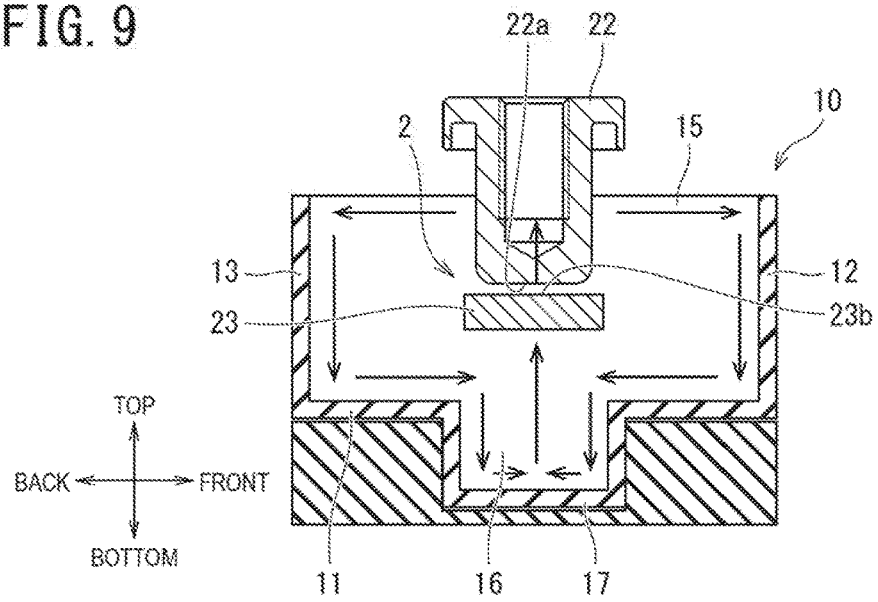
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FIG. 10

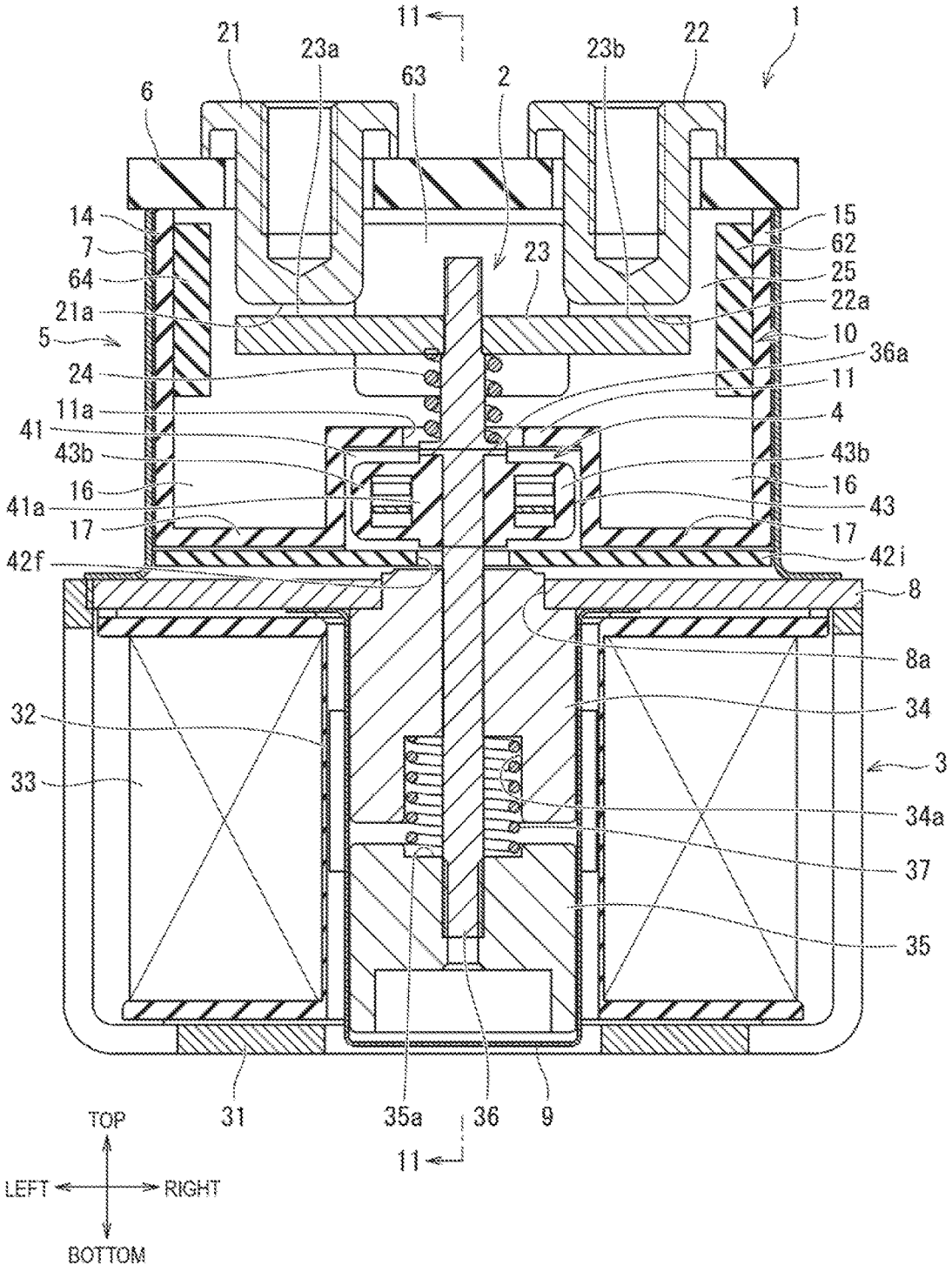
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FIG. 11

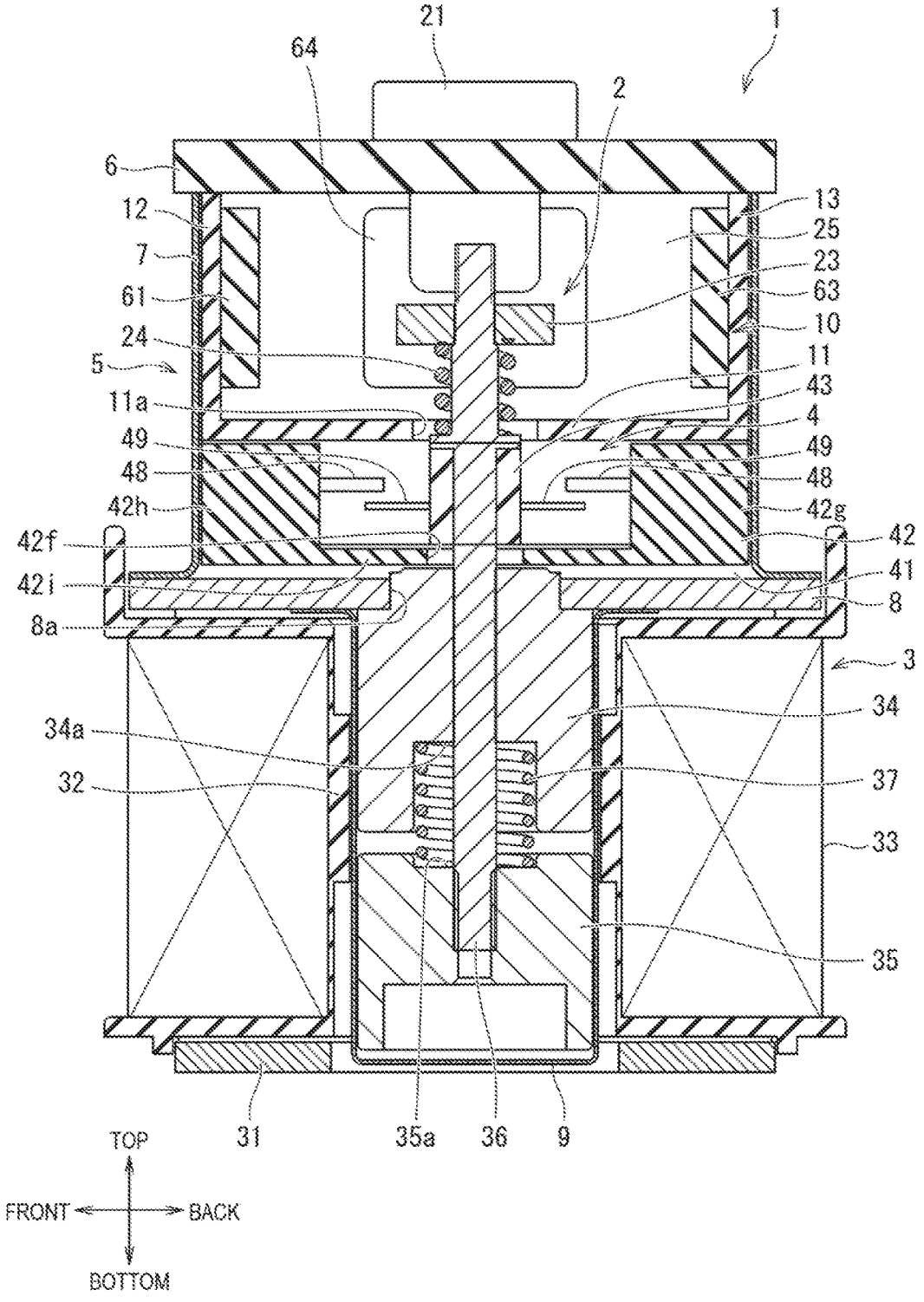
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FIG. 12

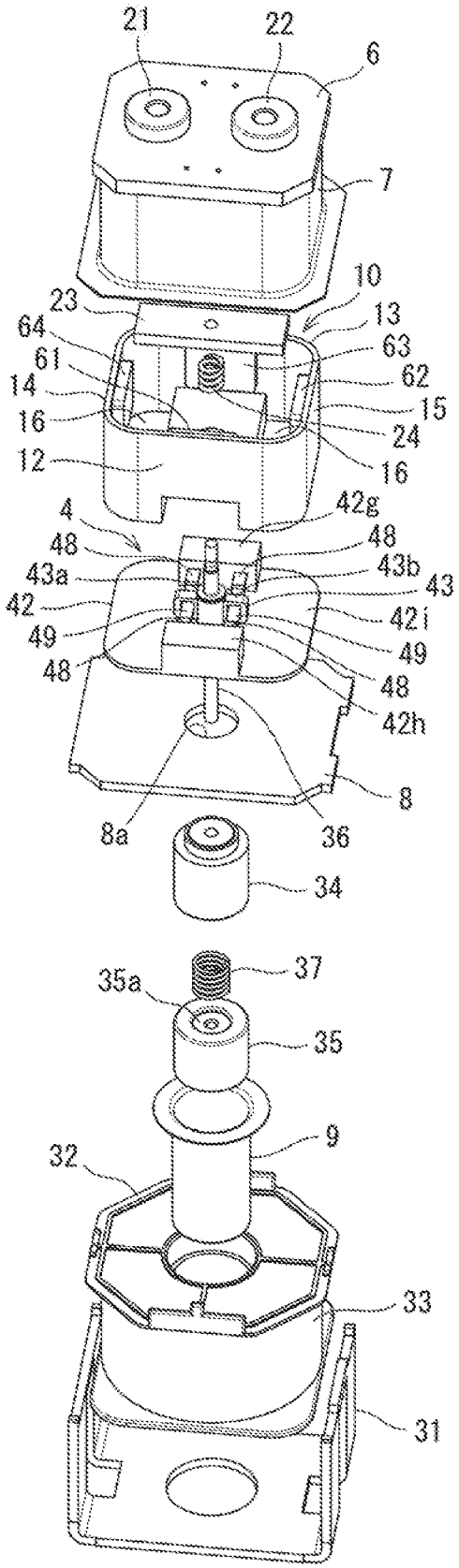
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FIG. 13A

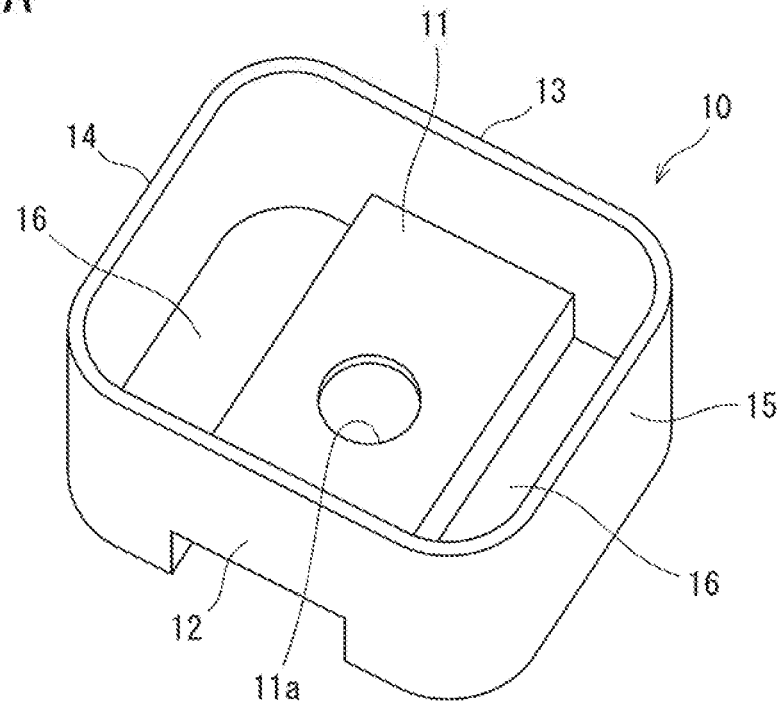

FIG. 13B

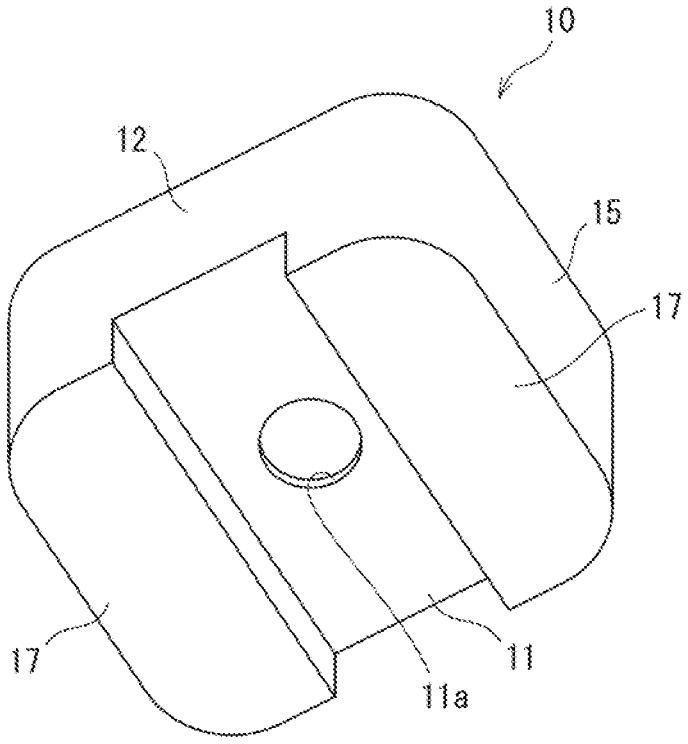

FIG. 14

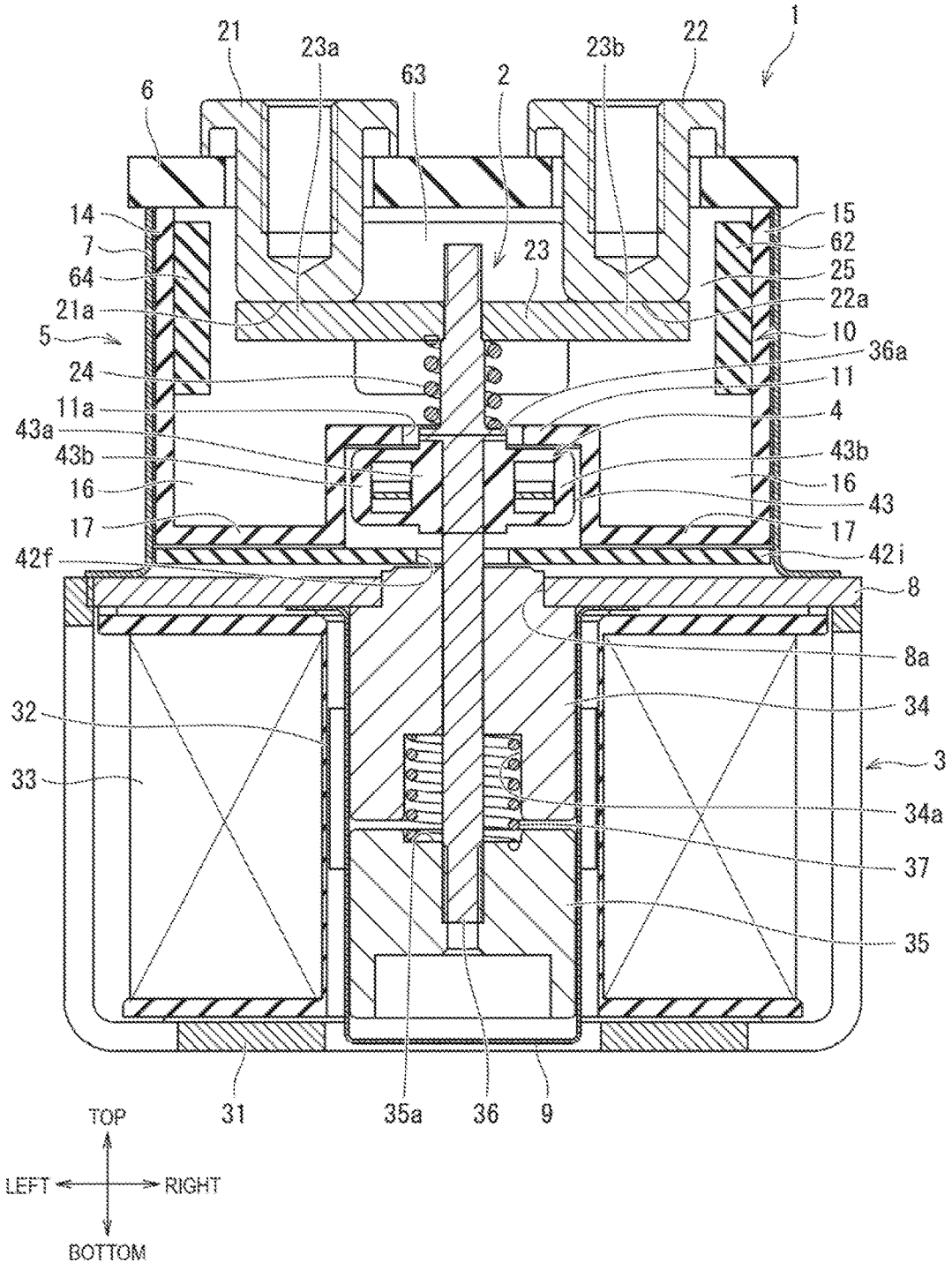
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FIG. 15

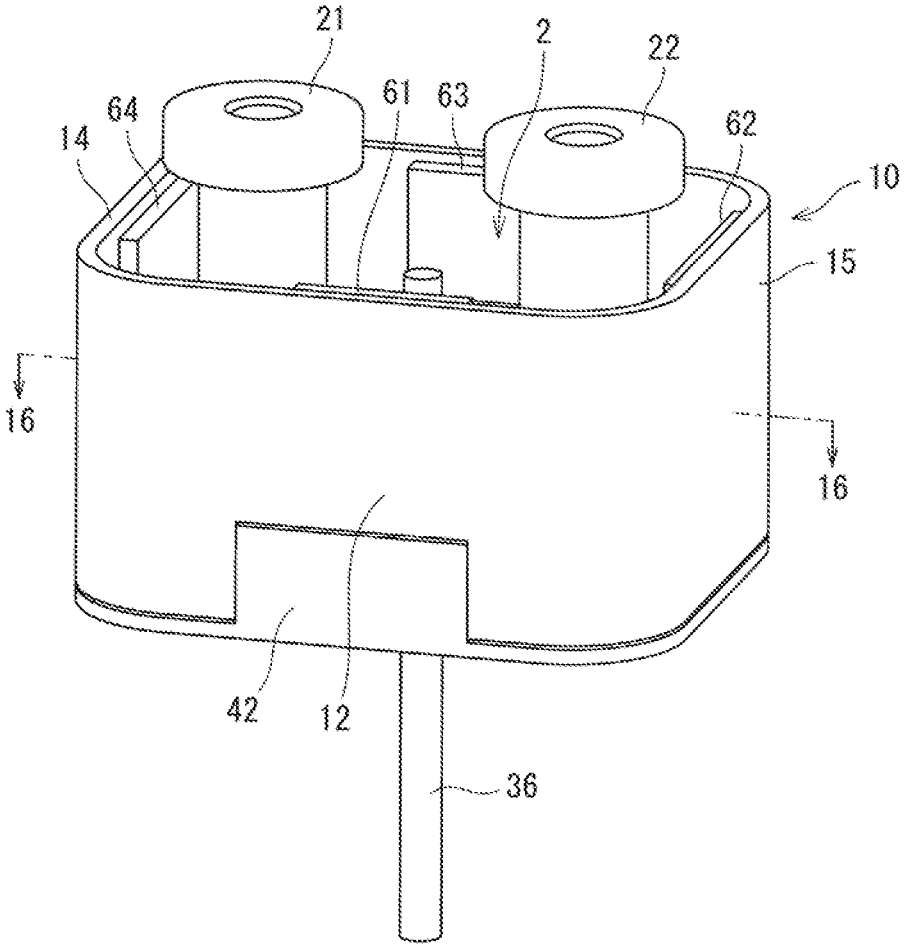

FIG. 16

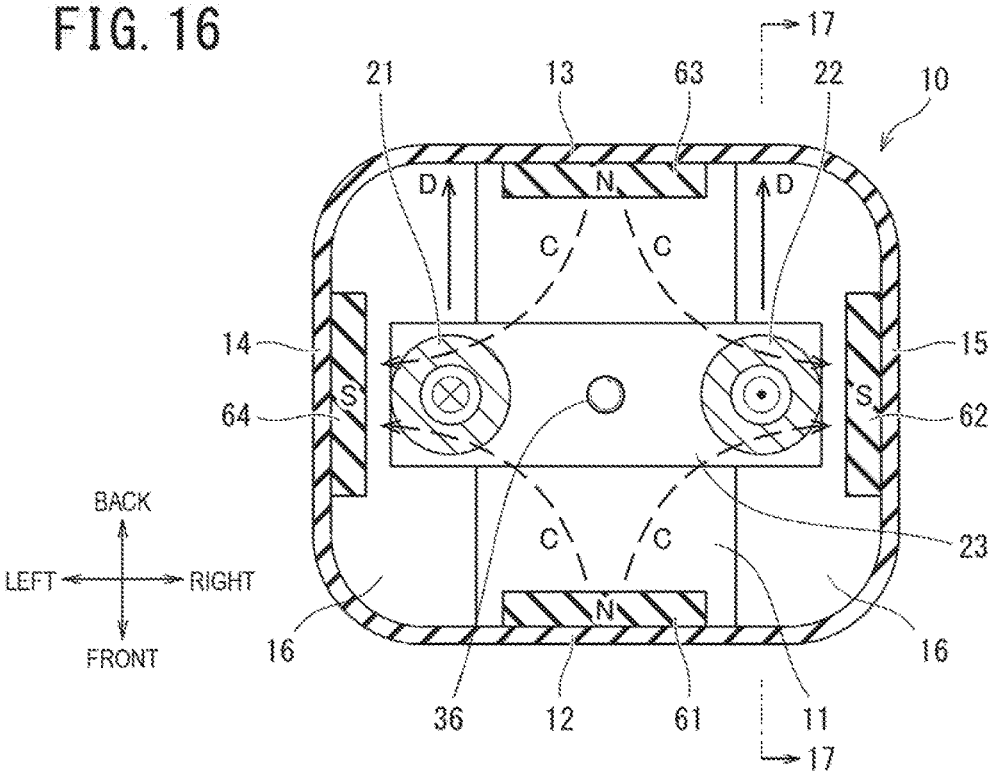
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FIG. 17

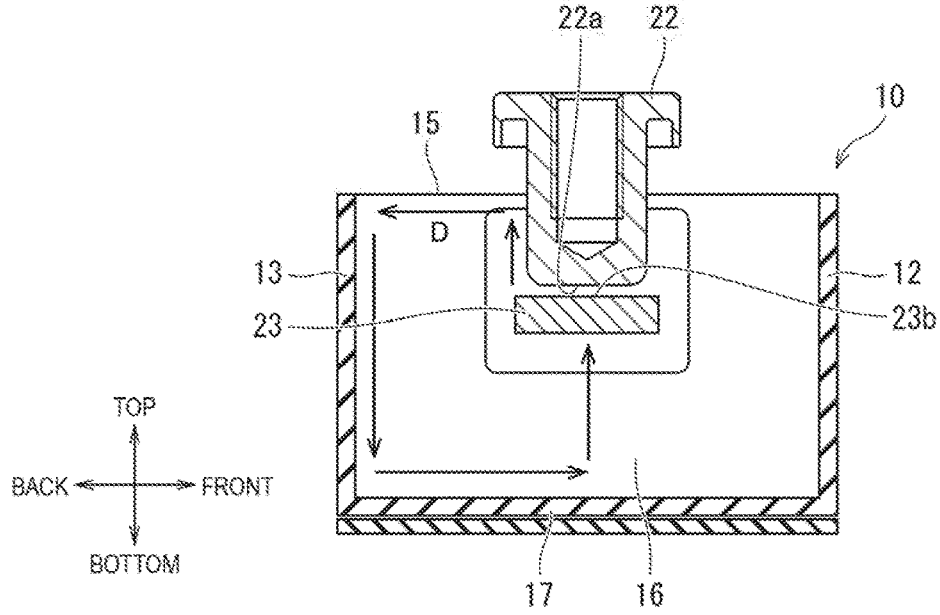
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FIG. 18

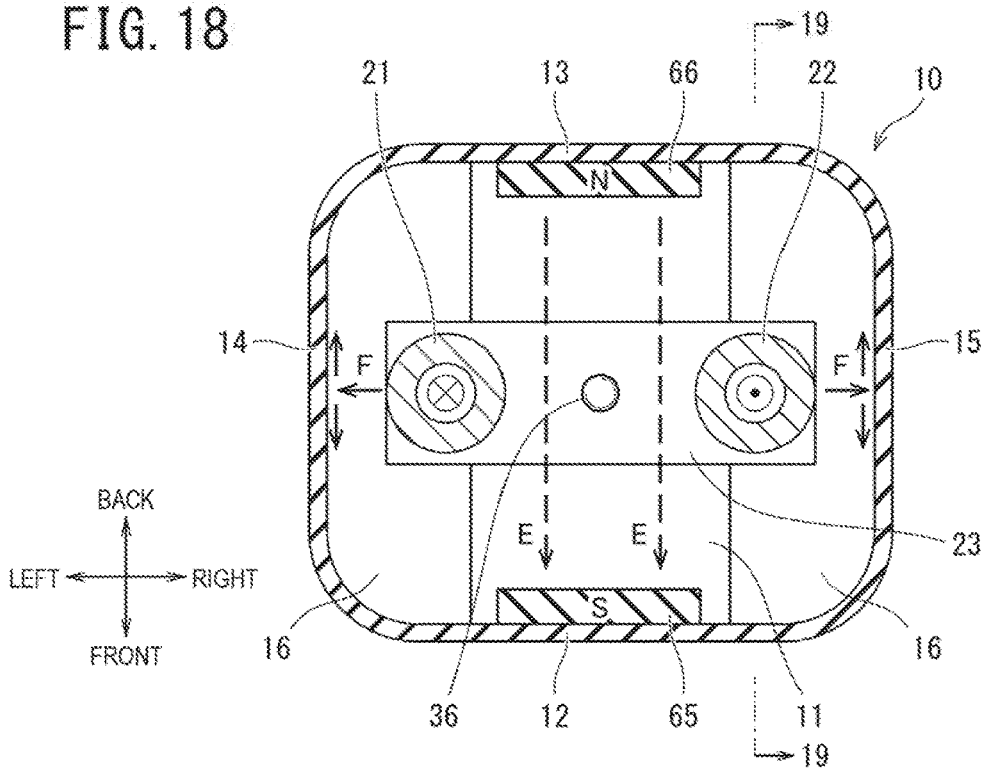
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FIG. 19

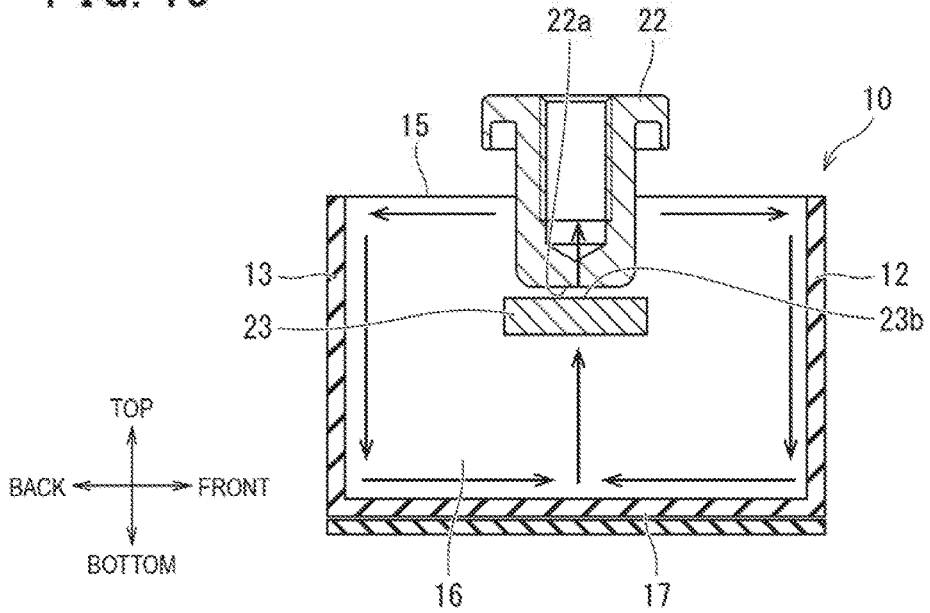
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FIG. 20

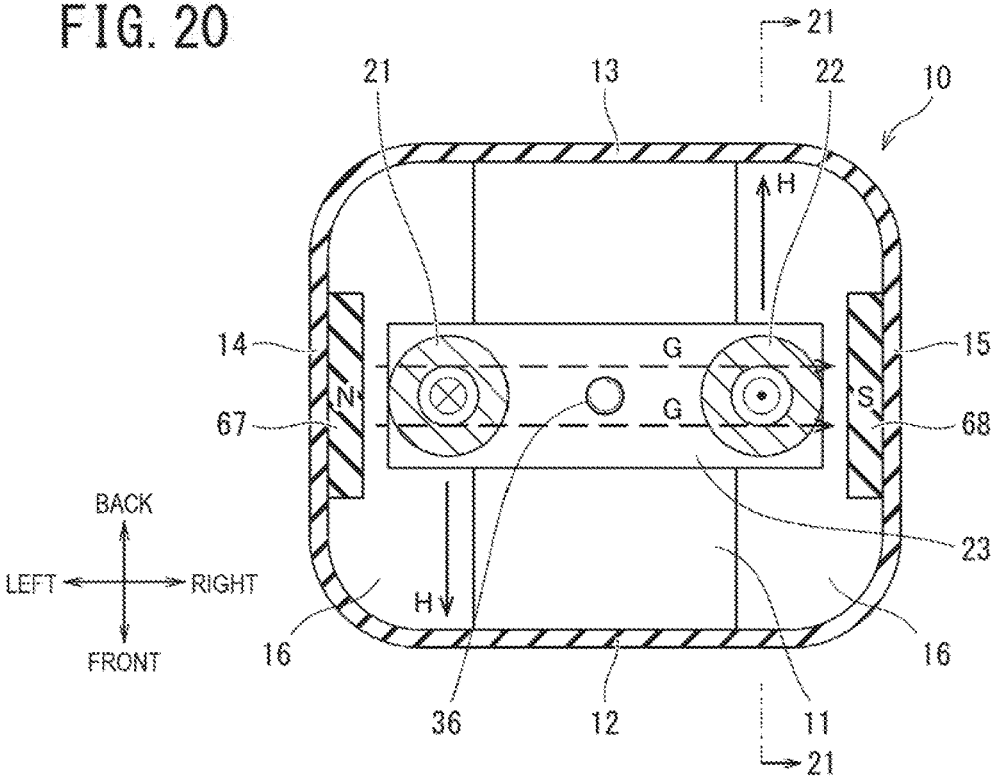
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FIG. 21

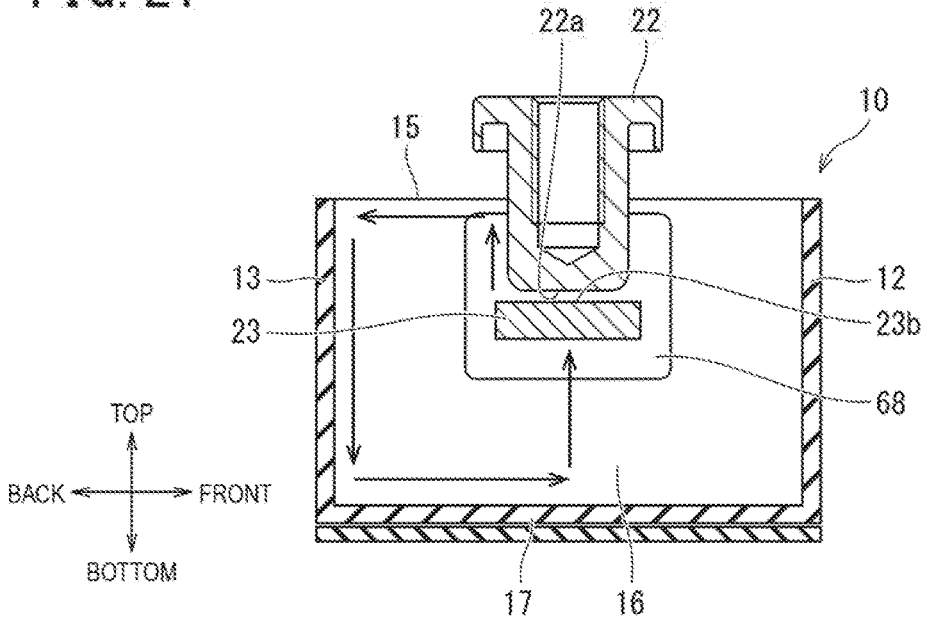
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FIG. 22

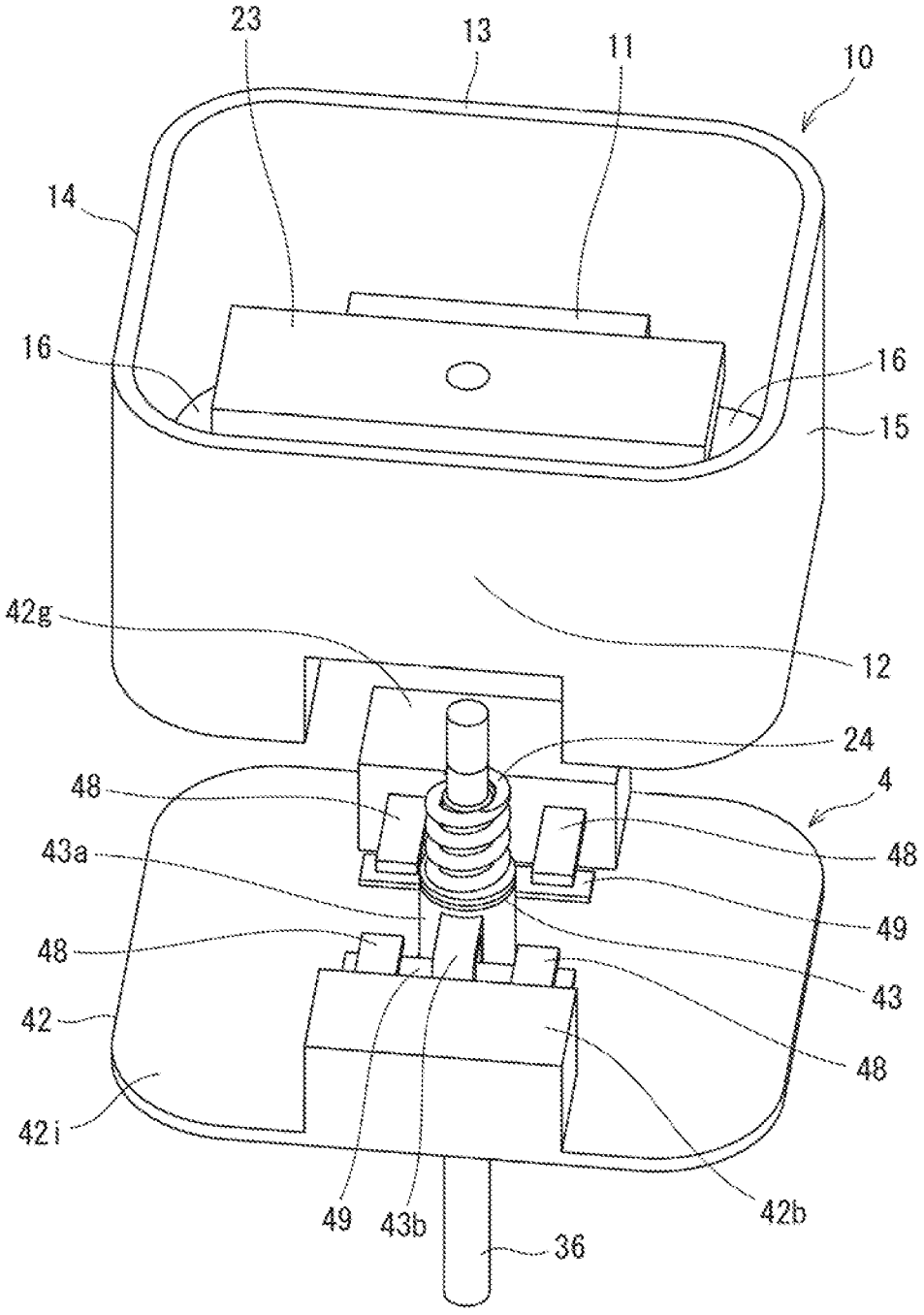
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FIG. 23A

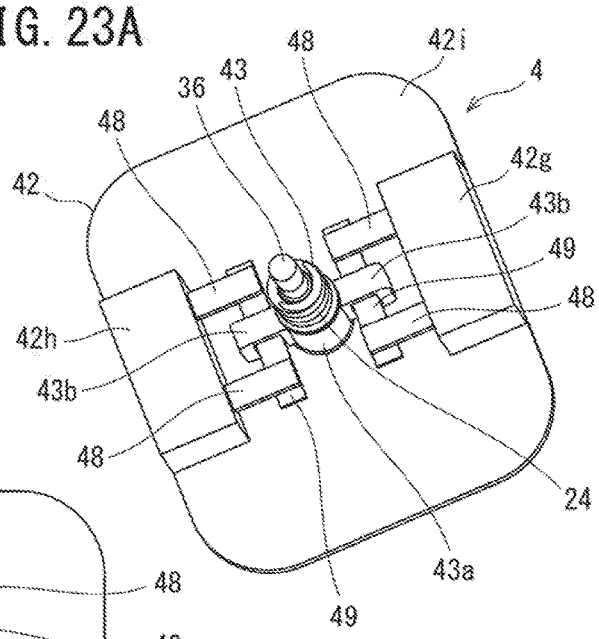


FIG. 23B

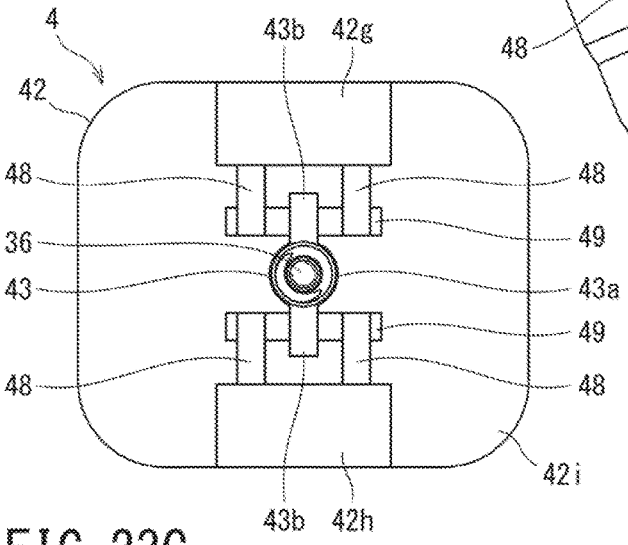


FIG. 23C

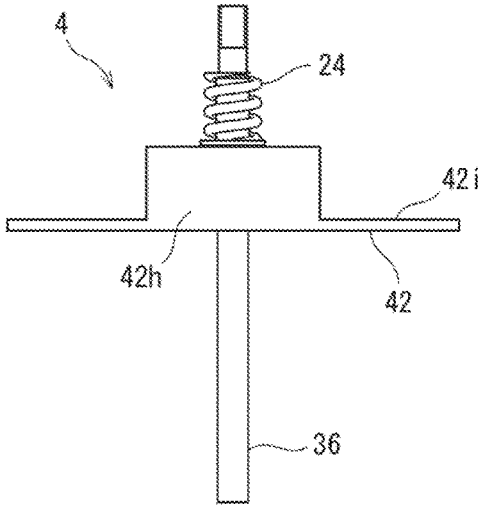
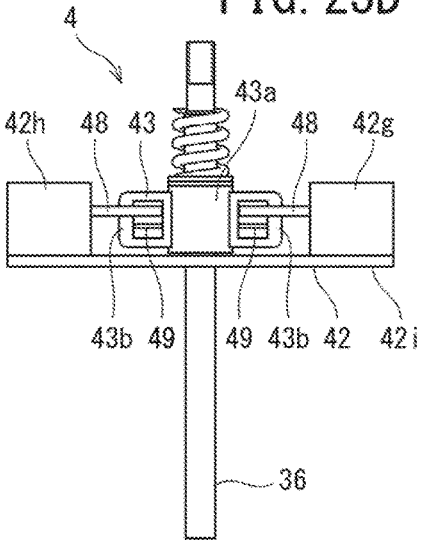


FIG. 23D



ELECTROMAGNETIC CONTACTOR

CROSS REFERENCE TO RELATED APPLICATIONS AND INCORPORATION BY REFERENCE

[0001] This application is a continuation application filed under 35 U.S.C. § 111 (a) of International Patent Application No. PCT/JP2017/006610, filed Feb. 22, 2017, which claims the foreign priority benefit under 35 U.S.C. § 119 of Japanese Patent Application No. 2016-047358, filed Mar. 10, 2016, the contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to an electromagnetic contactor for opening and closing a current path.

BACKGROUND ART

[0003] Electromagnetic contactors, which open and close a current path, often include a main contact mechanism that carries and interrupts high currents, as well as, an auxiliary contact mechanism that operates in coordination with the operation of the main contact mechanism. For example, an electromagnetic contactor that includes a main contact mechanism and an auxiliary contact mechanism as the one described in PTL 1 is known.

[0004] The electromagnetic contactor described in PTL 1 includes: a main contact mechanism that has a pair of main contact side fixed contacts and a main contact side movable contact that can move toward and away from the main contact side fixed contacts; an auxiliary contact mechanism that operates in coordination with the main contact side movable contact; and an electromagnet unit that drives the main contact side movable contact of the main contact mechanism. The electromagnet unit includes a movable plunger that is connected to the main contact side movable contact via a connecting shaft and an excitation coil that excites and generates exciting power in the electromagnet unit to drive the movable plunger.

[0005] The main contact mechanism, the auxiliary contact mechanism, and the movable plunger and the connecting shaft of the electromagnet unit, are hermetically sealed in a housing chamber. The housing chamber is filled with arc extinguishing gas.

CITATION LIST

Patent Literature

[0006] PTL 1: U.S. Pat. No. 7,944,333 B2

SUMMARY OF INVENTION

Technical Problem

[0007] With such an electromagnetic contactor that includes a main contact mechanism and an auxiliary contact mechanism as described in PTL 1, a main contact mechanism housing chamber that houses the main contact mechanism and an auxiliary contact mechanism housing chamber that houses the auxiliary contact mechanism are partitioned by a partitioning wall made of an insulating material, whereby arcs generated by the main contact mechanism are extinguished within the main contact mechanism housing chamber. This is to prevent arcs generated by the main contact mechanism from adversely affecting the auxiliary contact mechanism.

[0008] Here, it is preferable to enlarge the main contact mechanism housing chamber to extend longer and properly extinguish the arcs generated by the main contact mechanism. For example, if a current that flows in the main contact mechanism is large, a small-sized main contact mechanism housing chamber cannot properly block arcs since there is not much space for extending arcs.

[0009] On the other hand, if the size of the main contact mechanism housing chamber is enlarged, the size becomes large in a direction in which the main contact mechanism housing chamber and auxiliary contact mechanism housing chamber are arranged, to increase the size of the product.

[0010] The present invention is, therefore, made to solve this problem in the prior art. The objective of the present invention is to provide an electromagnetic contactor that allows the extension space for arcs to be enlarged without having to enlarge the size in a direction in which a main contact mechanism housing chamber and an auxiliary contact mechanism housing chamber are arranged.

Solution to Problem

[0011] In order to achieve the object mentioned above, according to an aspect of the present invention, there is provided an electromagnetic contactor including: a main contact mechanism housing chamber for housing a main contact mechanism, the main contact mechanism including a pair of main contact side fixed contacts with a predetermined interspace, and a main contact side movable contact configured to move toward and away from the pair of main contact side fixed contacts; an auxiliary contact mechanism housing chamber for housing an auxiliary contact mechanism, the auxiliary contact mechanism including at least a pair of auxiliary contact side fixed contacts that is fixed to an auxiliary fixed contact supporting member, and an auxiliary contact side movable contact configured to move toward and away from the at least pair of auxiliary contact side fixed contacts; an electromagnet unit including a movable plunger for driving the main contact side movable contact and the auxiliary contact side movable contact; and a partitioning wall for partitioning the main contact mechanism housing chamber and the auxiliary contact mechanism housing chamber, wherein the partitioning wall has a pair of arc extension recesses that is formed by indenting the partitioning wall toward the side of the auxiliary contact mechanism housing chamber and into which an arc generated by the main contact mechanism extends.

Advantageous Effects of Invention

[0012] According to the present invention, it is possible to provide an electromagnetic contactor that allows the extension space for arcs to be enlarged without having to enlarge the size in a direction in which a main contact mechanism housing chamber and an auxiliary contact mechanism housing chamber are arranged.

BRIEF DESCRIPTION OF DRAWINGS

[0013] FIG. **1** is a section view illustrative of an electromagnetic contactor according to a first embodiment of the present invention;

[0014] FIG. **2** is a section view taken along a line **2-2** of FIG. **1**;

[0015] FIG. **3** is an exploded perspective view of the electromagnetic contactor illustrated in FIG. **1**;

[0016] FIGS. **4**A and **4**B illustrate an arc-extinguishing chamber of the electromagnetic contactor illustrated in FIG. **1**; FIG. **4**A is a perspective view obliquely from above and FIG. **4**B is a perspective view obliquely from below;

[0017] FIG. **5** is a section view illustrative of a state where the main contact mechanism and the auxiliary contact mechanism are closed in the electromagnetic contactor illustrated in FIG. **1**;

[0018] FIG. **6** is a perspective view illustrative of an assembly state of the arc-extinguishing chamber, the main contact mechanism, and the auxiliary fixed contact supporting member of the electromagnetic contactor illustrated in FIG. **1**;

[0019] FIG. **7** is a section view taken along a line **7-7** of FIG. **6**, illustrative of the direction of lines of magnetic force and the directions of the flows of arcs;

[0020] FIG. **8** is a section view taken along a line **8-8** of FIG. **7**, illustrative of the directions of the flows of arcs;

[0021] FIG. **9** is a section view taken along a line **9-9** of FIG. **7**, illustrative of the directions of the flows of arcs;

[0022] FIG. **10** is a section view illustrative of an electromagnetic contactor according to a second embodiment of the present invention;

[0023] FIG. **11** is a section view taken along a line **11-11** of FIG. **10**;

[0024] FIG. **12** is an exploded perspective view of the electromagnetic contactor illustrated in FIG. **10**;

[0025] FIGS. **13**A and **13**B illustrate an arc-extinguishing chamber of the electromagnetic contactor illustrated in FIG. **10**; FIG. **13**A is a perspective view obliquely from above and FIG. **13**B is a perspective view obliquely from below;

[0026] FIG. **14** is a section view illustrative of a state where the main contact mechanism and the auxiliary contact mechanism are closed in the electromagnetic contactor illustrated in FIG. **10**;

[0027] FIG. **15** is a perspective view illustrative of an assembly state of the arc-extinguishing chamber, the main contact mechanism, and the auxiliary fixed contact supporting member of the electromagnetic contactor illustrated in FIG. **10**;

[0028] FIG. **16** is a section view taken along a line **16-16** of FIG. **15**, illustrative of the directions of lines of magnetic force and the directions of the flows of arcs;

[0029] FIG. **17** is a section view taken along a line **17-17** of FIG. **16**, illustrative of the direction of the flow of an arc;

[0030] FIG. **18** is a section view, like FIG. **16**, illustrative of a first example where the arrangement of permanent magnets is changed in the electromagnetic contactor illustrated in FIG. **10**, also illustrating the direction of lines of magnetic force and the directions of the flows of arcs;

[0031] FIG. **19** is a section view taken along a line **19-19** of FIG. **18**, illustrative of the directions of the flows of arcs;

[0032] FIG. **20** is a section view, like FIG. **16**, illustrative of a second example where the arrangement of permanent magnets is changed in the electromagnetic contactor illustrated in FIG. **10**, also illustrating the direction of lines of magnetic force and the directions of the flows of arcs;

[0033] FIG. **21** is a section view taken along a line **21-21** of FIG. **20**, illustrative of the direction of the flow of an arc;

[0034] FIG. **22** is a perspective view separately illustrating the main contact side movable contact, the arc-extinguishing chamber, and the auxiliary contact mechanism, which is a variation of the electromagnetic contactor illustrated in FIG. **10**; and

[0035] FIGS. **23**A to **23**D illustrate an auxiliary contact mechanism in the variation of the electromagnetic contactor illustrated in FIG. **22**; FIG. **23**A is a perspective view, FIG. **23**B a plan view, FIG. **23**C a front view, and FIG. **23**D a right side view.

DESCRIPTION OF EMBODIMENTS

[0036] The following will describe the embodiments of the present invention with reference to the drawings.

First Embodiment

[0037] The electromagnetic contactor according to the first embodiment of the present invention is illustrated in FIGS. **1** to **9**. The electromagnetic contactor **1** illustrated in FIG. **1** is for opening and closing a current path, including: a main contact mechanism **2**; an electromagnet unit **3** configured to drive a main contact side movable contact **23** of the main contact mechanism **2**, as will be described later; an auxiliary contact mechanism **4** that operates in coordination with the main contact side movable contact **23**; and a housing chamber **5**.

[0038] The housing chamber **5** includes: a metal joint member **7** of a rectangular cylindrical shape; a ceramic top plate **6** that is connected to the upper end portion of the joint member **7** and closes the top side of the joint member **7**; a magnetic yoke **8** of a flat plate shape, as will be described later, of which upper surface is sealed on the bottom end portion of the joint member **7**; and a metal cap **9** of a cylindrical shape that is sealed on the lower surface of the magnetic yoke **8**. Then, the housing chamber **5** hermetically houses the main contact mechanism **2**, the auxiliary contact mechanism **4**, a connecting shaft **36** as will be described later, a fixed iron core **34**, and a movable plunger **35**, then, is filled with arc extinguishing gas. Hereinafter, in this specification, as indicated by arrows in FIGS. **1** and **2**, the top side in FIG. **1** is defined as "top," the bottom side "bottom," the left side "left," and the right side "right," and the left side in FIG. **2** is defined as "front" and the right side "back."

[0039] Here, the main contact mechanism **2** includes a pair of main contact side fixed contacts **21**, **22** fixed to the top plate **6** and a main contact side movable contact **23** that can move toward and away from the pair of main contact side fixed contacts **21**, **22**. The main contact side fixed contacts **21**, **22**, made of a conductive metal material, are fixed in a left and right direction on the top plate **6** of the housing chamber **5** with a predetermined interspace therebetween. A contact point **21***a* is formed on the bottom surface of the left-side main contact side fixed contact **21** and a contact point **22***a* is formed on the bottom surface of the right-side main contact side fixed contact **22**.

[0040] The main contact side movable contact **23** is a conductive plate, made of a conductive metal material, that is elongated in a left and right direction and supported by the connecting shaft **36** fixed to the movable plunger **35** of the electromagnet unit **3**, as will be described later, in a manner movable in an up and down direction. On the upper surface of the main contact side movable contact **23**, a contact point

23*a* for contacting with the contact point **21***a* of the left-side main contact side fixed contact **21** is formed on the left end, whereas, a contact point **23***b* for contacting with the contact point **22***a* of the right-side main contact side fixed contact **22** is formed on the right end. Then, the connecting shaft **36** has a flange part **36***a* below the main contact side movable contact **23**, the flange part being protruded outwardly. A contact spring **24** is further provided between the flange part **36***a* and the main contact side movable contact **23** to upwardly bias the main contact side movable contact **23**.

[0041] This main contact mechanism **2** is housed in a main contact mechanism housing chamber **25** in the housing chamber **5**. Inside the main contact mechanism housing chamber **25** is arranged an arc-extinguishing chamber **10** made of an insulating material. As illustrated in FIGS. **1** to **4**B, the arc-extinguishing chamber **10** includes a partitioning wall **11** of a generally rectangular flat plate shape that separates the auxiliary contact mechanism **4** from the main contact mechanism **2** and forms an auxiliary contact mechanism housing chamber **41** below the partitioning wall **11**. Thus, the partitioning wall **11** of the arc-extinguishing chamber **10** partitions the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41**. The arc-extinguishing chamber **10** has a front wall **12** that rises from the front edge of the partitioning wall **11**; a rear wall **13** that rises from the rear edge of the partitioning wall **11**; a left side wall **14** that rises from the left edge of the partitioning wall **11**; and a right side wall **15** that rises from the right edge of the partitioning wall **11**. The front wall **12** is connected to the front edges of the left side wall **14** and the right side wall **15** and the rear wall **13** is connected to the rear edges of the left side wall **14** and the right side wall **15** in such a manner as to enclose the arc-extinguishing chamber **10**. Then, as illustrated in FIGS. **1** and **2**, the front wall **12**, the rear wall **13**, the left side wall **14** and the right side wall **15** of the arc-extinguishing chamber **10** are formed in a dimension inscribed in the inner circumferential surface of the joint member **7**, and the front wall **12**, the rear wall **13**, the left side wall **14** and the right side wall **15** surround and house there inside the main contact mechanism **2**. The partitioning wall **11** has a through hole **11***a* at the central part, through which the connecting shaft **36** can be inserted.

[0042] The partitioning wall **11** of the arc-extinguishing chamber **10** has a pair of left and right arc extension recesses **16**, into which arcs generated by the main contact mechanism **2** are extended, with the recess being formed by indenting the partitioning wall **11** toward the side of the auxiliary contact mechanism housing chamber **41**. The left-side arc extension recess **16** is formed, as illustrated in FIG. **1**, near the contact point **23***a* of the main contact side movable contact **23** and the contact point **21***a* of the main contact side fixed contact **21**, specifically, below the contact points **23***a* and **21***a*. The right-side arc extension recess **16** is formed, as illustrated in FIG. **1**, near the contact point **23***b* of the main contact side movable contact **23** and the contact point **22***a* of the main contact side fixed contact **22**, specifically, below the contact points **23***b* and **22***a*. A pair of arc extension recess forming projections **17** is provided to form the pair of left and right arc extension recesses **16**. The left-side arc extension recess **16** extends in a left and right direction from a position in the vicinity of the contact point **23***a* up to the left side wall **14** of the arc-extinguishing chamber **10** and the right-side arc extension recess **16** extends in a left and right direction from a position in the vicinity of the contact point **23***b* up to the right side wall **15** of the arc-extinguishing chamber **10**. The width of each arc extension recess **16** in a front and rear direction is, as illustrated in FIG. **7**, slightly larger than the width of the main contact side movable contact **23** in a front and rear direction. The function of each arc extension recess **16** will be described later in detail.

[0043] The auxiliary contact mechanism **4** is housed in the auxiliary contact mechanism housing chamber **41** and has a plurality of pairs (two pairs, in the first embodiment) of auxiliary contact side fixed contacts **48**, **48** and a plurality (two, in the first embodiment) of auxiliary contact side movable contacts **49** that can move toward and away from the plurality of pairs of auxiliary contact side fixed contacts **48**, **48**. This auxiliary contact mechanism **4** is used, among others, to detect the open/closed state of the main contact mechanism **2** and to detect whether the main contact side movable contact **23** is welded to the main contact side fixed contacts **21**, **22** in the main contact mechanism **2**.

[0044] Here, the plurality of pairs of auxiliary contact side fixed contacts **48**, **48** are fixed to an electrically non-conductive auxiliary fixed contact supporting member **42**. As illustrated in FIG. **3**, this auxiliary fixed contact supporting member **42** has four auxiliary fixed contact supporting parts **42***a*, **42***b*, **42***c*, **42***d* that are housed in the auxiliary contact mechanism housing chamber **41** at both front and rear sides of and between the pair of arc extension recesses **16** and that fix the plurality of pairs of auxiliary contact side fixed contacts **48**, **48**. These four auxiliary fixed contact supporting parts **42***a*, **42***b*, **42***c*, **42***d* are installed on a bottom plate part **42***e* of a generally rectangular flat plate shape. The auxiliary fixed contact supporting member **42** is integrally formed by molding electrically non-conductive synthetic resin. It should be noted that the bottom plate part **42***e* has a through hole **42***f*, through which the connecting shaft **36** can be inserted.

[0045] The plurality of auxiliary contact side movable contacts **49** are supported by an auxiliary movable contact supporting member **43**. As illustrated in FIG. **3**, the auxiliary movable contact supporting member **43** includes a cylindrical-shape center part **43***a* fixed to the connecting shaft **36** and a pair of auxiliary movable contact supporting parts **43***b*, **43***b*, extending forward and backward from the center part **43***a*. The auxiliary movable contact supporting member **43** is housed in a left and right direction in the auxiliary contact mechanism housing chamber **41** between the pair of arc extension recesses **16**. The plurality of auxiliary contact side movable contacts **49** extend, as illustrated in FIG. **3**, in the same left and right direction as the main contact side movable contact **23** and are supported by the pair of auxiliary movable contact supporting parts **43***b*, **43***b*. Each auxiliary contact side movable contact **49** is supported by each auxiliary movable contact supporting part **43***b*, **43***b* in such a manner that the contact is always upwardly biased by a biasing spring, which is not illustrated. In the case of the electromagnetic contactor **1** of the first embodiment, the auxiliary contact side movable contact **49** supported by the front-side auxiliary movable contact supporting part **43***b* extends in the same left and right direction as the main contact side movable contact **23** and contacts with an auxiliary contact side fixed contact **48** fixed to the auxiliary fixed contact supporting part **42***b* and an auxiliary contact side fixed contact **48** fixed to the auxiliary fixed contact

supporting part **42***d* that is opposed in a left and right direction to the auxiliary fixed contact supporting part **42***b*. Whereas, the auxiliary contact side movable contact **49** supported by the rear-side auxiliary movable contact supporting part **43***b* extends in the same left and right direction as the main contact side movable contact **23** and contacts with an auxiliary contact side fixed contact **48** fixed to the auxiliary fixed contact supporting part **42***a* and an auxiliary contact side fixed contact **48** fixed to the auxiliary fixed contact supporting part **42***c* that is opposed in a left and right direction to the auxiliary fixed contact supporting part **42***a*.

[0046] Here, each pair of auxiliary contact side fixed contacts **48**, **48** and each auxiliary contact side movable contact **49** form a-contact (i.e., normally open-type contact), thus, when the main contact side movable contact **23** is in a released state, the contact portions formed at both ends of the auxiliary contact side movable contact **49** are apart from the contact portions of the pair of auxiliary contact side fixed contacts **48**, **48** while the auxiliary contact side movable contact **49** maintaining a predetermined interspace therebelow. Whereas, when the main contact side movable contact **23** becomes in a charged state, the auxiliary contact side movable contact **49** moves upward and the contact portions formed at both ends of the auxiliary contact side movable contact **49** contact with the contact portions of the pair of auxiliary contact side fixed contacts **48**, **48** by a predetermined contacting force of the biasing spring.

[0047] It should be noted that each pair of auxiliary contact side fixed contacts **48**, **48** and each auxiliary contact side movable contact **49** may form b-contact (i.e., normally closed-type contact). Alternatively, the front-side auxiliary contact side fixed contacts **48**, **48** and the front-side auxiliary contact side movable contact **49** may form a-contact and the rear-side auxiliary contact side fixed contacts **48**, **48** and the rear-side auxiliary contact side movable contact **49** may form b-contact.

[0048] Next, as illustrated in FIGS. **1** to **3**, the electromagnet unit **3** includes a lower magnetic yoke **31** that is U-shaped when seen from a side. The upper end, which is an open end, of the lower magnetic yoke **31** is fixed to a magnetic yoke **8** of a flat plate shape, the upper surface of which is sealed on the bottom end portion of the above-described connecting member **7**. The magnetic yoke **8** has a through hole **8***a* at the central part.

[0049] Further, the central part of the lower surface of the magnetic yoke **8** is sealed on a cap **9** of a bottomed cylinder-shape to surround the through hole **8***a*.

[0050] Inside this cap **9**, a fixed iron core **34** of a column shape that is fixed to the through hole **8***a* of the magnetic yoke **8** is arranged, as well as, a movable plunger **35** is arranged below the fixed iron core **34** in a manner movable in an up and down direction. The connecting shaft **36** supports the main contact side movable contact **23** at the upper end side, is inserted through a through hole formed at the center of the fixed iron core **34** and is fixed to the movable plunger **35** of a column shape at the lower end.

[0051] The fixed iron core **34** has a return spring housing recess **34***a* that is indented upwardly from the lower surface. Also, the movable plunger **35** has a return spring recess **35***a* that is indented downwardly from the upper surface. Between the return spring housing recess **34***a* and the return spring recess **35***a* is housed a return spring **37** that always downwardly biases the movable plunger **35**.

[0052] Further, a spool **32** is arranged at the outer periphery of the cap **9**. This spool **32** is wound, at the outer periphery, by an excitation coil **33** configured to drive the movable plunger **35**.

[0053] Further, a pair of arc-driving permanent magnets **51**, **52** for driving arcs in the extension directions of the main contact side movable contact **23** (leftward and rightward directions) is oppositely arranged on the front wall **12** and rear wall **13** of the arc-extinguishing chamber **10**, as illustrated in FIGS. **1** to **3**, **6** and **7**.

[0054] The following will describe the operation of the electromagnetic contactor **1** of the first embodiment.

[0055] Suppose one main contact side fixed contact **21** is connected to a power supply source that supplies a large current and the other main contact side fixed contact **22** is connected to a load device.

[0056] In this condition, as illustrated in FIG. **1**, it is assumed that an excitation coil **33** of the electromagnet unit **3** is in an unexcited state and the main contact side movable contact **23** is in a released state where the electromagnet unit **3** is not generating an exciting force that raises the movable plunger **35**.

[0057] In this released state, the movable plunger **35** is downwardly biased by the return spring **37**. As such, the main contact side movable contact **23** of the main contact mechanism **2**, which is connected to the movable plunger **35** via the connecting shaft **36**, is apart from the pair of main contact side fixed contacts **21**, **22** with a predetermined interspace. In this way, the electric current path between the pair of main contact side fixed contacts **21**, **22** is in an interrupted state and the main contact mechanism **2** is in an open state.

[0058] From this released state, if electricity is carried to the excitation coil **33** of the electromagnet unit **3**, an exciting force is generated by the electromagnet unit **3**, as illustrated in FIG. **5**, raising the movable plunger **35** upward against the biasing force of the return spring **37**.

[0059] In this way, with the rise of the movable plunger **35**, the main contact side movable contact **23** that is connected to the movable plunger **35** via the connecting shaft **36** is also raised, whereby both contact points **23***a*, **23***b* of the main contact side movable contact **23** contact with both contact points **21***a*, **22***a* of the pair of main contact side fixed contacts **21**, **22** by the contact force of the contact spring **24**.

[0060] As the result, a large current from the power supply source is supplied to the load device through the one main contact side fixed contact **21**, the main contact side movable contact **23**, and the other main contact side fixed contact **22**, and the main contact mechanism **2** becomes in a closed state.

[0061] When the main contact mechanism **2** is shifted from the open state to the closed state, each auxiliary contact side movable contact **49** of the auxiliary contact mechanism **4** contacts with a corresponding pair of auxiliary contact side fixed contacts **48**, **48**, through which a current flows.

[0062] Then, to interrupt the current feed to the load device when the main contact mechanism **2** is in the closed state, electricity to the excitation coil **33** of the electromagnet unit **3** is turned off.

[0063] When the electricity to the excitation coil **33** is turned off, the electromagnet unit **3** loses the exciting force for moving the movable plunger **35** upward and the movable plunger **35** falls by the biasing force of the return spring **37**.

[0064] This fall of the movable plunger **35** causes a fall of the main contact side movable contact **23** that is connected

to the movable plunger **35** through the connecting shaft **36**. If the contact spring **24** is exerting a contact pressure against this fall, the main contact side movable contact **23** stays in contact with the pair of main contact side fixed contacts **21**, **22**. Thereafter, when the contact pressure of the contact spring **24** is lost, the closed state shifts to an open start state where the main contact side movable contact **23** moves downward apart from the pair of main contact side fixed contacts **21**, **22**.

[0065] In such an open start state, arcs are generated between both contact points **23***a*, **23***b* of the main contact side movable contact **23** and both contact points **21***a*, **22***a* of the pair of main contact side fixed contacts **21**, **22**, thus, an electricity conducting state is maintained by the arcs.

[0066] The arcs are extinguished as follows.

[0067] As illustrated in FIG. **7**, a pair of arc-driving permanent magnets **51**, **52** for driving arcs in the extension directions of the main contact side movable contact **23** (leftward and rightward directions) is oppositely arranged on the front wall **12** and rear wall **13** of the arc-extinguishing chamber **10**. The lines of magnetic force are directed in a direction indicated by dashed line arrows A from the N pole of the arc-driving permanent magnet **52** located on the rear wall **13** to the S pole of the arc-driving permanent magnet **51** located on the front wall **12**. These lines of magnetic force affect arcs and, in accordance with the Fleming's left-hand rule, the arc generated between the contact point **23***a* of the main contact side movable contact **23** and the contact point **21***a* of the one main contact side fixed contact **21** is driven in a leftward direction indicated by a solid line arrow B (hereinafter, referred to as a left arc). On the other hand, the arc generated between the contact point **23***b* of the main contact side movable contact **23** and the contact point **22***a* of the other main contact side fixed contact **22** is driven in a rightward direction indicated by a solid line arrow B (hereinafter, referred to as a right arc). Then, as illustrated in FIG. **8**, the left arc collides with the left side wall of the arc-extinguishing chamber **10**, extends in a downward direction as indicated by a solid arrow, returns to the main contact side movable contact **23** via the bottom wall of the left-side arc extension recess **16**, then, is eventually extinguished. On the other hand, as illustrated in FIG. **8**, the right arc collides with the right side wall of the arc-extinguishing chamber **10**, extends in a downward direction as indicated by a solid arrow, returns to the main contact side movable contact **23** via the bottom wall of the right-side arc extension recess **16**, then, is eventually extinguished. It should be noted that, when the left arc and the right arc respectively collide with the left side wall of the arc-extinguishing chamber **10** and the right side wall of the arc-extinguishing chamber **10**, each arc is split into the front and back and the front one collides with the front wall **12** and the back one collides with the rear wall **13** as indicated by solid lines of FIG. **9** (only the flow of the right arc is illustrated in FIG. **9**). Then, the left arc and the right arc extend in a downward direction as indicated by solid arrows, collide with the partitioning wall **11** of the arc-extinguishing chamber **10**, extend toward the center and inside the arc extension recess **16**, return to the main contact side movable contact **23**, then, are extinguished.

[0068] Here, since each arc extension recess **16** is made by indenting the partitioning wall **11** that partitions the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41** toward the side of the auxiliary contact mechanism housing chamber **41**, the extension space for arcs can be enlarged without having to enlarge the size of the electromagnetic contactor **1** in the direction in which the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41** are arranged (up and down direction). In this way, even a current that flows in the main contact mechanism **2** is large, arcs can be properly blocked.

[0069] The left-side arc extension recess **16** is formed near the contact point **23***a* of the main contact side movable contact **23** and the contact point **21***a* of the left-side main contact side fixed contact **21**, while the right-side arc extension recess **16** is formed near the contact point **23***b* of the main contact side movable contact **23** and the contact point **22***a* of the right-side main contact side fixed contact **22**. In this way, the left arc and right arc can be properly extended.

[0070] Further, a pair of arc-driving permanent magnets **51**, **52** for driving arcs in the extension directions of the main contact side movable contact **23** (leftward and rightward directions) is oppositely arranged on the front wall **12** and rear wall **13** of the arc-extinguishing chamber **10**. The lines of magnetic force are directed from the N pole of the arc-driving permanent magnet **52** located on the rear wall **13** to the S pole of the arc-driving permanent magnet **51** located on the front wall **12**. As such, the left arc can be properly driven in a leftward direction toward the left-side arc extension recess **16** and the right arc can be properly driven in a rightward direction toward the right-side arc extension recess **16**.

[0071] It should be noted that, when left-side and right-side arc extension recesses **16** are formed by indenting the partitioning wall **11** to the side of the auxiliary contact mechanism housing chamber **41**, the space inside the auxiliary contact mechanism housing chamber **41** becomes smaller by the space of forming the arc extension recesses **16**. This might possibly disable the auxiliary contact mechanism **4** to be housed in the auxiliary contact mechanism housing chamber **41**.

[0072] To solve this problem, the auxiliary movable contact supporting member **43** is housed in a left and right direction in the auxiliary contact mechanism housing chamber **41** between the pair of arc extension recesses **16**. Further, the plurality of auxiliary contact side movable contacts **49** extend in the same left and right direction as the main contact side movable contact **23** and are supported by the auxiliary movable contact supporting member **43**. In addition, the auxiliary fixed contact supporting member **42** has four auxiliary fixed contact supporting parts **42***a*, **42***b*, **42***c*, **42***d* that are housed in the auxiliary contact mechanism housing chamber **41** at both front and rear sides of and between the pair of arc extension recesses **16** and that fix the plurality of pairs of auxiliary contact side fixed contacts **48**. In this way, the auxiliary contact mechanism **4** can be properly housed in the auxiliary contact mechanism housing chamber **41** even though a pair of left-side and right-side arc extension recesses **16** is formed by indenting the partitioning wall **11** of the arc-extinguishing chamber **10** toward the side of the auxiliary contact mechanism housing chamber **41**.

[0073] As described above, the left arc and right arc are extinguished and, when the release operation of the movable plunger **35** has completed, the opening completes.

Second Embodiment

[0074] Next, an electromagnetic contactor according to a second embodiment of the present invention will be

described with reference to FIGS. **10** to **21**. In FIGS. **10** to **21**, like components as those illustrated in FIGS. **1** to **9** are assigned the same signs and the explanation may be omitted.

[0075] The electromagnetic contactor according to the second embodiment of the present invention includes that same basic components as those of the electromagnetic contactor **1** according to the first embodiment illustrated in FIGS. **1** to **9**, yet, is different in the shapes of the left-side and right-side arc extension recesses **16** and the shape of the auxiliary contact mechanism **4**.

[0076] In particular, as illustrated in FIG. **10**, the left-side arc extension recess **16** of the electromagnetic contactor **1** according to the second embodiment is formed near the contact point **23***a* of the main contact side movable contact **23** and the contact point **21***a* of the left-side main contact side fixed contact **21**, specifically, below both contact points **23***a*, **21***a*, and extends in a left and right direction from a location in the vicinity of the contact point **23***a* up to the left side wall **14** of the arc-extinguishing chamber **10**. On the other hand, as illustrated in FIG. **10**, the right-side arc extension recess **16** is formed near the contact point **23***b* of the main contact side movable contact **23** and the contact point **22***a* of the right-side main contact side fixed contact **22**, specifically, below both contact points **23***b*, **22***a*, and extends in a left and right direction from a location in the vicinity of the contact point **23***b* up to the right side wall **15** of the arc-extinguishing chamber **10**. These features are the same as those of the left-side and right-side arc extension recesses **16** of the electromagnetic contactor **1** according to the first embodiment.

[0077] However, as illustrated in FIGS. **10** to **13**B, the left-side arc extension recess **16** of the electromagnetic contactor **1** according to the second embodiment extends in a direction orthogonal to the extension directions of the main contact side movable contact **23**. That is, the left-side arc extension recess **16** extends in a front and rear direction from the front wall **12** up to the rear wall **13** of the arc-extinguishing chamber **10**. Likewise, the right-side arc extension recess **16** of the electromagnetic contactor **1** according to the second embodiment extends in a direction orthogonal to the extension direction of the main contact side movable contact **23**. That is, the right-side arc extension recess **16** extends in a front and rear direction from the front wall **12** up to the rear wall **13** of the arc-extinguishing chamber **10**.

[0078] In this way, by extending each of the left-side and right-side arc extension recesses **16** in a direction orthogonal to the extension direction of the main contact side movable contact **23**, the driving direction of arcs can be the directions orthogonal to the extension direction of the main contact side movable contact **23** (frontward and backward directions) without limitation to the extension directions of the main contact side movable contact **23** (leftward and rightward directions) as in the first embodiment.

[0079] The following will describe driving and extinguishing of arcs in the electromagnetic contactor **1** according to the second embodiment.

[0080] First, two pairs of arc-driving permanent magnets **61**, **62**, **63**, **64**, for driving arcs to the extension directions (frontward and backward directions) of the pair of arc extension recesses **16**, that is, into the pair of arc extension recesses **16**, are respectively arranged on the front wall **12**, the right side wall **15**, the rear wall **13**, and the left side wall **14** of the arc-extinguishing chamber **10** that houses the main contact mechanism **2**, as illustrated in FIGS. **10** to **12**, FIG. **15** and FIG. **16**.

[0081] Then, when the main contact side movable contact **23** is shifted from an open state illustrated in FIG. **14** to an open start state where the main contact side movable contact **23** is downward apart from the pair of main contact side fixed contacts **21**, **22**, arcs are generated between both contact points **23***a*, **23***b* of the main contact side movable contact **23** and both contact points **21***a*, **22***a* of the pair of main contact side fixed contacts **21**, **22**, thus, an electricity conducting state is maintained by the arcs.

[0082] Here, as illustrated in FIG. **16**, the lines of magnetic force indicated by dashed line arrows C are directed from the N pole of the arc-driving permanent magnet **61** located on the front wall **12** of the arc-extinguishing chamber **10** to the S pole of the arc-driving permanent magnet **64** located on the left side wall **14** and the S pole of the arc-driving permanent magnet **62** located on the right side wall **15**. These lines of magnetic force affect arcs and, in accordance with the Fleming' s left-hand rule, the arc generated between the contact point **23***a* of the main contact side movable contact **23** and the contact point **21***a* of the one main contact side fixed contact **21** is driven in a backward direction indicated by a solid line arrow D (hereinafter, referred to as a left arc). On the other hand, the arc generated between the contact point **23***b* of the main contact side movable contact **23** and the contact point **22***a* of the other main contact side fixed contact **22** is driven in a backward direction indicated by a solid line arrow D (hereinafter, referred to as a right arc). Then, the left arc and right arc collide with the rear wall **13** of the arc-extinguishing chamber **10** and extend in a downward direction along the rear wall **13** as illustrated by a solid line of FIG. **17** (only the flow of the right arc is illustrated in FIG. **17**). Then, the left arc and the right arc respectively collide with the bottom wall of the left-side arc extension recess **16** and the bottom wall of the right-side arc extension recess **16**, extend in a forward direction, return, at the central part in a front and rear direction, to the main contact side movable contact **23**, then, are extinguished.

[0083] Here, since the left-side and right-side arc extension recesses **16** are made by indenting the partitioning wall **11** that partitions the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41** toward the side of the auxiliary contact mechanism housing chamber **41**, the extension space for arcs can be enlarged without having to enlarge the size of the electromagnetic contactor **1** in the direction in which the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41** are arranged (up and down direction). In this way, even a current that flows in the main contact mechanism **2** is large, arcs can be properly blocked.

[0084] Next, with the electromagnetic contactor **1** according to the second embodiment, as illustrated in FIG. **18**, a pair of arc-driving permanent magnets **65**, **66** for driving arcs to the extension directions (leftward direction and rightward direction) of the main contact side movable contact **23**, that is, into the pair of arc extension recesses **16**, can be arranged oppositely on the front wall **12** and rear wall **13** of the arc-extinguishing chamber **10** that houses the main contact mechanism **2**.

[0085] In this case, the lines of magnetic force are directed in a direction indicated by dashed line arrows E from the N

pole of the arc-driving permanent magnet **66** located on the rear wall **13** of the arc-extinguishing chamber **10** to the S pole of the arc-driving permanent magnet **65** located on the front wall **12**. These lines of magnetic force affect arcs and, in accordance with the Fleming's left-hand rule, the arc generated between the contact point **23***a* of the main contact side movable contact **23** and the contact point **21***a* of the one main contact side fixed contact **21** is driven in a leftward direction indicated by a solid line arrow F (hereinafter, referred to as a left arc). On the other hand, the arc generated between the contact point **23***b* of the main contact side movable contact **23** and the contact point **22***a* of the other main contact side fixed contact **22** is driven in a rightward direction indicated by a solid line arrow F (hereinafter, referred to as a right arc). Then, when the left arc and the right arc respectively collide with the left side wall **14** of the arc-extinguishing chamber **10** and the right side wall **15** of the arc-extinguishing chamber **10**, each arc is split into the front and back and the front one collides with the front wall **12** and the back one collides with the rear wall **13** as indicated by solid lines of FIG. **19** (only the flow of the right arc is illustrated in FIG. **19**). The left arc and right arc subsequently extend in a downward direction as indicated by solid line arrows, collide with the bottom wall of the left-side arc extension recess **16** and the bottom wall of the right-side arc extension recess **16** respectively, then, extend to the center. Then, the arcs return to the main contact side movable contact **23** and are extinguished.

[0086] Here, since the left-side and right-side arc extension recesses **16** are made by indenting the partitioning wall **11** that partitions the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41** toward the side of the auxiliary contact mechanism housing chamber **41**, the extension space for arcs can be enlarged without having to enlarge the size of the electromagnetic contactor **1** in the direction in which the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41** are arranged (up and down direction). In this way, even a current that flows in the main contact mechanism **2** is large, arcs can be properly blocked.

[0087] Further, as illustrated in FIG. **20**, in the electromagnetic contactor **1** according to the second embodiment, a pair of arc-driving permanent magnets **67**, **68**, for driving the left arc to one extension direction (frontward direction) of the arc extension recess **16** and driving the right arc to the other extension direction (backward direction) of the arc extension recess **16**, can be arranged oppositely on the left side wall **14** and right side wall **15** of the arc-extinguishing chamber **10** that houses the main contact mechanism **2**.

[0088] In this case, the lines of magnetic force are directed in a direction indicated by dashed line arrows G from the N pole of the arc-driving permanent magnet **67** located on the left side wall **14** of the arc-extinguishing chamber **10** to the S pole of the arc-driving permanent magnet **68** located on the right side wall **15**. These lines of magnetic force affect the arcs and, in accordance with the Fleming' s left-hand rule, the left arc generated between the contact point **23***a* of the main contact side movable contact **23** and the contact point **21***a* of the one main contact side fixed contact **21** is driven in a frontward direction indicated by a solid line arrow H. On the other hand, the right arc generated between the contact point **23***b* of the main contact side movable contact **23** and the contact point **22***a* of the other main contact side fixed contact **22** is driven in a backward direction indicated by a solid line arrow H. Then, the left arc collides with the front wall **12** of the arc-extinguishing chamber **10**, extends in a downward direction and collides with the bottom wall of the left-side arc extension recess **16**, extends in a backward direction along the bottom wall, and returns from the central part in a front and rear direction to the main contact side movable contact **23**. The arc is, then, extinguished. On the other hand, the right arc collides with the rear wall **13** of the arc-extinguishing chamber **10**, extends in a downward direction and collides with the bottom wall of the right-side arc extension recess **16**, extends in a forward direction along the bottom wall, and returns from the central part in a front and rear direction to the main contact side movable contact **23**. The arc is, then, extinguished.

[0089] Here, since the left-side and right-side arc extension recesses **16** are made by indenting the partitioning wall **11** that partitions the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41** toward the side of the auxiliary contact mechanism housing chamber **41**, the extension space for arcs can be enlarged without having to enlarge the size of the electromagnetic contactor **1** in the direction in which the main contact mechanism housing chamber **25** and the auxiliary contact mechanism housing chamber **41** are arranged (up and down direction). In this way, even a current that flows in the main contact mechanism **2** is large, arcs can be properly blocked.

[0090] As described above, according to the electromagnetic contactor **1** of the second embodiment, each of the left-side and right-side arc extension recesses **16** extends in a direction orthogonal to the extension direction of the main contact side movable contact **23**. That is, each arc extension recess **16** extends in a front and rear direction from the front wall **12** up to the rear wall **13** of the arc-extinguishing chamber **10**. In this way, the driving directions of arcs may be directions orthogonal to the extension direction of the main contact side movable contact **23** (frontward and backward directions) without limiting to the extension directions of the main contact side movable contact **23** (leftward direction and rightward direction).

[0091] Next, if the left-side and right-side arc extension recesses **16** are extended from the front wall **12** up to the rear wall **13** of the arc-extinguishing chamber **10** in a front and rear direction, the space within the auxiliary contact mechanism housing chamber **41** becomes smaller by the space of forming the arc extension recesses **16**. This might possibly disable the auxiliary contact mechanism **4** to be housed in the auxiliary contact mechanism housing chamber **41**.

[0092] To solve this problem, as illustrated in FIGS. **10** to **12**, in the electromagnetic contactor **1** according to the second embodiment, the auxiliary movable contact supporting member **43** is housed in the auxiliary contact mechanism housing chamber **41** between the pair of arc extension recesses **16** in a left and right direction. Further, a plurality of (two in the second embodiment) auxiliary contact side movable contacts **49** extend in a front and rear direction orthogonal to the main contact side movable contact **23** and are supported by the auxiliary movable contact supporting member **43**. In addition, the auxiliary fixed contact supporting member **42** has two auxiliary fixed contact supporting parts **42***g*, **42***h* that are housed in a left and right direction in the auxiliary contact mechanism housing chamber **41**

between the pair of arc extension recesses **16** and are housed in a front and rear direction at the front and rear of the auxiliary movable contact supporting member **43**. Each auxiliary fixed contact supporting part **42***g*, **42***h* fixes two auxiliary contact side fixed contacts **48**, **48** and are arranged on a bottom plate **42***i* of a generally rectangular flat plate shape. The bottom plate **42***i* has a through hole **42***f* at its center portion, through which the connecting shaft **36** can be inserted. As such, the auxiliary contact mechanism **4** can be properly housed in the auxiliary contact mechanism housing chamber **41**, even though a pair of left-side and right-side arc extension recesses **16** is formed by indenting the partitioning wall **11** of the arc-extinguishing chamber **10** toward the side of the auxiliary contact mechanism housing chamber **41** and further extending each arc extension recess **16** in a front and rear direction from the front wall **12** to the rear wall **13** of the arc-extinguishing chamber **10**. In this case, the auxiliary contact side fixed contacts **48** fixed by the auxiliary fixed contact supporting part **42***g* and the auxiliary contact side fixed contacts **48** fixed by the auxiliary fixed contact supporting part **42***h* are electrically conducted via the auxiliary contact side movable contacts **49**.

[0093] It should be noted that, as illustrated in FIGS. **22** to **23**D, the plurality of auxiliary contact side movable contacts **49** may be extended in the same left and right direction as the main contact side movable contact **23** by rotating an auxiliary movable contact supporting member **43** supporting a plurality of (two in the second embodiment) auxiliary contact side movable contacts **49** by 90 degrees around the connecting shaft **36**. In this case, the two auxiliary contact side fixed contacts **48** fixed by the auxiliary fixed contact supporting part **42***g* are electrically conducted via the auxiliary contact side movable contact **49**, as well as, the two auxiliary contact side fixed contacts **48** fixed by the auxiliary fixed contact supporting part **42***h* are electrically conducted by the other auxiliary contact side movable contact **49**.

[0094] As illustrated in FIGS. **22** to **23**D, it should be appreciated that the auxiliary contact mechanism **4** can also be properly housed in the auxiliary contact mechanism housing chamber **41** even though the auxiliary movable contact supporting member **43** is rotated by 90 degrees around the connecting shaft **36** to make the plurality of auxiliary contact side movable contacts **49** extended in the same left and right direction as the main contact side movable contact **23**.

[0095] Although the above has described embodiments of the present invention, the present invention can be modified and improved in many ways without limitation to these embodiments.

[0096] For example, in the electromagnetic contactor **1** according to the first embodiment and the electromagnetic contactor **1** according to the second embodiment, each main contact side fixed contact **21**, **22** is formed in a column shape protruding in the arc-extinguishing chamber **10**. However, each main contact side fixed contact **21**, **22** may be formed in a U-shaped section in the arc-extinguishing chamber **10**, and the main contact side movable contact **23** may be in contact with the main contact side fixed contacts **21**, **22** of the U-shaped section.

[0097] Further, the electromagnetic contactor **1** according to the first and the second embodiments may be laid down so that the main contact mechanism **2**, the auxiliary contact mechanism **4**, and the electromagnet unit **3** are arranged side by side and oriented in a horizontal direction.

[0098] As long as the auxiliary contact mechanism **4** is housed in the auxiliary contact mechanism housing chamber **41**, the structure is not limited to the illustration for both electromagnetic contactor **1** according to the first embodiment and electromagnetic contactor **1** according to the second embodiment.

[0099] In the electromagnetic contactor **1** according to the first embodiment, the number of the pairs of the arc-driving permanent magnets **51**, **52** configured to drive arcs in the extension directions of the main contact side movable contact **23** is at least one without limiting to one.

[0100] Further, in the electromagnetic contactor **1** according to the second embodiment, the arrangement and pole faces of the arc-driving permanent magnets are not limited to those illustrated in the figures, as long as the arcs are driven in the extension directions of the main contact side movable contact **23** or the extension directions of the pair of arc extension recesses **16**, that is, into the pair of arc extension recesses **16**.

REFERENCE SIGNS LIST

[0101] **1** Electromagnetic contactor
[0102] **2** Main contact mechanism
[0103] **3** Electromagnet unit
[0104] **4** Auxiliary contact mechanism
[0105] **5** Housing chamber
[0106] **10** Arc-extinguishing chamber
[0107] **11** Partitioning wall
[0108] **12** Front wall
[0109] **13** Rear wall
[0110] **14** Left Side wall
[0111] **15** Right side wall
[0112] **16** Arc extension recess
[0113] **21**, **22** Main contact side fixed contact
[0114] **23** Main contact side movable contact
[0115] **23***a*, **23***b* Contact point
[0116] **25** Main contact mechanism housing chamber
[0117] **35** Movable plunger
[0118] **36** Connecting shaft
[0119] **41** Auxiliary contact mechanism housing chamber
[0120] **42** Auxiliary fixed contact supporting member
[0121] **42***a*, **42***b*, **42***c*, **42***d* Auxiliary fixed contact supporting part
[0122] **42***g*, **42***h* Auxiliary fixed contact supporting part
[0123] **43** Auxiliary movable contact supporting member
[0124] **48** Auxiliary contact side fixed contact
[0125] **49** Auxiliary contact side movable contact
[0126] **51**, **52** Arc-driving permanent magnet
[0127] **61**, **62** **63**, **64** Arc-driving permanent magnet
[0128] **65**, **66** Arc-driving permanent magnet
[0129] **67**, **68** Arc-driving permanent magnet

1. An electromagnetic contactor comprising:

a main contact mechanism housing chamber for housing a main contact mechanism, the main contact mechanism including a pair of main contact side fixed contacts with a predetermined interspace, and a main contact side movable contact configured to move toward and away from the pair of main contact side fixed contacts;

an auxiliary contact mechanism housing chamber for housing an auxiliary contact mechanism, the auxiliary contact mechanism including at least a pair of auxiliary contact side fixed contacts that is fixed to an auxiliary fixed contact supporting member, and an auxiliary

contact side movable contact configured to move toward and away from the at least pair of auxiliary contact side fixed contacts;

an electromagnet unit including a movable plunger for driving the main contact side movable contact and the auxiliary contact side movable contact; and

a partitioning wall for partitioning the main contact mechanism housing chamber and the auxiliary contact mechanism housing chamber,

wherein the partitioning wall has a pair of arc extension recesses that is formed by indenting the partitioning wall toward the side of the auxiliary contact mechanism housing chamber and into which an arc generated by the main contact mechanism extends.

2. The electromagnetic contactor according to claim **1**, wherein the pair of arc extension recesses is formed near contact points of the main contact side movable contact and the main contact side fixed contacts.

3. The electromagnetic contactor according to claim **2**, wherein at least a pair of arc-driving permanent magnets, for driving the arc in extension directions of the main contact side movable contact, is arranged on walls of the main contact mechanism housing chamber.

4. The electromagnetic contactor according to claim **1**, wherein the pair of arc extension recesses is formed near contact points of the main contact side movable contact and the main contact side fixed contacts and extend in directions orthogonal to an extension direction of the main contact side movable contact.

5. The electromagnetic contactor according to claim **4**, wherein at least a pair of arc-driving permanent magnets, for driving the arc into the pair of arc extension recesses, is arranged on walls of the main contact mechanism housing chamber.

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