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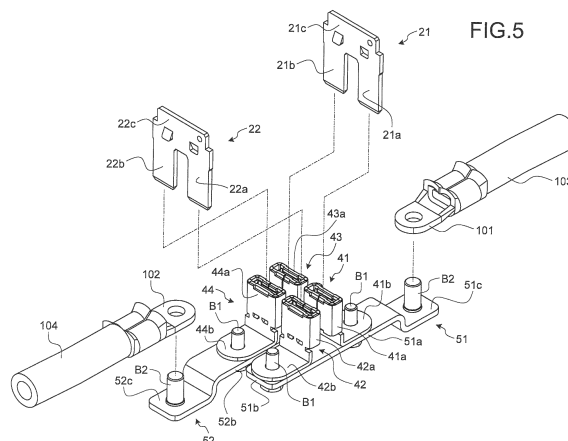
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(54) **FITTING CONNECTOR**

(57) A fitting connector includes a first connector (11) including first and second terminals (21, 22) and a housing (30) and a second connector (12) including first to fourth counterpart terminals (41 to 44), a first conductive member (51) that is electrically connected to the first and the second counterpart terminals, a second conductive member (52) that is electrically connected to the third and the fourth counterpart terminals, and a counterpart housing (60) and electrically connecting the first and the third counterpart terminals to the first terminal and elec-

trically connecting the second and the fourth counterpart terminals to the second terminal when a fitted state of the housing and the counterpart housing as a result of insertion between them is in a completely fitted state. The first conductive member has a current input portion (51c) that is electrically connected to an input-side conductive member (101) of a main circuit and the second conductive member has a current output portion (52c) that is electrically connected to an output-side conductive member (102) of the main circuit.



Description

Field

5 **[0001]** The present invention relates to a fitting connector.

Background

10 **[0002]** Conventionally, fitting connectors including two connectors that are fitted with each other, such as a female connector and a male connector, and electrically connecting both terminals thereof by fitting the connectors with each other have been known. This type of fitting connector is provided on a main circuit and shuts off the main circuit by opening it when a fitted state of the connectors is canceled and allows electric conduction by closing the main circuit when the connectors are in a completely fitted state. In the fitting connector, the terminals of the connectors are arranged in series on an electric conduction path of the main circuit in the completely fitted state. For example, in vehicles (such as electric automobiles and hybrid cars) including a rotary machine as a driving source, a high-voltage main circuit (power supply circuit) for supplying electric power from a power supply device to the rotary machine is provided. When an inspection work or a relief work is performed in a vehicle of this type, first, the power supply circuit is shut off in order to secure the safety of a worker. A fitting connector for opening and closing the power supply circuit (opening and closing device for a power supply circuit, called service plug) is therefore provided in this vehicle (Patent Literature 1).

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Patent Literature

[0003] Patent Literature 1: Japanese Patent Application Laid-open No. 2013-109944

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Summary

Technical Problem

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[0004] In the fitting connector, allowable currents of the terminals of the connectors are determined in accordance with the magnitude of an electric current flowing through the main circuit and the terminals based on the allowable currents are provided in order to endure heat generated by electric conduction. The allowable currents of the terminals are increased as the current flowing through the main circuit is larger. In the conventional fitting connector, the terminals on the electric conduction path are arranged in series. For this reason, as the current flowing through the main circuit is larger, the cross-sectional areas of the terminals in the direction orthogonal to the electric conduction path are increased to secure durability, for example. Accordingly, the conventional fitting connector still has a room for improvement in a method for securing the durability.

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[0005] An object of the present invention is to provide a fitting connector capable of easily securing the durability.

Solution to Problem

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[0006] In order to solve the above mentioned problem and achieve the object, a fitting connector according to the present invention includes a first connector including a first terminal, a second terminal, and a housing that holds the first terminal and the second terminal; and a second connector including first to fourth counterpart terminals, a first conductive member that is electrically connected to the first counterpart terminal and the second counterpart terminal, a second conductive member that is electrically connected to the third counterpart terminal and the fourth counterpart terminal, and a counterpart housing that holds at least the first to the fourth counterpart terminals, and electrically connecting the first counterpart terminal and the third counterpart terminal to the first terminal and electrically connecting the second counterpart terminal and the fourth counterpart terminal to the second terminal when a fitted state of the housing and the counterpart housing as a result of insertion between the housing and the counterpart housing is in a completely fitted state, wherein the first conductive member has a current input portion electrically connected to an input-side conductive member of a main circuit, and the second conductive member has a current output portion electrically connected to an output-side conductive member of the main circuit.

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[0007] Further, in the fitting connector, it is preferable that the first terminal has an input-side electric connection portion that is physically and electrically connected to a first electric connection portion of the first counterpart terminal and an output-side electric connection portion that is physically and electrically connected to a first electric connection portion of the third counterpart terminal, the second terminal has an input-side electric connection portion that is physically and electrically connected to a first electric connection portion of the second counterpart terminal and an output-side electric connection portion that is physically and electrically connected to a first electric connection portion of the fourth counterpart

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terminal, the first conductive member has a first input-side electric connection portion that is physically and electrically connected to a second electric connection portion of the first counterpart terminal and a second input-side electric connection portion that is physically and electrically connected to a second electric connection portion of the second counterpart terminal, and the second conductive member has a first output-side electric connection portion that is physically and electrically connected to a second electric connection portion of the third counterpart terminal and a second output-side electric connection portion that is physically and electrically connected to a second electric connection portion of the fourth counterpart terminal.

[0008] Further, in the fitting connector, it is preferable that a first electric conduction path through which a current flows while passing through the first conductive member, the first counterpart terminal, the first terminal, the third counterpart terminal, and the second conductive member and a second electric conduction path through which a current flows while passing through the first conductive member, the second counterpart terminal, the second terminal, the fourth counterpart terminal, and the second conductive member are provided in parallel between the current input portion and the current output portion, and the first and the second terminals, the first to the fourth counterpart terminals, and the first and the second conductive members are formed and arranged such that a resistance value of the first electric conduction path and a resistance value of the second electric conduction path are the same value.

[0009] Further, in the fitting connector, it is preferable that when the first terminal and the second terminal are formed into the same shape, the first to the fourth counterpart terminals are formed into the same shape, and the first conductive member and the second conductive member are formed into the same shape, the first and the second terminals, the first to the fourth counterpart terminals, and the first and the second conductive members are arranged such that a path length of the first electric conduction path and a path length of the second electric conduction path are the same.

[0010] Further, in the fitting connector, it is preferable that the main circuit is a circuit provided on a vehicle including a rotary machine as a driving source and is a power supply circuit for supplying electric power of a power supply device to the rotary machine.

Advantageous Effects of Invention

[0011] In the fitting connector according to the present invention, the electric conduction path (first electric conduction path) through which a current flows while passing through the first conductive member, the first counterpart terminal, the first terminal, the third counterpart terminal, and the second conductive member and the electric conduction path (second electric conduction path) through which a current flows while passing through the first conductive member, the second counterpart terminal, the second terminal, the fourth counterpart terminal, and the second conductive member are provided in parallel between the current input portion and the current output portion in a completely fitted state. The fitting connector can decrease allowable currents of components, such as the first terminal, forming the first electric conduction path and components, such as the second terminal, forming the second electric conduction path while securing durability of the components because the currents flowing through the first electric conduction path and the second electric conduction path are smaller than that in the conventional series circuit when the magnitude of the current flowing through the main circuit is not changed. The fitting connector can decrease the allowable currents of the components forming the first electric conduction path and the components forming the second electric conduction path while securing the durability of the components because the currents flowing through the first electric conduction path and the second electric conduction path are smaller than that flowing through the series circuit even when the magnitude of the current flowing through the main circuit is increased to be less than the double. The fitting connector can form the first electric conduction path and the second electric conduction path without lowering the durability by using some or all of the components forming the conventional series circuit because the currents flowing through the first electric conduction path and the second electric conduction path are smaller than that flowing through the series circuit when the current is increased to be equal to or less than the double. The fitting connector can minimize increase in the allowable currents of the components forming the first electric conduction path and the components forming the second electric conduction path while securing the durability of the components because the currents flowing through the first electric conduction path and the second electric conduction path are smaller than that flowing through the series circuit even when the current is increased to be larger than the double. Thus, the fitting connector can easily secure the durability even when the magnitude of the current flowing through the main circuit is changed in conventional applicable vehicles.

Brief Description of Drawings

[0012]

FIG. 1 is a perspective view illustrating a fitting canceled state between first and second connectors in a fitting connector according to an embodiment.

FIG. 2 is a perspective view illustrating the fitting canceled state between the first and the second connectors in the

fitting connector in the embodiment when seen from another angle.

FIG. 3 is a perspective view illustrating a completely fitted state between the first and the second connectors in the fitting connector in the embodiment.

FIG. 4 is a perspective view illustrating the completely fitted state between the first and the second connectors in the fitting connector in the embodiment when seen from another angle.

FIG. 5 is a perspective view illustrating conductive members included in the fitting connector in a fitting canceled state.

FIG. 6 is a perspective view illustrating the conductive members included in the fitting connector in a completely fitted state.

FIG. 7 is a plan view illustrating the conductive members included in the fitting connector in the completely fitted state.

FIG. 8 is an exploded perspective view of the first connector.

FIG. 9 is a plan view when the first connector is seen from an opening side in connector fitting.

FIG. 10 is an exploded perspective view of the second connector.

FIG. 11 is an exploded perspective view when the second connector is seen from another angle.

FIG. 12 is a plan view when the second connector is seen from an opening side in the connector fitting.

FIG. 13 is a perspective view illustrating a variation of the conductive members included in the fitting connector in a completely fitted state.

FIG. 14 is a plan view illustrating the variation of the conductive members included in the fitting connector in the completely fitted state.

Description of Embodiments

[0013] Hereinafter, an embodiment of a fitting connector according to the present invention will be described in detail with reference to the drawings. It should be noted that the embodiment does not limit the invention.

[Embodiment]

[0014] One of embodiments of the fitting connector according to the present invention will be described with reference to FIGS. 1 to 14.

[0015] Reference numeral 1 in FIGS. 1 to 4 indicates the fitting connector in the embodiment. In the embodiment, the fitting connector 1 that is used as a circuit opening and closing device on an electric conduction path of a main circuit is described as an example. The fitting connector 1 opens and closes the main circuit by switching a completely fitted state (FIGS. 3 and 4) and a fitting canceled state (FIGS. 1 and 2). The fitting connector 1 includes conductive members (a first terminal 21, which will be described later, and the like) for opening and closing the main circuit (FIGS. 5 and 6). A vehicle (not illustrated), such as an electric automobile, including a rotary machine as a driving source is used as an example. The main circuit in this example is a circuit provided in the vehicle and is a power supply circuit for supplying electric power from a power supply device in a driving system to the rotary machine. The fitting connector 1 in this example indicates an opening and closing device for the power supply circuit (what is called a service plug) arranged on a power feeding path of the high-voltage power supply circuit.

[0016] The fitting connector 1 is arranged between a conductive member (hereinafter, referred to as an "input-side conductive member") 101 on a current input side (that is, the power supply device side) of the main circuit in power feeding and a conductive member (hereinafter, referred to as an "output-side conductive member") 102 on a current output side (that is, the rotary machine side) of the main circuit in the power feeding (FIG. 5). The input-side conductive member 101 and the output-side conductive member 102 are, for example, terminal fittings. An electric wire 103 on the power supply device side is electrically connected to the input-side conductive member 101. An electric wire 104 on the rotary machine side is electrically connected to the output-side conductive member 102.

[0017] The fitting connector 1 includes a first connector 11 and a second connector 12 (FIGS. 1 to 4) that can be fitted with each other. The fitting connector 1 shuts off the main circuit by opening it when they are in the fitting canceled state and allows electric conduction by closing the main circuit when they are in the completely fitted state.

[0018] The first connector 11 includes the first terminal 21 and a second terminal 22 (FIGS. 5 to 9). The first connector 11 includes a housing 30 holding the first terminal 21 and the second terminal 22 (FIGS. 8 and 9).

[0019] The second connector 12 includes first to fourth counterpart terminals 41 to 44 (FIGS. 5, and 10 to 12). The second connector 12 includes a first conductive member 51 that is electrically connected to the first counterpart terminal 41 and the second counterpart terminal 42 and a second conductive member 52 that is electrically connected to the third counterpart terminal 43 and the fourth counterpart terminal 44. The second connector 12 further includes a counterpart housing 60 holding at least the first to the fourth counterpart terminals 41 to 44 (FIGS. 10 to 12). The second connector 12 electrically connects the first counterpart terminal 41 and the third counterpart terminal 43 to the first terminal 21 and electrically connects the second counterpart terminal 42 and the fourth counterpart terminal 44 to the second terminal 22 when a fitted state of the housing 30 of the first connector 11 and the counterpart housing 60 as a

result of insertion between them is in the completely fitted state (FIG. 6).

[0020] The fitting connector 1 in the embodiment has a structure serving as what is called a LIF connector in order to improve workability of a fitting work and a pulling-out work between the first connector 11 and the second connector 12. A lever member 70 serving as what is called a LIF lever for supporting the fitting work and the pulling-out work is provided

between the first connector 11 and the second connector 12 (FIGS. 1 to 4, 8, and 9).

[0021] Hereinafter, specific examples of the first connector 11 and the second connector 12 are described.

[0022] The first terminal 21 has an electric connection portion (hereinafter, referred to as an "input-side electric connection portion") 21a for electric connection to the input-side conductive member 101 and an electric connection portion (hereinafter, referred to as an "output-side electric connection portion") 21b for electric connection to the output-side conductive member 102 between the input-side conductive member 101 and the output-side conductive member 102 (FIG. 5). The first terminal 21 further has a coupling portion 21c that electrically connects the input-side electric connection portion 21a and the output-side electric connection portion 21b.

[0023] The second terminal 22 has an electric connection portion (hereinafter, referred to as an "input-side electric connection portion") 22a for electric connection to the input-side conductive member 101 and an electric connection portion (hereinafter, referred to as an "output-side electric connection portion") 22b for electric connection to the output-side conductive member 102 between the input-side conductive member 101 and the output-side conductive member 102 (FIG. 5). The second terminal 22 further has a coupling portion 22c that electrically connects the input-side electric connection portion 22a and the output-side electric connection portion 22b.

[0024] Each of the first terminal 21 and the second terminal 22 may be configured by one component formed with a conductive material such as metal or may be an assembly of a plurality of components formed with a conductive material such as metal. For example, in the former case, the first terminal 21 is provided by press forming using a metal plate as a base material such that the input-side electric connection portion 21a, the output-side electric connection portion 21b, and the coupling portion 21c are integrated with each other. The second terminal 22 is provided by press forming using a metal plate as a base material such that the input-side electric connection portion 22a, the output-side electric connection portion 22b, and the coupling portion 22c are integrated with each other. On the other hand, in the latter case, the first terminal 21 is provided by forming the input-side electric connection portion 21a, the output-side electric connection portion 21b, and the coupling portion 21c as individual components and assembling these three components for integration. The second terminal 22 is provided by forming the input-side electric connection portion 22a, the output-side electric connection portion 22b, and the coupling portion 22c as individual components and assembling these three components for integration. In the embodiment, the first terminal 21 is prepared as a U-shaped press-formed product in the former case, provided by connecting end portions of the input-side electric connection portion 21a and the output-side electric connection portion 21b by the coupling portion 21c, and the second terminal 22 is prepared as a U-shaped press-formed product in the former case, provided by connecting end portions of the input-side electric connection portion 22a and the output-side electric connection portion 22b by the coupling portion 22c. Thus, in this example, the input-side electric connection portions 21a and 22a and the output-side electric connection portions 21b and 22b are formed as male terminals (what is called male tubs). The input-side electric connection portions 21a and 22a and the output-side electric connection portions 21b and 22b may be formed as female terminals when the counterpart sides are male terminals.

[0025] The first terminal 21 and the second terminal 22 in the embodiment are formed into the same shape and the same terminals are used therefor.

[0026] The first counterpart terminal 41 has a first electric connection portion 41a for electric connection to the input-side electric connection portion 21a of the first terminal 21 and a second electric connection portion 41b for electric connection to the input-side conductive member 101 (FIGS. 5 to 7). The first electric connection portion 41a in this example is fitted with the input-side electric connection portion 21a of the first terminal 21 to be thereby physically and electrically connected to the input-side electric connection portion 21a. In this example, the first electric connection portion 41a is formed as a female terminal. The first electric connection portion 41a may, however, be formed as a male terminal if the input-side electric connection portion 21a is a female terminal. The second electric connection portion 41b is electrically connected to the input-side conductive member 101 with the first conductive member 51 interposed therebetween, as will be described later.

[0027] The second counterpart terminal 42 has a first electric connection portion 42a for electric connection to the input-side electric connection portion 22a of the second terminal 22 and a second electric connection portion 42b for electric connection to the input-side conductive member 101 (FIGS. 5 to 7). The first electric connection portion 42a in this example is fitted with the input-side electric connection portion 22a of the second terminal 22 to be thereby physically and electrically connected to the input-side electric connection portion 22a. In this example, the first electric connection portion 42a is formed as a female terminal. The first electric connection portion 42a may, however, be formed as a male terminal if the input-side electric connection portion 22a is a female terminal. The second electric connection portion 42b is electrically connected to the input-side conductive member 101 with the first conductive member 51 interposed therebetween, as will be described later.

[0028] The third counterpart terminal 43 has a first electric connection portion 43a for electric connection to the output-side electric connection portion 21b of the first terminal 21 and a second electric connection portion 43b for electric connection to the output-side conductive member 102 (FIG. 7). The first electric connection portion 43a in this example is fitted with the output-side electric connection portion 21b of the first terminal 21 to be thereby physically and electrically connected to the output-side electric connection portion 21b. In this example, the first electric connection portion 43a is formed as a female terminal. The first electric connection portion 43a may, however, be formed as a male terminal if the output-side electric connection portion 21b is a female terminal. The second electric connection portion 43b is electrically connected to the output-side conductive member 102 with the second conductive member 52 interposed therebetween, as will be described later.

[0029] The fourth counterpart terminal 44 has a first electric connection portion 44a for electric connection to the output-side electric connection portion 22b of the second terminal 22 and a second electric connection portion 44b for electric connection to the output-side conductive member 102 (FIGS. 5 to 7). The first electric connection portion 44a in this example is fitted with the output-side electric connection portion 22b of the second terminal 22 to be thereby physically and electrically connected to the output-side electric connection portion 22b. In this example, the first electric connection portion 44a is formed as a female terminal. The first electric connection portion 44a may, however, be formed as a male terminal if the output-side electric connection portion 22b is a female terminal. The second electric connection portion 44b is electrically connected to the output-side conductive member 102 with the second conductive member 52 interposed therebetween, as will be described later.

[0030] Each of the first to the fourth counterpart terminals 41 to 44 may be configured by one component formed with a conductive material such as metal or may be an assembly of a plurality of components formed with a conductive material such as metal like the first terminal 21 and the second terminal 22. For example, in the former case, the first to the fourth counterpart terminals 41 to 44 are provided by press forming using metal plates as base materials such that the first electric connection portions 41a to 44a and the second electric connection portions 41b to 44b are integrated with each other. On the other hand, in the latter case, the first to the fourth counterpart terminals 41 to 44 are provided by forming the first electric connection portions 41a to 44a and the second electric connection portions 41b to 44b as individual components and assembling these two components for integration. In the embodiment, the first to the fourth counterpart terminals 41 to 44 are prepared as press-formed products in the former case provided by arranging the first electric connection portions 41a to 44a and the second electric connection portions 41b to 44b in L shapes.

[0031] The first to fourth counterpart terminals 41 to 44 in the embodiment are formed into the same shape and the same terminals are used therefor.

[0032] The first conductive member 51 is formed with a conductive material such as metal for being electrically connected to the first counterpart terminal 41, the second counterpart terminal 42, and the input-side conductive member 101. The first conductive member 51 has a first input-side electric connection portion 51a for electric connection to the second electric connection portion 41b of the first counterpart terminal 41 and a second input-side electric connection portion 51b for electric connection to the second electric connection portion 42b of the second counterpart terminal 42 (FIGS. 2, and 4 to 7). The first conductive member 51 further has a current input portion 51c for electric connection to the input-side conductive member 101. The first conductive member 51 is formed such that the first input-side electric connection portion 51a and the second input-side electric connection portion 51b are adjacently arranged and the current input portion 51c is arranged to be adjacent to either of the first input-side electric connection portion 51a or the second input-side electric connection portion 51b. In this example, a press-formed product using a metal plate as a base material is used for the first conductive member 51. In the first conductive member 51 in this example, the current input portion 51c, the first input-side electric connection portion 51a, and the second input-side electric connection portion 51b are arranged in this order. The current input portion 51c, the first input-side electric connection portion 51a, and the second input-side electric connection portion 51b are arranged in a row. In the first conductive member 51, a current therefore flows through the current input portion 51c, the first input-side electric connection portion 51a, and the second input-side electric connection portion 51b in this order in power feeding.

[0033] In this example, the second electric connection portion 41b and the first input-side electric connection portion 51a are screwed with each other for physical and electric connection and the second electric connection portion 42b and the second input-side electric connection portion 51b are screwed with each other for physical and electric connection. Through-holes 41b₁, 51a₁, 42b₁, and 51b₁ for inserting male screw members B1 thereinto are respectively formed in the second electric connection portion 41b, the first input-side electric connection portion 51a, the second electric connection portion 42b, and the second input-side electric connection portion 51b (FIGS. 10 and 11). The counterpart housing 60 holds female screw members N1 that respectively correspond to the male screw members B1 (FIG. 11). The female screw members N1 and the male screw members B1 are screwed with each other, so that the second electric connection portion 41b and the first input-side electric connection portion 51a are physically and electrically connected to each other, the second electric connection portion 42b and the second input-side electric connection portion 51b are physically and electrically connected to each other, and the second electric connection portion 41b, the first input-side electric connection portion 51a, the second electric connection portion 42b, and the second input-side electric connection

portion 51b are fixed to the counterpart housing 60. In this example, the input-side conductive member 101 and the current input portion 51c are also screwed with each other for physical and electric connection. For example, a male screw member B2 such as a stud bolt is mounted on the current input portion 51c (FIGS. 5 and 6) and the input-side conductive member 101 is formed as what is called a round terminal through which the male screw member B2 is inserted. The input-side conductive member 101 and the current input portion 51c are physically and electrically connected to each other by screwing a female screw member (not illustrated) with the male screw member B2.

[0034] The first conductive member 51 in this example is formed such that the first input-side electric connection portion 51a can be used as the second input-side electric connection portion 51b and the second input-side electric connection portion 51b can be used as the first input-side electric connection portion 51a. Accordingly, the first conductive member 51 can also cause the current to flow through the current input portion 51c, the second input-side electric connection portion 51b, and the first input-side electric connection portion 51a in this order in the power feeding.

[0035] The second conductive member 52 is formed with a conductive material such as metal for being electrically connected to the third counterpart terminal 43, the fourth counterpart terminal 44, and the output-side conductive member 102. The second conductive member 52 has a first output-side electric connection portion 52a for electric connection to the second electric connection portion 43b of the third counterpart terminal 43 and a second output-side electric connection portion 52b for electric connection to the second electric connection portion 44b of the fourth counterpart terminal 44 (FIGS. 2, and 4 to 7). The second conductive member 52 further has a current output portion 52c for electric connection to the output-side conductive member 102. The second conductive member 52 is formed such that the first output-side electric connection portion 52a and the second output-side electric connection portion 52b are adjacently arranged and the current output portion 52c is arranged to be adjacent to either of the first output-side electric connection portion 52a or the second output-side electric connection portion 52b. In this example, a press-formed product using a metal plate as a base material is used for the second conductive member 52. In the second conductive member 52 in this example, the first output-side electric connection portion 52a, the second output-side electric connection portion 52b, and the current output portion 52c are arranged in this order. In this example, the first output-side electric connection portion 52a, the second output-side electric connection portion 52b, and the current output portion 52c are arranged in a row. In the second conductive member 52, the current that has flowed to the first output-side electric connection portion 52a therefore flows to the current output portion 52c through the second output-side electric connection portion 52b in the power feeding.

[0036] In this example, the second electric connection portion 43b and the first output-side electric connection portion 52a are screwed with each other for physical and electric connection and the second electric connection portion 44b and the second output-side electric connection portion 52b are screwed with each other for physical and electric connection. Through-holes 43b₁, 52a₁, 44b₁, and 52b₁ for inserting the male screw members B1 thereinto are respectively formed in the second electric connection portion 43b, the first output-side electric connection portion 52a, the second electric connection portion 44b, and the second output-side electric connection portion 52b (FIG. 11). The counterpart housing 60 holds the female screw members N1 that respectively correspond to the male screw members B1. The female screw members N1 and the male screw members B1 are screwed with each other, so that the second electric connection portion 43b and the first output-side electric connection portion 52a are physically and electrically connected to each other, the second electric connection portion 44b and the second output-side electric connection portion 52b are physically and electrically connected to each other, and the second electric connection portion 43b, the first output-side electric connection portion 52a, the second electric connection portion 44b, and the second output-side electric connection portion 52b are fixed to the counterpart housing 60. In this example, the output-side conductive member 102 and the current output portion 52c are also screwed with each other for physical and electric connection. For example, the male screw member B2 such as the stud bolt is mounted on the current output portion 52c (FIGS. 5 and 6) and the output-side conductive member 102 is formed as what is called a round terminal through which the male screw member B2 is inserted. The output-side conductive member 102 and the current output portion 52c are physically and electrically connected to each other by screwing a female screw member (not illustrated) with the male screw member B2.

[0037] The second conductive member 52 in this example is formed such that the first output-side electric connection portion 52a can be used as the second output-side electric connection portion 52b and the second output-side electric connection portion 52b can be used as the first output-side electric connection portion 52a. Accordingly, the second conductive member 52 can also cause the current that has flowed to the second output-side electric connection portion 52b to flow to the current output portion 52c through the first output-side electric connection portion 52a in the power feeding.

[0038] The first conductive member 51 and the second conductive member 52 in the embodiment are formed into the same shape and the same terminals are used therefor.

[0039] The housing 30 is formed with an insulating material such as synthetic resin. The housing 30 has a first terminal accommodation chamber 31 accommodating and holding therein the first terminal 21 and a second terminal accommodation chamber 32 accommodating and holding therein the second terminal 22 (FIGS. 2 and 9). The housing 30 accommodates therein the first terminal 21 and the second terminal 22 side by side such that the input-side electric connection

portions 21a and 22a and the output-side electric connection portions 21b and 22b of the first and the second terminals 21 and 22 are arranged in a grid form. The first terminal accommodation chamber 31 and the second terminal accommodation chamber 32 are formed inside a main body 33 of the housing 30 such that the first terminal 21 and the second terminal 22 can be arranged therein.

[0040] The first terminal accommodation chamber 31 has an opening 31a for exposing at least the input-side electric connection portion 21a and the output-side electric connection portion 21b of the first terminal 21 in a state of accommodating therein the first terminal 21 (FIG. 2). In this example, the first electric connection portion 41a of the first counterpart terminal 41 and the first electric connection portion 43a of the third counterpart terminal 43 are inserted into the first terminal accommodation chamber 31 through the opening 31a. In the chamber, the input-side electric connection portion 21a and the first electric connection portion 41a are fitted with each other and the output-side electric connection portion 21b and the first electric connection portion 43a are fitted with each other.

[0041] The second terminal accommodation chamber 32 has an opening 32a for exposing at least the input-side electric connection portion 22a and the output-side electric connection portion 22b of the second terminal 22 in a state of accommodating therein the second terminal 22 (FIG. 2). In this example, the first electric connection portion 42a of the second counterpart terminal 42 and the first electric connection portion 44a of the fourth counterpart terminal 44 are inserted into the second terminal accommodation chamber 32 through the opening 32a. In the chamber, the input-side electric connection portion 22a and the first electric connection portion 42a are fitted with each other and the output-side electric connection portion 22b and the first electric connection portion 44a are fitted with each other.

[0042] The main body 33 of the housing 30 in this example is formed into a cuboid shape and the first terminal accommodation chamber 31 and the second terminal accommodation chamber 32 having cuboid shapes are formed inside the main body 33. To be specific, the rectangular cylindrical-shaped main body 33 having an open end is provided with a partition wall 34 partitioning a space therein into the first terminal accommodation chamber 31 and the second terminal accommodation chamber 32 (FIGS. 2 and 9).

[0043] The counterpart housing 60 is formed with an insulating material such as synthetic resin. The counterpart housing 60 has a first terminal accommodation chamber 61 accommodating and holding therein the first counterpart terminal 41, a second terminal accommodation chamber 62 accommodating and holding therein the second counterpart terminal 42, a third terminal accommodation chamber 63 accommodating and holding therein the third counterpart terminal 43, and a fourth terminal accommodation chamber 64 accommodating and holding therein the fourth counterpart terminal 44 (FIGS. 1, 10 and 12). The counterpart housing 60 accommodates therein the first to the fourth counterpart terminals 41 to 44 in a state of being arranged in a grid form such that the first to the fourth electric connection portions 41a to 44a of the first to the fourth counterpart terminals 41 to 44 are arranged in a grid form. The first to the fourth terminal accommodation chambers 61 to 64 are formed inside a main body 65 of the counterpart housing 60 such that the first to the terminals 41 to 44 can be arranged.

[0044] The first terminal accommodation chamber 61 has an opening 61a for exposing the first electric connection portion 41a of the first counterpart terminal 41 in a state of accommodating therein the first counterpart terminal 41 (FIGS. 1, 10, and 12). In this example, the input-side electric connection portion 21a of the first terminal 21 is inserted into the first terminal accommodation chamber 61 through the opening 61a, and the input-side electric connection portion 21a and the first electric connection portion 41a are fitted with each other in the chamber.

[0045] The second terminal accommodation chamber 62 has an opening 62a for exposing the first electric connection portion 42a of the second counterpart terminal 42 in a state of accommodating therein the second counterpart terminal 42 (FIG. 12). In this example, the input-side electric connection portion 22a of the second terminal 22 is inserted into the second terminal accommodation chamber 62 through the opening 62a, and the input-side electric connection portion 22a and the first electric connection portion 42a are fitted with each other in the chamber.

[0046] The third terminal accommodation chamber 63 has an opening 63a for exposing the first electric connection portion 43a of the third counterpart terminal 43 in a state of accommodating therein the third counterpart terminal 43 (FIGS. 1, 10, and 12). In this example, the output-side electric connection portion 21b of the first terminal 21 is inserted into the third terminal accommodation chamber 63 through the opening 63a, and the output-side electric connection portion 21b and the first electric connection portion 43a are fitted with each other in the chamber.

[0047] The fourth terminal accommodation chamber 64 has an opening 64a for exposing the first electric connection portion 44a of the fourth counterpart terminal 44 in a state of accommodating therein the fourth counterpart terminal 44 (FIGS. 1, 10, and 12). In this example, the output-side electric connection portion 22b of the second terminal 22 is inserted into the fourth terminal accommodation chamber 64 through the opening 64a, and the output-side electric connection portion 22b and the first electric connection portion 44a are fitted with each other in the chamber.

[0048] In the counterpart housing 60 in this example, a first fitting portion 66 and a second fitting portion 67 having cuboid shapes are arranged in a space inside the rectangular cylindrical-shaped main body 65 having open ends (FIGS. 1, 10, and 12). The main body 33 of the housing 30 is inserted into the space inside the main body 65 with progress of fitting between the first connector 11 and the second connector 12.

[0049] The first fitting portion 66 is arranged in the space inside the main body 65 in a state in which the first terminal

accommodation chamber 61 and the third terminal accommodation chamber 63 are formed side by side therein and the openings 61a and 63a thereof are directed to one opening of the main body 65. The first fitting portion 66 is inserted into the first terminal accommodation chamber 31 of the housing 30 with progress of fitting between the first connector 11 and the second connector 12 (that is, insertion of the main body 33 of the housing 30 into the space inside the main body 65). In the fitting connector 1, the input-side electric connection portion 21a and the first electric connection portion 41a are fitted with each other and the output-side electric connection portion 21b and the first electric connection portion 43a are fitted with each other with progress of insertion of the first fitting portion 66 into the first terminal accommodation chamber 31.

[0050] The second fitting portion 67 is arranged in the space inside the main body 65 in a state in which the second terminal accommodation chamber 62 and the fourth terminal accommodation chamber 64 are formed side by side therein and the openings 62a and 64a thereof are directed to one opening of the main body 65. The second fitting portion 67 is inserted into the second terminal accommodation chamber 32 of the housing 30 with progress of fitting between the first connector 11 and the second connector 12 (that is, insertion of the main body 33 of the housing 30 into the space inside the main body 65). In the fitting connector 1, the input-side electric connection portion 22a and the first electric connection portion 42a are fitted with each other and the output-side electric connection portion 22b and the first electric connection portion 44a are fitted with each other with progress of insertion of the second fitting portion 67 into the second terminal accommodation chamber 32.

[0051] In the counterpart housing 60, the first fitting portion 66 and the second fitting portion 67 are arranged side by side in the space inside the main body 65 such that the first to the fourth terminal accommodation chambers 61 to 64 are arranged in the grid form.

[0052] The counterpart housing 60 holds the first conductive member 51 and the second conductive member 52 such that the current input portion 51c and the current output portion 52c are arranged on the opposite sides with respect to the first to the fourth counterpart terminals 41 to 44 arranged in the grid form (FIG. 12).

[0053] A rectangular annular-shaped flange portion 68 is provided on the counterpart housing 60 so as to surround an outer peripheral wall of the main body 65 (FIGS. 1 to 4 and 10 to 12). The counterpart housing 60 is mounted on the vehicle by screwing or the like through the flange portion 68. An interlock switch SW is provided on the counterpart housing 60. The interlock switch SW shuts off a system main relay (not illustrated) when the first connector 11 and the second connector 12 are made into the fitting canceled state. The system main relay opens and closes the main circuit (power supply circuit) based on a signal of an electronic control unit (main ECU) in the driving system.

[0054] The lever member 70 is formed with an insulating material such as synthetic resin. The lever member 70 is arranged between the housing 30 and the counterpart housing 60 in order to make the first connector 11 and the second connector 12 into the completely fitted state and make the first connector 11 and the second connector 12 into the fitting canceled state. The main body 33 of the housing 30 is inserted into the space inside the main body 65 of the counterpart housing 60 in conjunction with a fitting operation (hereinafter, referred to as a "first lever operation") on a lever operation portion 71 (FIGS. 1 to 4 and FIGS. 8 and 9) of the lever member 70 in this example by a worker or the like. The fitting connector 1 is made into a conductible state while closing the main circuit by the first lever operation that makes the fitted state between the first connector 11 and the second connector 12 into the completely fitted state. The main body 33 of the housing 30 is pulled out from the space inside the main body 65 of the counterpart housing 60 in conjunction with a pulling-out operation (hereinafter, referred to as a "second lever operation") on the lever operation portion 71 of the lever member 70 in this example by the worker or the like. The fitting connector 1 is made into a non-conductible state while opening the main circuit by the second lever operation that makes the first connector 11 and the second connector 12 into the fitting canceled state.

[0055] The lever member 70 in this example is mounted on the main body 33 of the housing 30 in a rotationally movable manner. In this example, the lever member 70 is mounted on two outer peripheral walls 33a and 33b of the main body 33 that oppose each other (FIGS. 1 to 3, 8, and 9). The lever member 70 is provided with a first holding portion 72 arranged so as to oppose one outer peripheral wall 33a and a second holding portion 73 arranged so as to oppose the other outer peripheral wall 33b. The lever member 70 is mounted on the main body 33 so as to interpose it by the first holding portion 72 and the second holding portion 73 from the sides of the outer peripheral walls 33a and 33b. The first holding portion 72 and the second holding portion 73 are plate-like portions extending from the lever operation portion 71.

[0056] Rotationally movable shaft portions 35 arranged coaxially are provided on the outer peripheral walls 33a and 33b of the main body 33 (FIGS. 1 to 4, 8, and 9). The rotationally movable shaft portions 35 project from the outer peripheral walls 33a and 33b to the opposite directions in the axial direction. Bearing portions 74 that hold the rotationally movable shaft portions 35 in a rotationally movable manner about the axes are formed on the first holding portion 72 and the second holding portion 73. The rotationally movable shaft portions 35 in this example have columnar shapes mainly. The bearing portions 74 in this example mainly have through-hole shapes in which the rotationally movable shaft portions 35 are held in the rotationally movable manner in a state of being inserted therethrough. The lever member 70 is held on the main body 33 of the housing 30 in a rotationally movable manner by the rotationally movable shaft portions 35 and the bearing portions 74.

[0057] A guide mechanism that changes relative positions of the main body 33 and the main body 65 in conjunction with rotation of the lever member 70 relative to the main body 33 of the housing 30 is provided between the lever member 70 and the main body 65 of the counterpart housing 60. The guide mechanism includes to-be-guided portions 69 and guide portions 75 that guide the to-be-guided portions 69 in conjunction with the rotation of the lever member 70 relative to the main body 33 (FIGS. 1 and 3). The to-be-guided portions 69 in this example are provided on two outer peripheral walls 65a and 65b of the main body 65 that oppose each other (FIG. 12). The to-be-guided portions 69 coaxially project from the outer peripheral walls 65a and 65b to the opposite directions. The guide portions 75 are provided on the first holding portion 72 and the second holding portion 73 of the lever member 70 (FIG. 8). The guide portions 75 have shapes so as to enable relative movement of the first connector 11 and the second connector 12 between the fitting canceled state and the completely fitted state in conjunction with the rotation of the lever member 70 relative to the main body 33. The guide portions 75 are formed to have arc-like through-holes or arc-like grooves in this example. The guide portions 75 have the same shapes having arc-like walls opposing each other and are arranged such that projection shapes thereof overlap with each other in the axial direction of the rotationally movable shaft portions 35. In the guide mechanism, when fitting of the first connector 11 and the second connector 12 is started, the to-be-guided portions 69 are inserted into the guide portions 75, and the to-be-guided portions 69 are guided along the guide portions 75 in response to the subsequent relative rotation of the lever member 70.

[0058] The shapes of the guide portions 75 are determined such that the shaft centers of the rotationally movable shaft portions 35 and the shaft centers of the to-be-guided portions 69 are closest to each other in the completely fitted state of the first connector 11 and the second connector 12 and the shaft centers of the rotationally movable shaft portions 35 and the shaft centers of the to-be-guided portions 69 become farther from each other with the second lever operation. The shapes of one arc-like wall each of the guide portions 75 are determined such that they guide the to-be-guided portions 69 in a sliding manner along the one arc-like wall with the first lever operation and apply, to between the main body 33 of the housing 30 and the main body 65 of the counterpart housing 60, force of making close to each other with force acting on between the to-be-guided portions 69 and the arc-like walls and force acting on between the rotationally movable shaft portions 35 and the bearing portions 74 in the guiding. The shapes of the other arc-like walls of the guide portions 75 are determined such that they guide the to-be-guided portions 69 in a sliding manner along the other arc-like walls with the second lever operation and apply, to between the main body 33 of the housing 30 and the main body 65 of the counterpart housing 60, force of being farther from each other with force acting on between the to-be-guided portions 69 and the arc-like walls and force acting on between the rotationally movable shaft portions 35 and the bearing portions 74 in the guiding.

[0059] The fitting connector 1 includes the above-mentioned lever member 70 to thereby reduce a fitting operation force in the fitting between the first connector 11 and the second connector 12 and reduce a pulling-out operation force in pulling-out of the first connector 11 and the second connector 12.

[0060] In the fitting connector 1, plate-like members are used for the first terminal 21 and the second terminal 22. The axial direction of the rotationally movable axis (the rotationally movable shaft portions 35 and the bearing portions 74) of lever member 70 is therefore desirably orthogonal to a plane of the first terminal 21 and a plane of the second terminal 22. With this formation, in the fitting connector 1, even when the first terminal 21 and the second terminal 22 are inclined during the first lever operation or the second lever portion, the inclination direction thereof is along the plane of the first terminal 21 and the plane of the second terminal 22. In the fitting connector 1, when the first terminal 21 and the second terminal 22 are inclined, contact points between the first terminal 21 and the first counterpart terminal 41, between the first terminal 21 and the third counterpart terminal 43, between the second terminal 22 and the second counterpart terminal 42, and between the second terminal 22 and the fourth counterpart terminal 44 move along the plane of the first terminal 21 and the plane of the second terminal 22, thereby preventing increase in loads on the contact points and preventing biting or the like between them. The fitting connector 1 can therefore prevent increase in the fitting operation force and the pulling-out operation force and improve workability of the fitting work and the pulling-out work.

[0061] The rotationally movable axis of the lever member 70 is desirably set between the input-side electric connection portion 21a and the output-side electric connection portion 21b of the first terminal 21 (between the input-side electric connection portion 22a and the output-side electric connection portion 22b of the second terminal 22) on a virtual plane along the insertion/pulling-out direction of the first terminal 21 (second terminal 22) into/from the first and the third counterpart terminals 41 and 43 (second and fourth counterpart terminals 42 and 44) on a plane orthogonal to the plane of the first terminal 21 (the plane of the second terminal 22). With this setting, the fitting connector 1 can reduce difference in the relative movement amount with inclination of the first terminal 21 and the second terminal 22 between the first terminal 21 and the first counterpart terminal 41, between the first terminal 21 and the third counterpart terminal 43, between the second terminal 22 and the second counterpart terminal 42, and between the second terminal 22 and the fourth counterpart terminal 44 even when the first terminal 21 and the second terminal 22 are inclined during the first lever portion or the second lever portion, thereby further preventing biting or the like between them. The fitting connector 1 can therefore enhance an effect of preventing the increase in the fitting operation force and the pulling-out operation force and further improve the workability of the fitting work and the pulling-out work.

[0062] The above-mentioned fitting connector 1 in the embodiment can be made conductible by closing the main circuit by making the fitted state between the first connector 11 and the second connector 12 into the completely fitted state in a normal state. On the other hand, the fitting connector 1 is made non-conductible between the current input portion 51c and the current output portion 52c by opening and shutting off the main circuit by making the first connector 11 and the second connector 12 into the fitting canceled state in states other than the normal state as in an inspection work, a relief work, or the like on the vehicle.

[0063] A first electric conduction path Ep1 through which a current flows while passing through the first conductive member 51, the first counterpart terminal 41, the first terminal 21, the third counterpart terminal 43, and the second conductive member 52 and a second electric conduction path Ep2 through which a current flows while passing through the first conductive member 51, the second counterpart terminal 42, the second terminal 22, the fourth counterpart terminal 44, and the second conductive member 52 are provided in parallel between the current input portion 51c and the current output portion 52c in the completely fitted state (for example, between the male screw member B2 of the current input portion 51c and the male screw member B2 of the current output portion 52c) (FIG. 7). In the fitting connector 1 in the embodiment, the parallel circuit can divide the current that has flowed to the current input portion 51c into the first electric conduction path Ep1 and the second electric conduction path Ep2 and merge the current flowing through the first electric conduction path Ep1 and the current flowing through the second electric conduction path Ep2 in the current output portion 52c.

[0064] The fitting connector 1 in the embodiment has the above-mentioned parallel circuit, so that when, for example, the magnitude of the current flowing through the main circuit is the same as that flowing through the conventional series circuit, the currents flowing through the first electric conduction path Ep1 and the second electric conduction path Ep2 are decreased in comparison with that in the series circuit. The fitting connector 1 in this case can therefore decrease allowable currents of the components forming the first electric conduction path Ep1 (the first conductive member 51, the first counterpart terminal 41, the first terminal 21, the third counterpart terminal 43, and the second conductive member 52) and the components forming the second electric conduction path Ep2 (the first conductive member 51, the second counterpart terminal 42, the second terminal 22, the fourth counterpart terminal 44, and the second conductive member 52) while securing the durability of the components in comparison with components forming the series circuit, such as terminals. The fitting connector 1 in this case can use the components with the decreased allowable currents for the first electric conduction path Ep1 and the second electric conduction path Ep2, thereby reducing the thickness and size of the components. For example, the fitting connector 1 can be reduced in weight with the reduction in the thickness and size, thereby improving the durability against external input (such as road surface input and input associated with acceleration/deceleration in traveling of the vehicle, for example). The fitting connector 1 can reduce development man-hours and cost by using existing components adapted to the decreased allowable currents for the components forming the first electric conduction path Ep1 and the components forming the second electric conduction path Ep2 if such components are present.

[0065] In the conventional series circuit, when the magnitude of the current flowing through the main circuit is increased to be larger than the allowable currents of the components forming the series circuit, the thicknesses and sizes of the components need to be increased. On the other hand, in the fitting connector 1 in the embodiment, the parallel circuit by the first electric conduction path Ep1 and the second electric conduction path Ep2 is configured between the current input portion 51c and the current output portion 52c. The fitting connector 1 can therefore decrease the allowable currents of the components forming the first electric conduction path Ep1 and the components forming the second electric conduction path Ep2 while securing the durability of the components because the currents flowing through the first electric conduction path Ep1 and the second electric conduction path Ep2 are smaller than that flowing through the series circuit when the current is increased to be smaller than the double. The fitting connector 1 can therefore be reduced in weight with the reduction in the thicknesses and sizes of the components, thereby improving the durability against the external input.

[0066] In the fitting connector 1 in the embodiment, the first electric conduction path Ep1 and the second electric conduction path Ep2 can be formed without lowering the durability by using some or all of the components forming the conventional series circuit because the currents flowing through the first electric conduction path Ep1 and the second electric conduction path Ep2 are smaller than that flowing through the series circuit when the current is increased to be equal to or less than the double.

[0067] The fitting connector 1 in the embodiment can minimize increase in the allowable currents of the components forming the first electric conduction path Ep1 and the components forming the second electric conduction path Ep2 while securing the durability of the components because the currents flowing through the first electric conduction path Ep1 and the second electric conduction path Ep2 are smaller than that flowing through the series circuit even when the current is increased to be larger than the double. The fitting connector 1 in this case can therefore minimize the increase in the thicknesses and sizes of the components, thereby improving the durability against the external input.

[0068] Thus, the fitting connector 1 in the embodiment can easily secure the durability even when the magnitude of the current flowing through the main circuit is changed in conventional applicable vehicles, for example.

[0069] In the fitting connector 1, it is desirable that a resistance value of the first electric conduction path Ep1 and a resistance value of the second electric conduction path Ep2 are set to the same value and the current flowing to the current input portion 51c is divided into two of the first electric conduction path Ep1 and the second electric conduction path Ep2 in order to stabilize the current on the parallel circuit and equalize the durability of the components on the first electric conduction path Ep1 and the second electric conduction path Ep2. In order to achieve this, in the fitting connector 1, the first and the second terminals 21 and 22, the first to the fourth counterpart terminals 41 to 44, and the first and the second conductive members 51 and 52 are formed and arranged such that the resistance value of the first electric conduction path Ep1 and the resistance value of the second electric conduction path Ep2 are the same value.

[0070] In the embodiment, for example, the first terminal 21 and the second terminal 22 are formed into the same shape, the first to the fourth counterpart terminals 41 to 44 are formed into the same shape, and the first conductive member 51 and the second conductive member 52 are formed into the same shape. Accordingly, in the fitting connector 1, the first and the second terminals 21 and 22, the first to the fourth counterpart terminals 41 to 44, and the first and the second conductive members 51 and 52 are arranged such that the path length of the first electric conduction path Ep1 and the path length of the second electric conduction path Ep2 are the same value. With this arrangement, the resistance value of the first electric conduction path Ep1 and the resistance value of the second electric conduction path Ep2 are the same value. The arrangement places of the first and the second counterpart terminals 41 and 42 on the first conductive member 51 and the arrangement places of the third and the fourth counterpart terminals 43 and 44 on the second conductive member 52 are set as described above, and the first conductive member 51 and the second conductive member 52 are arranged such that the current input portion 51c and the current output portion 52c are arranged on the opposite sides. In the fitting connector 1 in the embodiment, the path length of the first electric conduction path Ep1 and the path length of the second electric conduction path Ep2 are therefore the same.

[0071] As illustrated in FIGS. 13 and 14, in the fitting connector 1, the counterpart housing 60 may hold the first conductive member 51 and the second conductive member 52 such that the current input portion 51c and the current output portion 52c are arranged on the same side with respect to the first to the fourth counterpart terminals 41 to 44 arranged in the grid form. In this case, for example, it is sufficient that the arrangement places of the third and the fourth counterpart terminals 43 and 44 (that is, positions of the first output-side electric connection portion 52a and the second output-side electric connection portion 52b) on the second conductive member 52 are switched while employing the same arrangement places of the first and the second counterpart terminals 41 and 42 on the first conductive member 51 as those described above or the arrangement places of the first and the second counterpart terminals 41 and 42 (that is, positions of the first input-side electric connection portion 51a and the second input-side electric connection portion 51b) on the first conductive member 51 are switched while employing the same arrangement places of the third and the fourth counterpart terminals 43 and 44 on the second conductive member 52 as those described above. In this example, the former case is described. The fitting connector 1 can provide the same effects as those described above even with the arrangement.

[0072] Even in the fitting connector 1 in FIGS. 13 and 14, it is desirable that the resistance values of the first electric conduction path Ep1 and the second electric conduction path Ep2 are set to be the same value. For example, in the example of these drawings, the path length of the second electric conduction path Ep2 is larger than the path length of the first electric conduction path Ep1, and the resistance value of the first electric conduction path Ep1 is smaller than the resistance value of the second electric conduction path Ep2. In this case, it is sufficient that for example, the resistance value of the first electric conduction path Ep1 is increased by increasing the cross-sectional area of the first terminal 21 along the direction orthogonal to the electric conduction direction by increasing the plate thickness of the first terminal 21 (by also adapting the shapes of the first and the third counterpart terminals 41 and 43 to the first terminal 21) or the resistance value of the second electric conduction path Ep2 is decreased by decreasing the cross-sectional area of the second terminal 22 along the direction orthogonal to the electric conduction direction by decreasing the plate thickness of the second terminal 22 (by also adapting the shapes of the second and the fourth counterpart terminals 42 and 44 to the second terminal 22). With this configuration, also in the fitting connector 1 in FIGS. 13 and 14, the current on the parallel circuit can be stabilized.

Reference Signs List

[0073]

1	FITTING CONNECTOR
11	FIRST CONNECTOR
12	SECOND CONNECTOR
21	FIRST TERMINAL
21a	INPUT-SIDE ELECTRIC CONNECTION PORTION
21b	OUTPUT-SIDE ELECTRIC CONNECTION PORTION

22	SECOND TERMINAL
22a	INPUT-SIDE ELECTRIC CONNECTION PORTION
22b	OUTPUT-SIDE ELECTRIC CONNECTION PORTION
30	HOUSING
5 41	FIRST COUNTERPART TERMINAL
41a, 42a, 43a, 44a	FIRST ELECTRIC CONNECTION PORTION
41b, 42b, 43b, 44b	SECOND ELECTRIC CONNECTION PORTION
42	SECOND COUNTERPART TERMINAL
43	THIRD COUNTERPART TERMINAL
10 44	FOURTH COUNTERPART TERMINAL
51	FIRST CONDUCTIVE MEMBER
51a	FIRST INPUT-SIDE ELECTRIC CONNECTION PORTION
51b	SECOND INPUT-SIDE ELECTRIC CONNECTION PORTION
51c	CURRENT INPUT PORTION
15 52	SECOND CONDUCTIVE MEMBER
52a	FIRST OUTPUT-SIDE ELECTRIC CONNECTION PORTION
52b	SECOND OUTPUT-SIDE ELECTRIC CONNECTION PORTION
52c	CURRENT OUTPUT PORTION
60	COUNTERPART HOUSING
20 101	INPUT-SIDE CONDUCTIVE MEMBER
102	OUTPUT-SIDE CONDUCTIVE MEMBER
Ep1	FIRST ELECTRIC CONDUCTION PATH
Ep2	SECOND ELECTRIC CONDUCTION PATH

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Claims

1. A fitting connector comprising:

30 a first connector including a first terminal, a second terminal, and a housing that holds the first terminal and the second terminal; and
a second connector including first to fourth counterpart terminals, a first conductive member that is electrically connected to the first counterpart terminal and the second counterpart terminal, a second conductive member that is electrically connected to the third counterpart terminal and the fourth counterpart terminal, and a counter-
35 part housing that holds at least the first to the fourth counterpart terminals, and electrically connecting the first counterpart terminal and the third counterpart terminal to the first terminal and electrically connecting the second counterpart terminal and the fourth counterpart terminal to the second terminal when a fitted state of the housing and the counterpart housing as a result of insertion between the housing and the counterpart housing is in a completely fitted state, wherein
40 the first conductive member has a current input portion electrically connected to an input-side conductive member of a main circuit, and
the second conductive member has a current output portion electrically connected to an output-side conductive member of the main circuit.

45 2. The fitting connector according to claim 1, wherein
the first terminal has an input-side electric connection portion that is physically and electrically connected to a first electric connection portion of the first counterpart terminal and an output-side electric connection portion that is physically and electrically connected to a first electric connection portion of the third counterpart terminal,
the second terminal has an input-side electric connection portion that is physically and electrically connected to a
50 first electric connection portion of the second counterpart terminal and an output-side electric connection portion that is physically and electrically connected to a first electric connection portion of the fourth counterpart terminal,
the first conductive member has a first input-side electric connection portion that is physically and electrically connected to a second electric connection portion of the first counterpart terminal and a second input-side electric connection portion that is physically and electrically connected to a second electric connection portion of the second
55 counterpart terminal, and
the second conductive member has a first output-side electric connection portion that is physically and electrically connected to a second electric connection portion of the third counterpart terminal and a second output-side electric connection portion that is physically and electrically connected to a second electric connection portion of the fourth

counterpart terminal.

3. The fitting connector according to claim 1 or 2, wherein
a first electric conduction path through which a current flows while passing through the first conductive member, the
first counterpart terminal, the first terminal, the third counterpart terminal, and the second conductive member and
a second electric conduction path through which a current flows while passing through the first conductive member,
the second counterpart terminal, the second terminal, the fourth counterpart terminal, and the second conductive
member are provided in parallel between the current input portion and the current output portion, and
the first and the second terminals, the first to the fourth counterpart terminals, and the first and the second conductive
members are formed and arranged such that a resistance value of the first electric conduction path and a resistance
value of the second electric conduction path are the same value.
4. The fitting connector according to claim 3, wherein
when the first terminal and the second terminal are formed into the same shape, the first to the fourth counterpart
terminals are formed into the same shape, and the first conductive member and the second conductive member
are formed into the same shape, the first and the second terminals, the first to the fourth counterpart terminals, and
the first and the second conductive members are arranged such that a path length of the first electric conduction
path and a path length of the second electric conduction path are the same.
5. The fitting connector according to any of claims 1 to 4, wherein
the main circuit is a circuit provided on a vehicle including a rotary machine as a driving source and is a power
supply circuit for supplying electric power of a power supply device to the rotary machine.

FIG.1

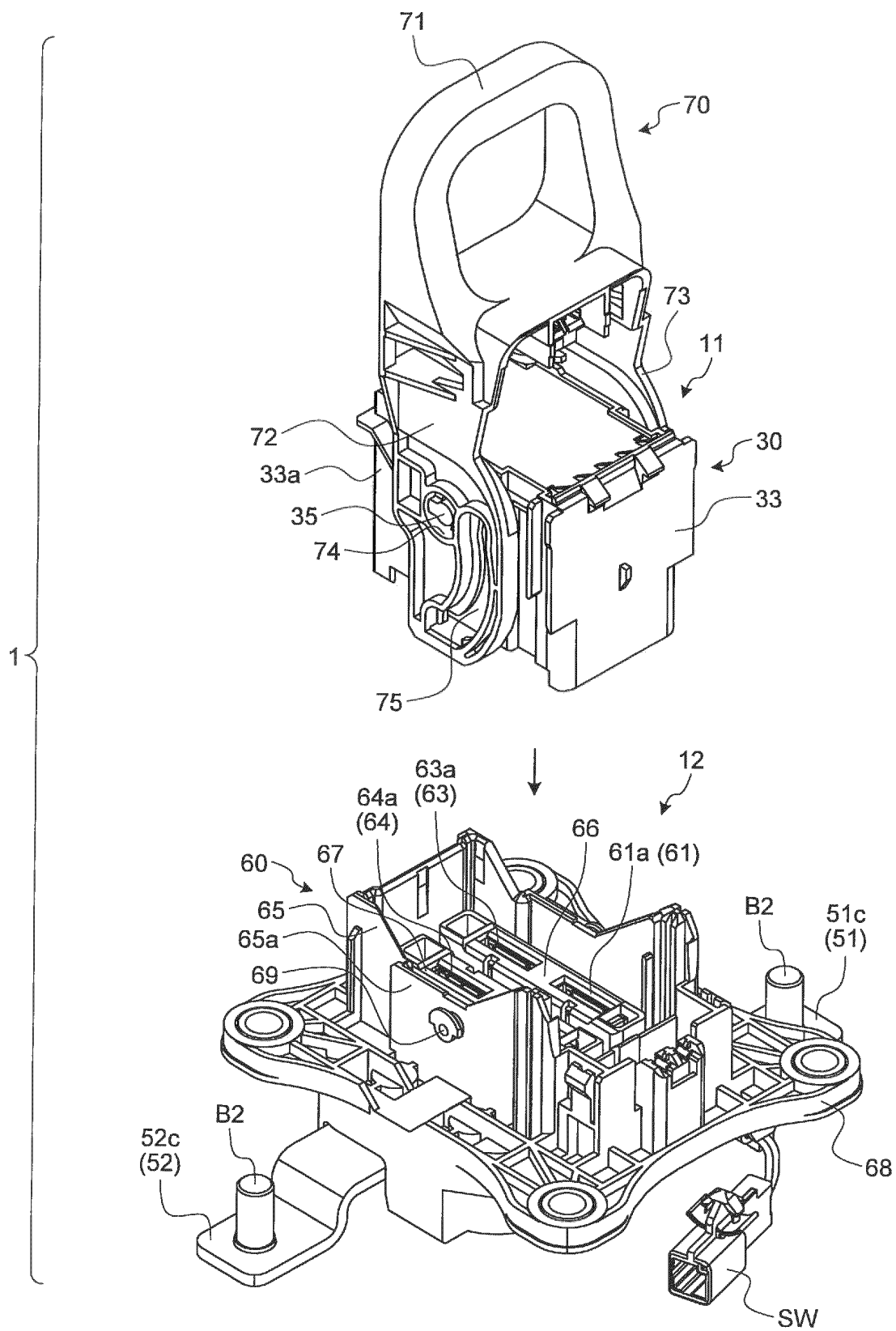


FIG.2

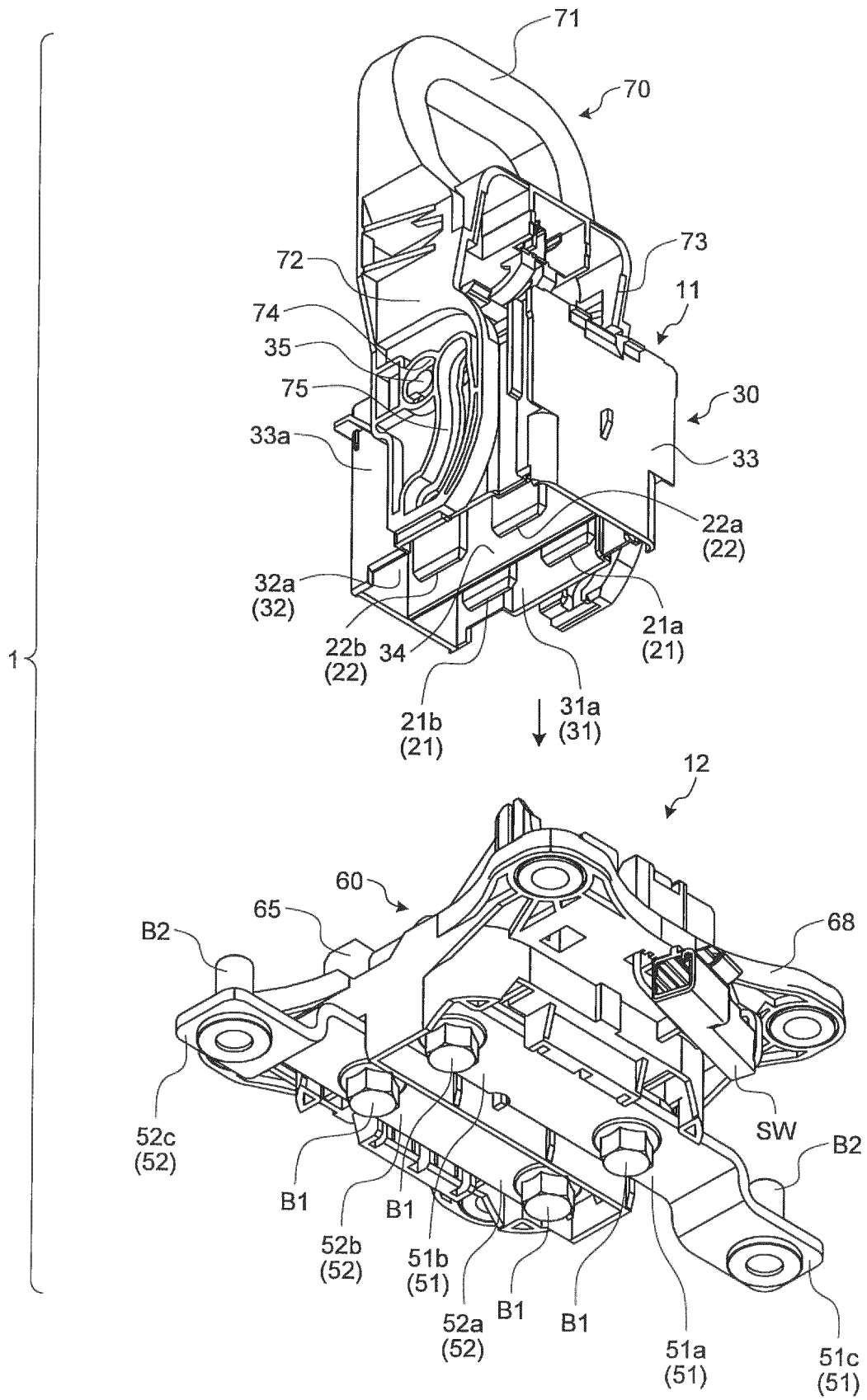


FIG.3

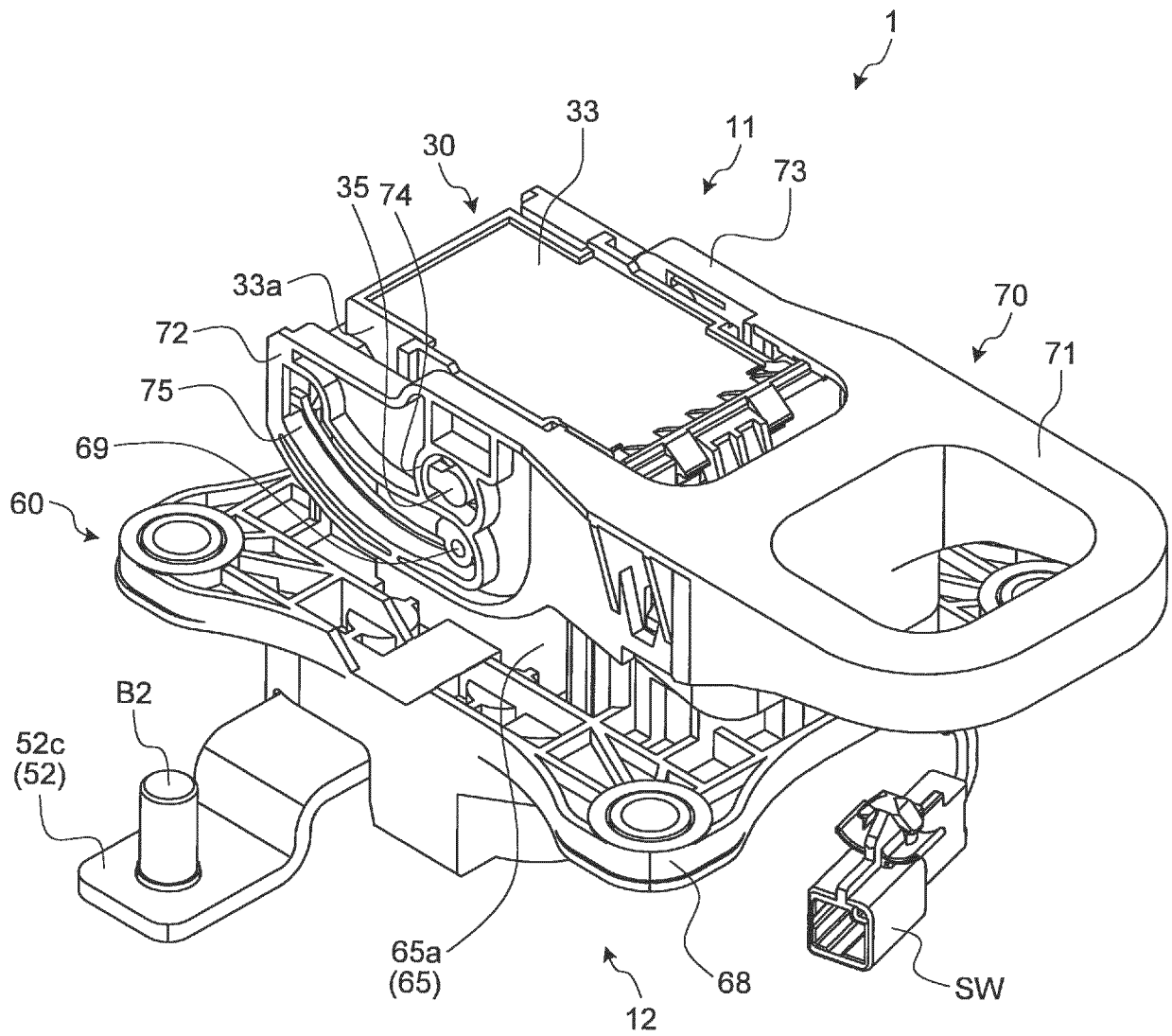
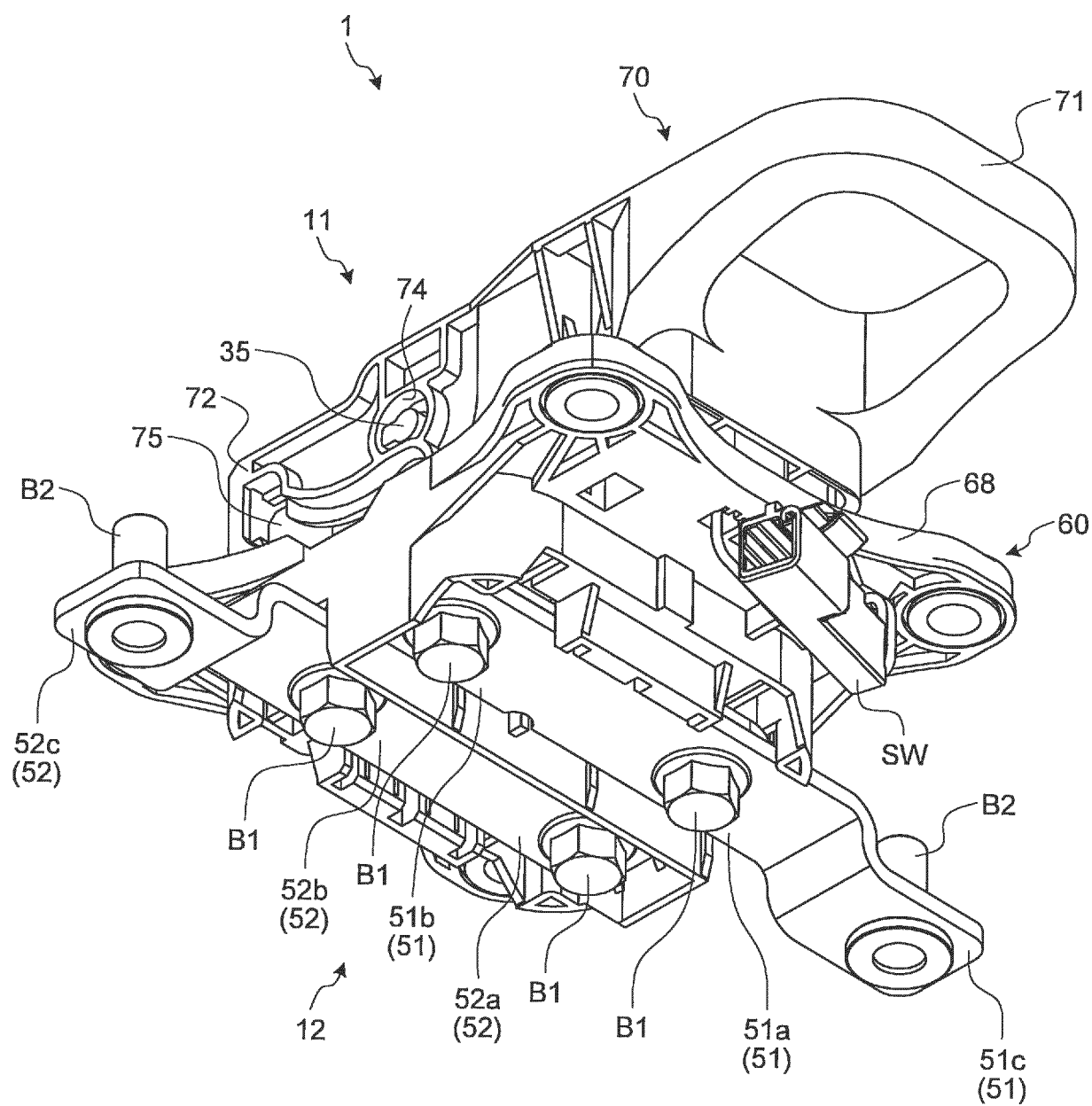


FIG.4



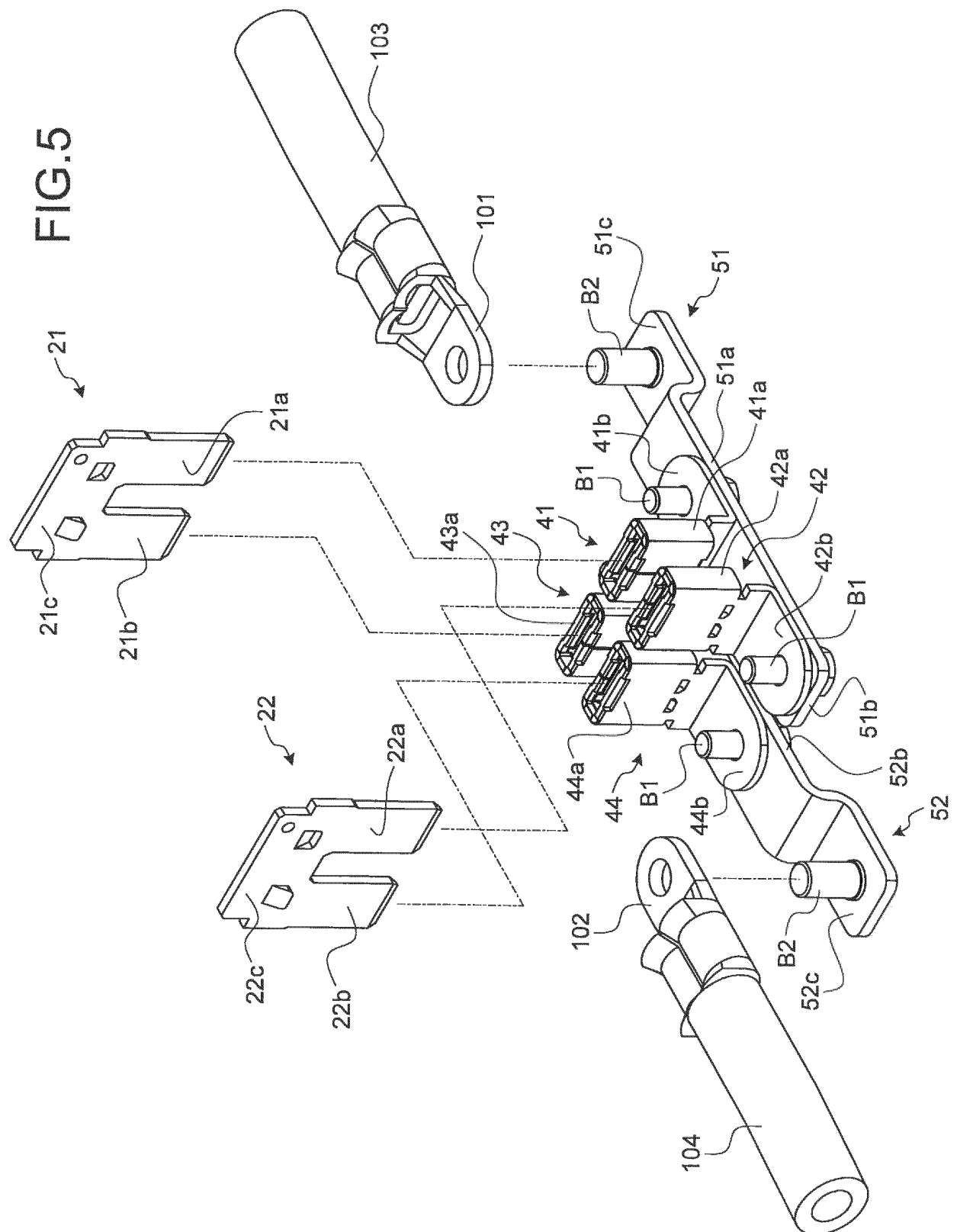


FIG.6

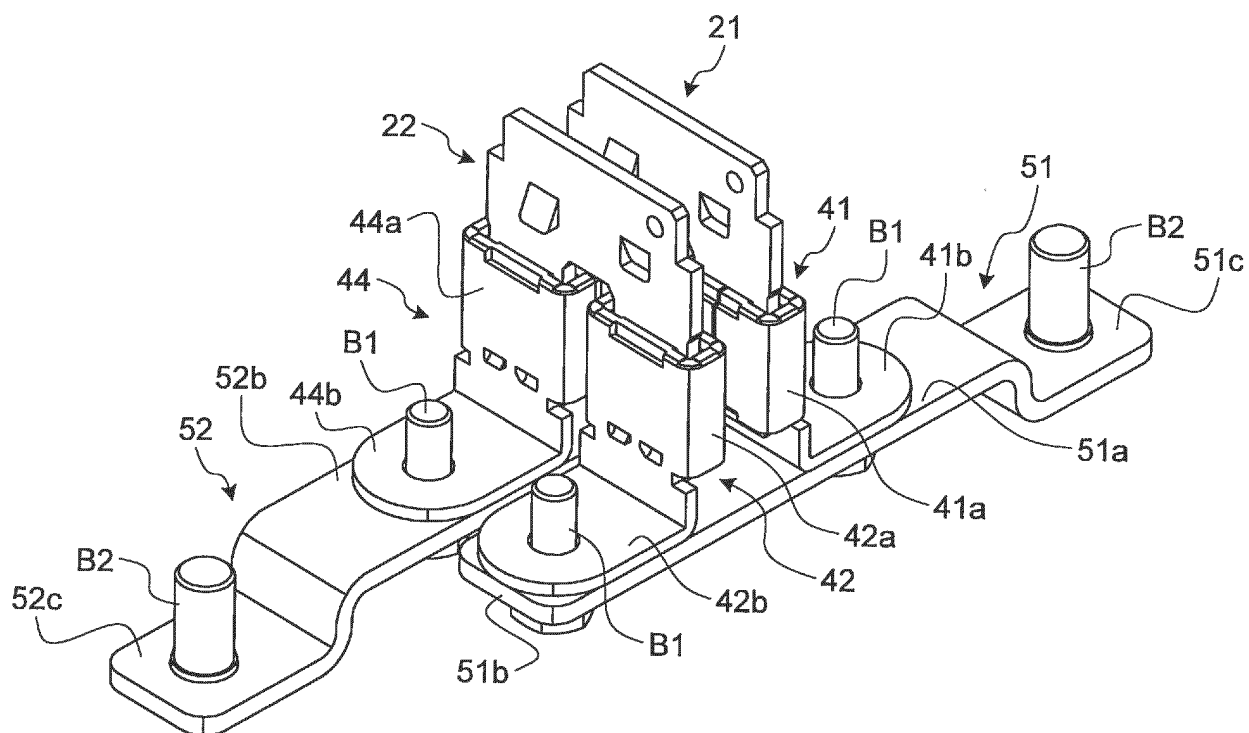


FIG.7

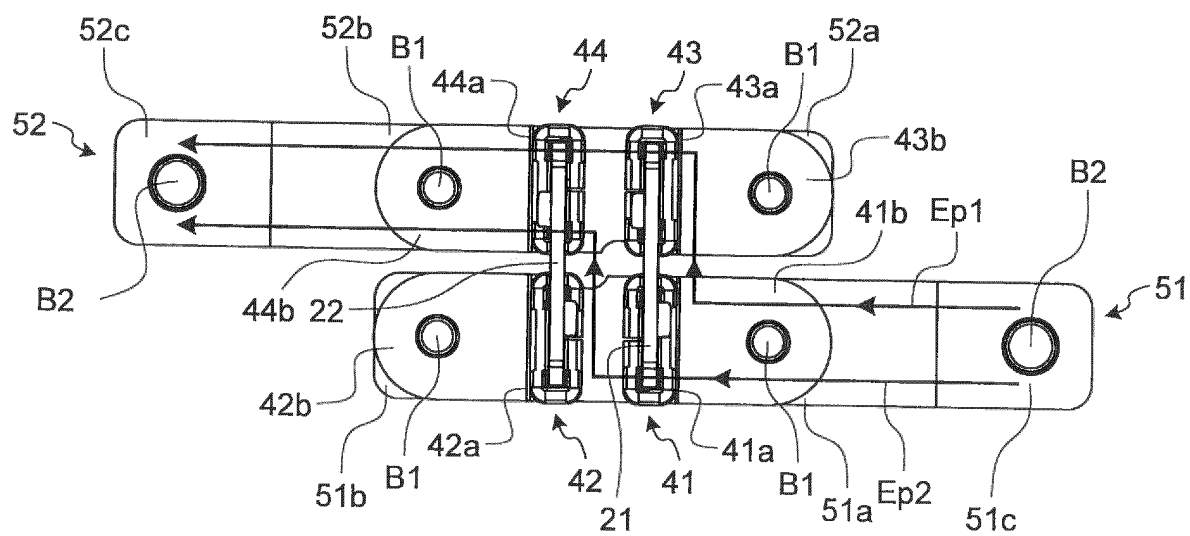


FIG.8

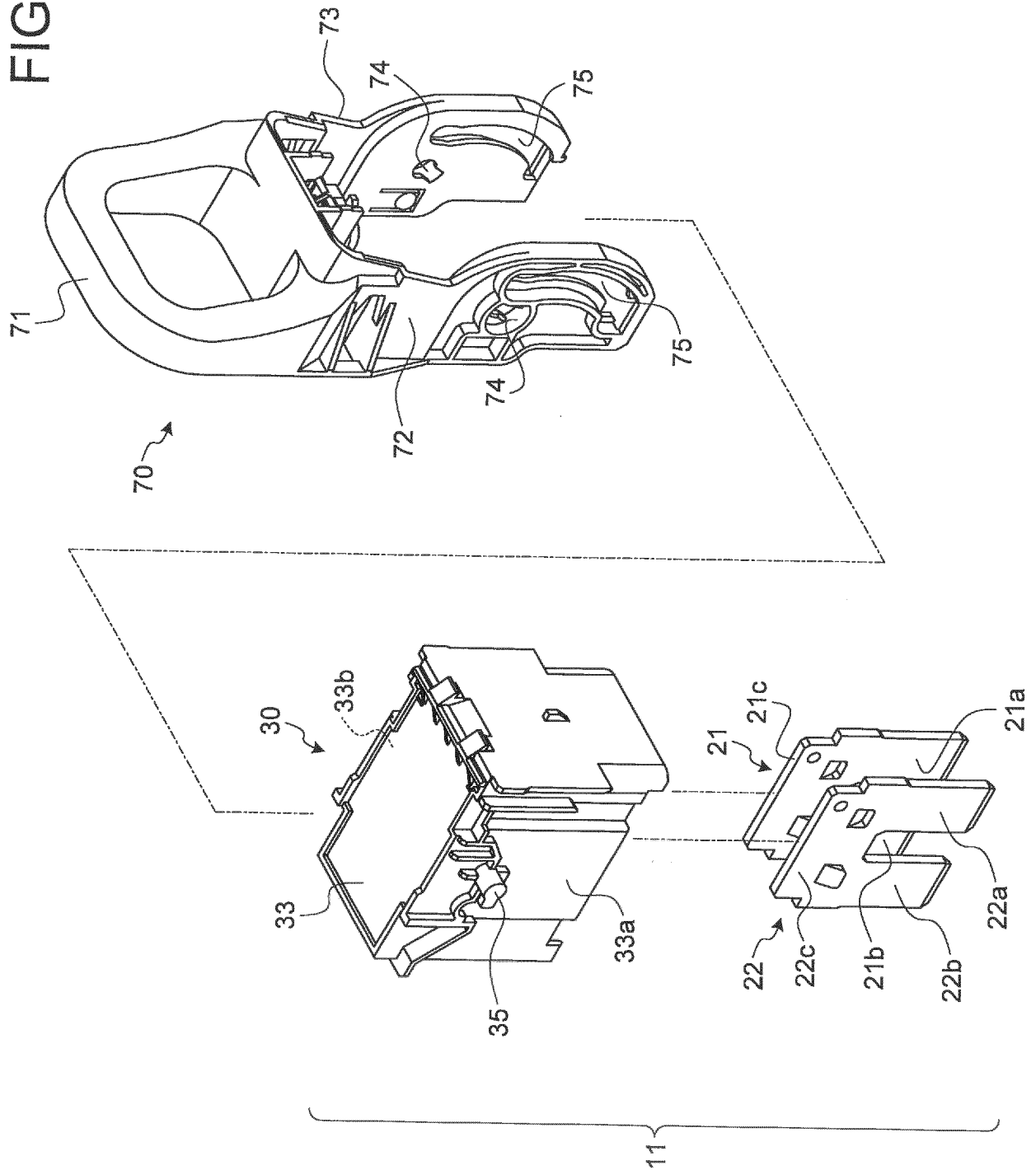


FIG.9

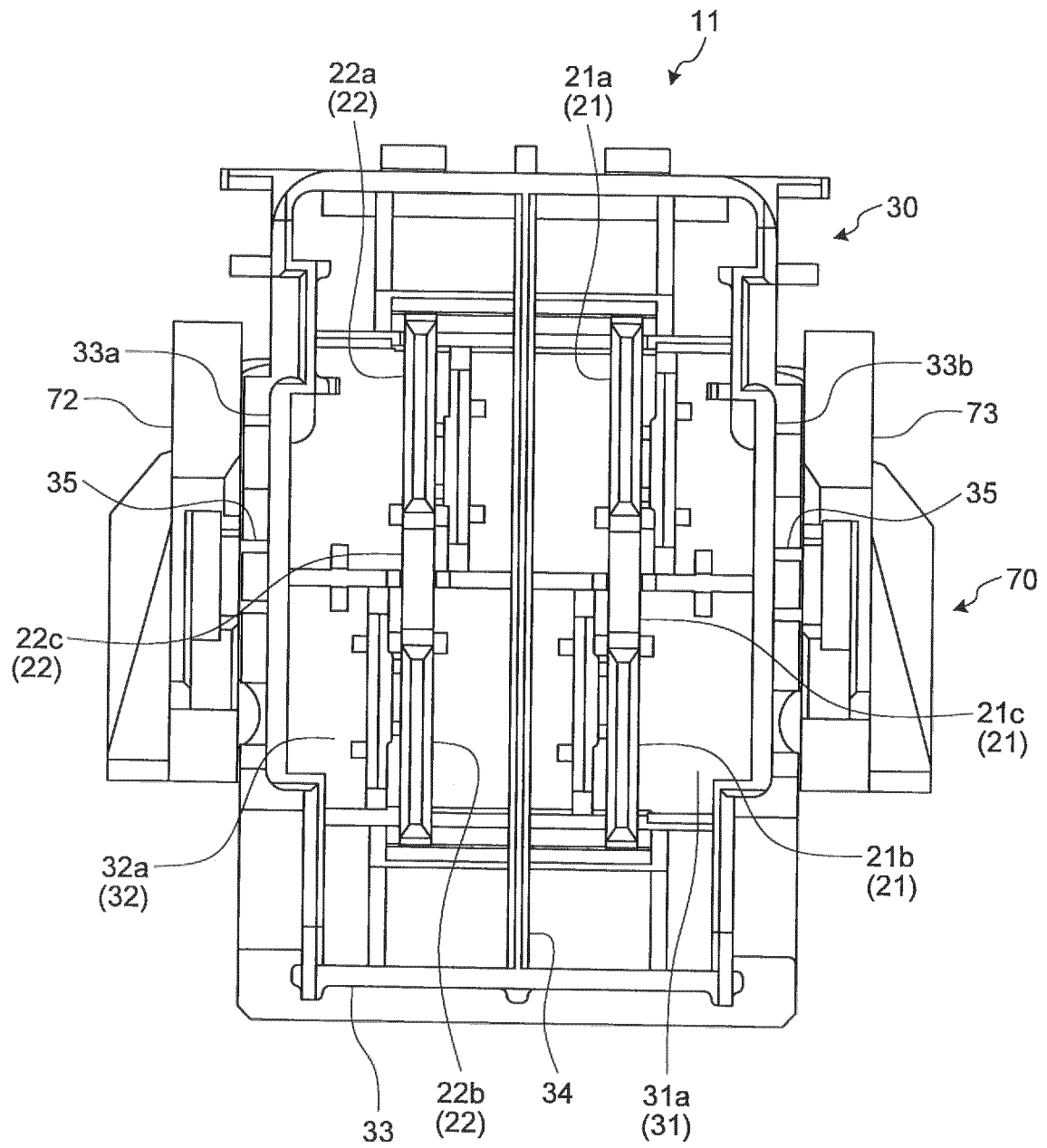


FIG.10

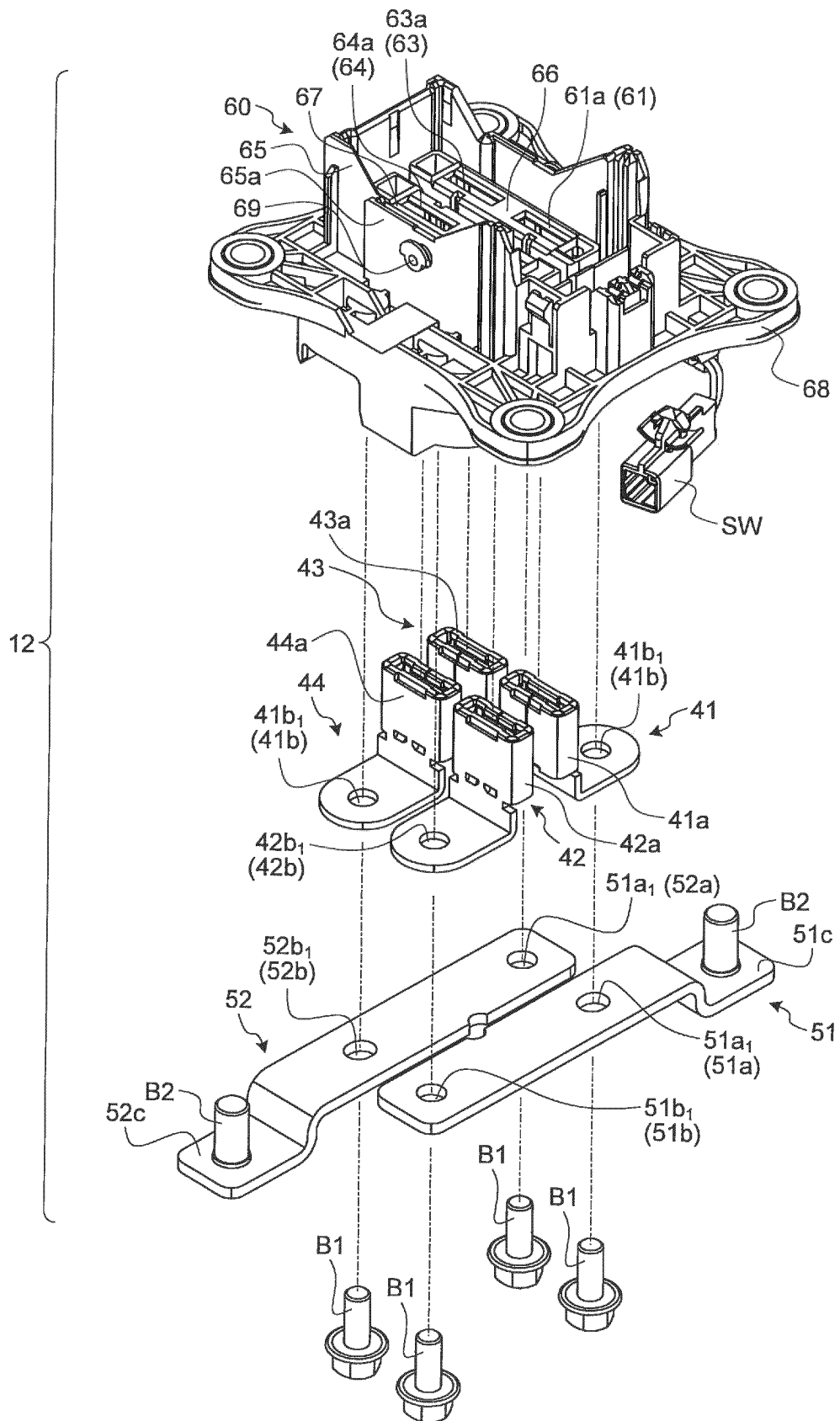


FIG.11

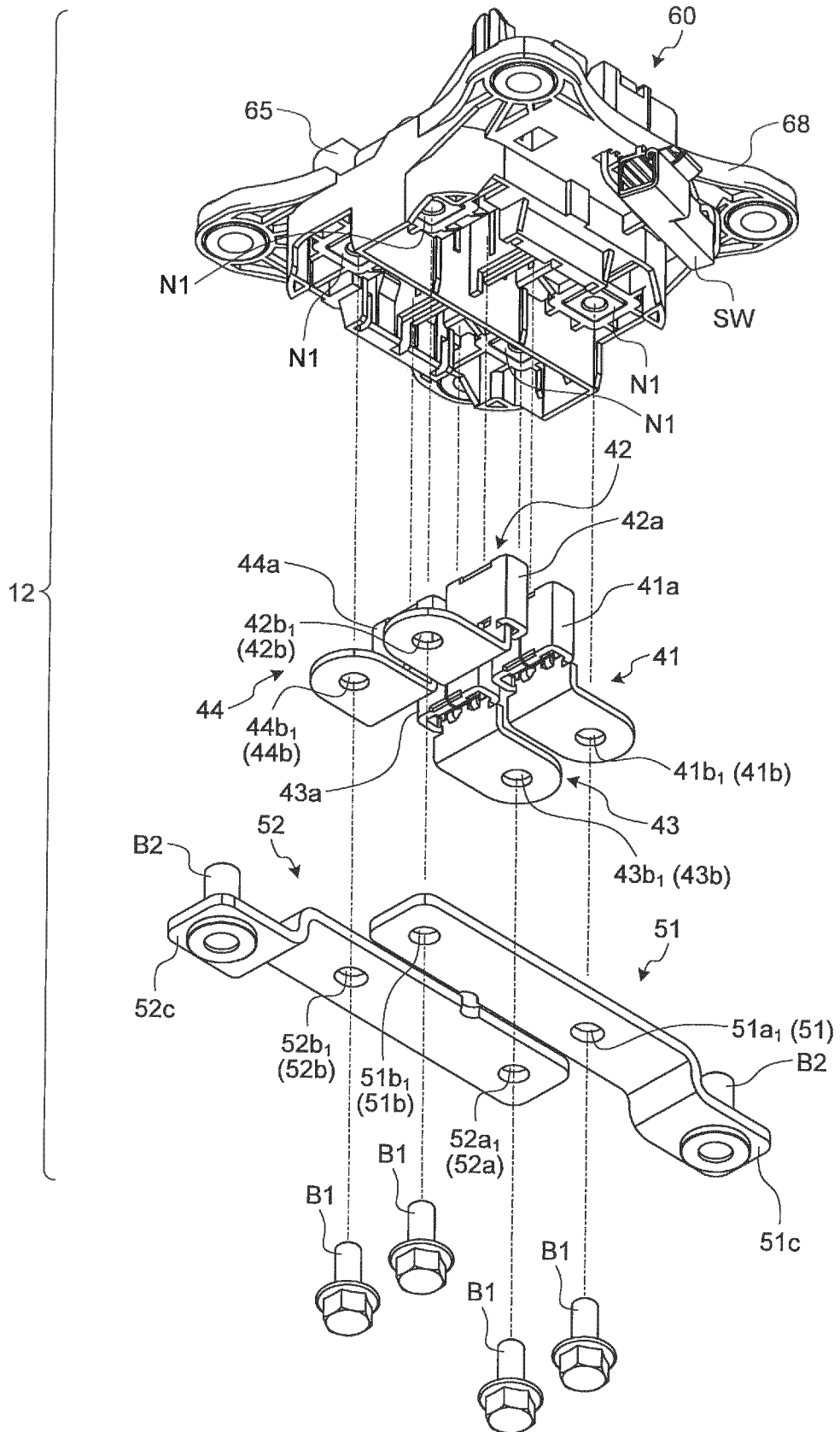


FIG.12

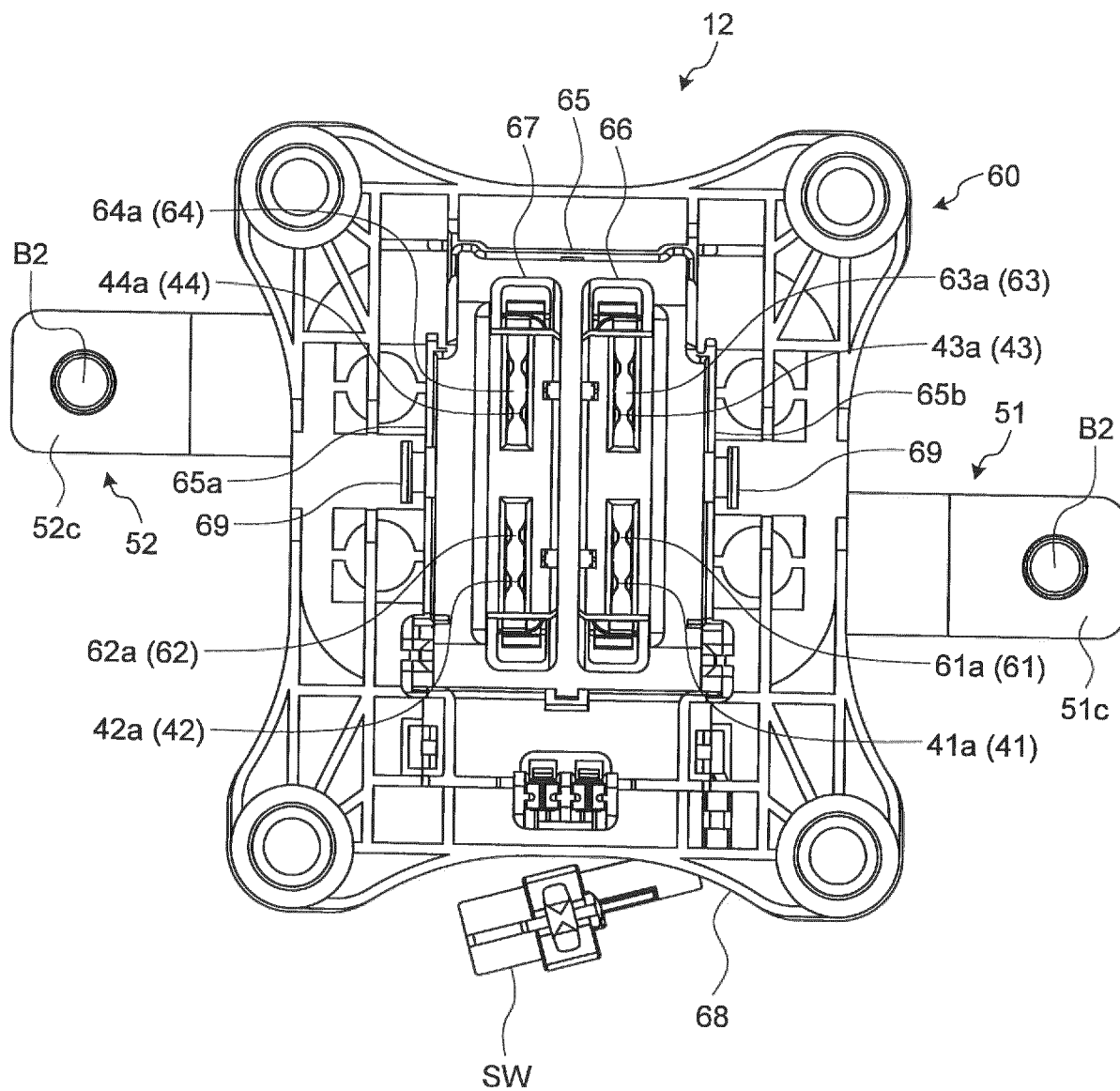


FIG.13

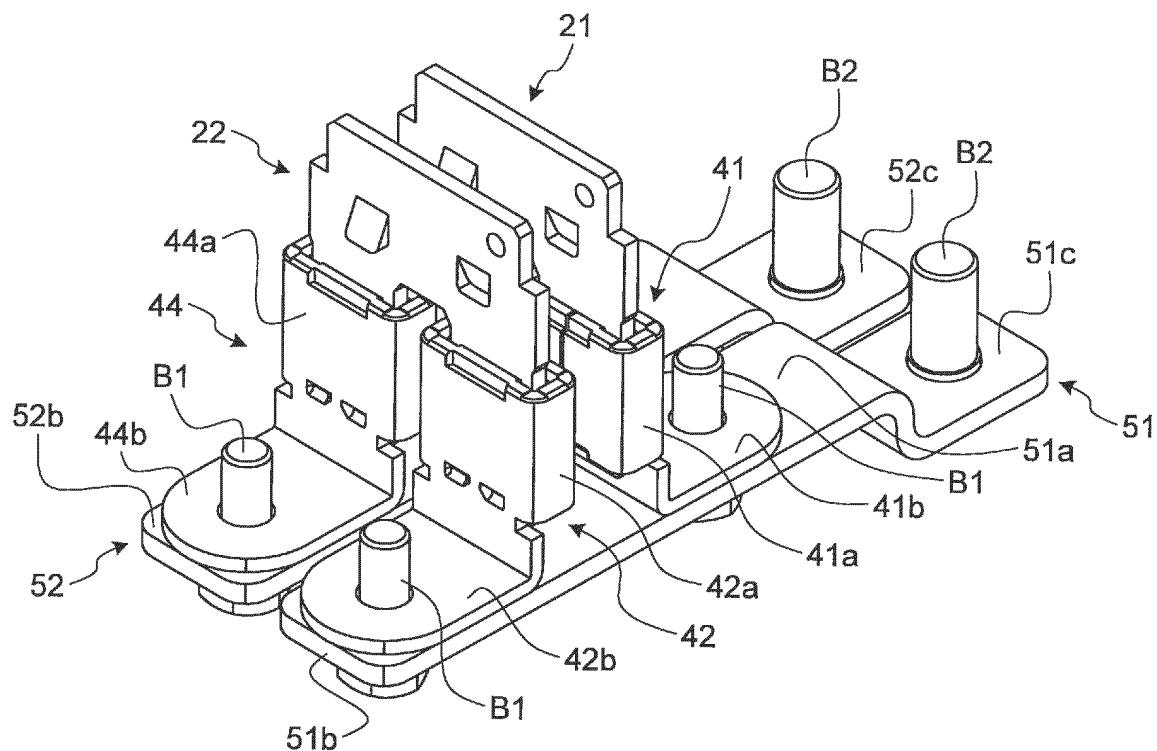
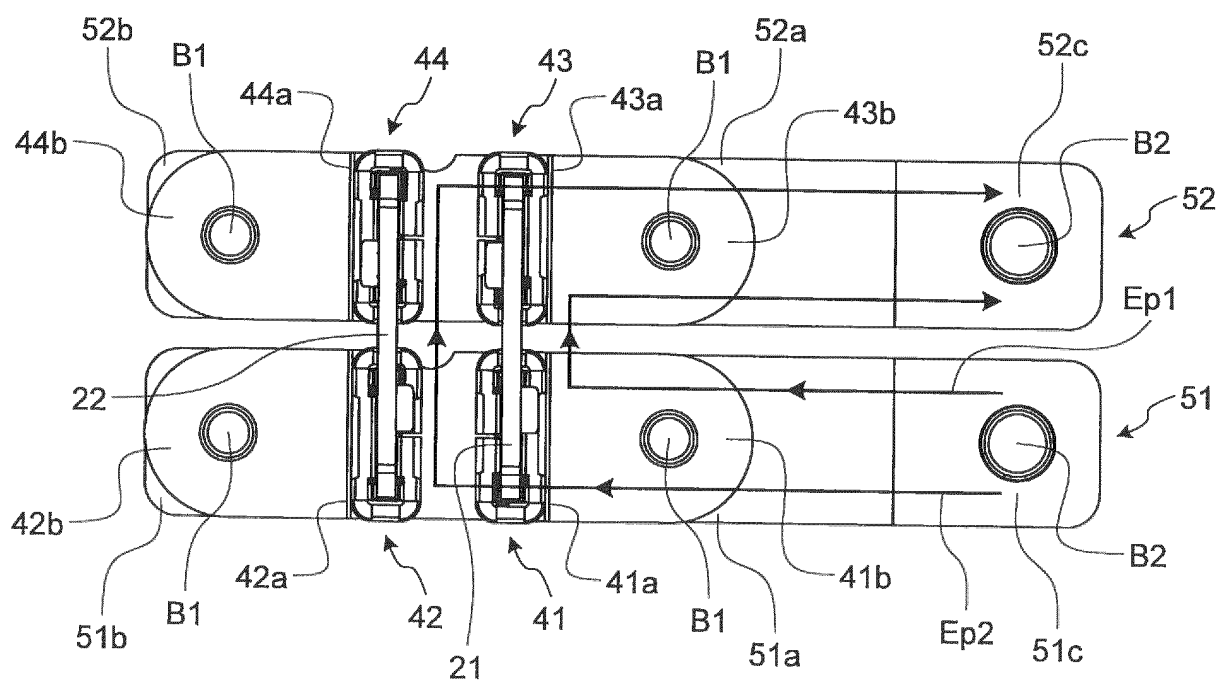


FIG.14



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/007262

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. H01H27/00 (2006.01) i, H01R13/629 (2006.01) i, H01R13/639 (2006.01) i,
H01R13/703 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int.Cl. H01H27/00, H01R13/629, H01R13/639, H01R13/703

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2018

Registered utility model specifications of Japan 1996-2018

Published registered utility model applications of Japan 1994-2018

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2013-58444 A (FURUKAWA ELECTRIC CO., LTD.; FURUKAWA AUTOMOTIVE SYSTEMS INC.) 28 March 2013, paragraphs [0018]-[0045], fig. 1-3 (Family: none)	1-5
A	JP 2013-58443 A (FURUKAWA ELECTRIC CO., LTD.; FURUKAWA AUTOMOTIVE SYSTEMS INC.) 28 March 2013, paragraphs [0017]-[0047], fig. 1-3 (Family: none)	1-5
A	JP 2000-40444 A (TOYO GIKEN KK) 08 February 2000, paragraphs [0009]-[0027], fig. 5, 10 (Family: none)	1-5



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search
08.05.2018

Date of mailing of the international search report
22.05.2018

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/007262

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 201560/1983 (Laid-open No. 111302/1985) (MITSUBISHI ELECTRIC CORPORATION) 27 July 1985, specification, page 4, lines 9-16 (Family: none)	1-5

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2013109944 A [0003]