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(54) **TERMINAL DEVICE AND ELECTRIC OUTLET USING SAME**

(57) A terminal device includes: a terminal part which is shaped like a plate and configured to be electrically connected with a conductor of a wire of which wire insulation is stripped; a terminal screw which is inserted into a hole of the terminal part; and a nut into which the terminal screw fits. The terminal device allows the conductor to be held between the terminal part and the nut. The terminal part is provided with a stopper part for preventing excessive introduction of the wire.

FIG. 1 A

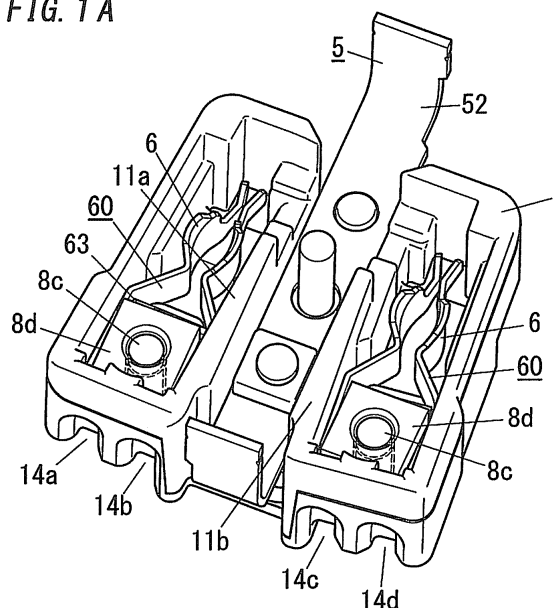
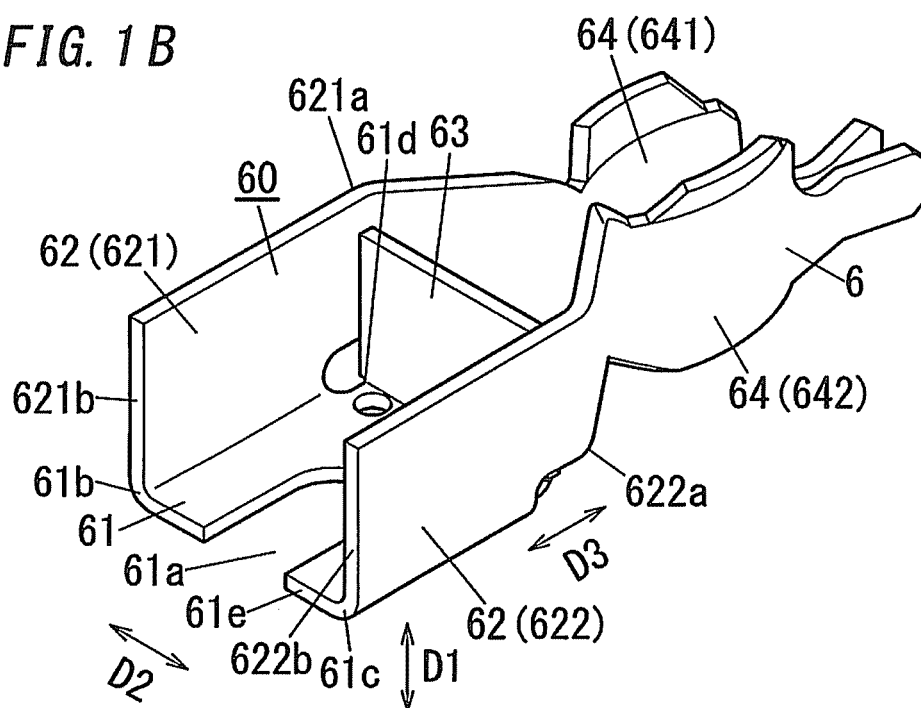


FIG. 1 B



Description

Technical Field

[0001] The invention relates to a terminal device and an outlet with the same.

Background Art

[0002] Conventionally, there is proposed a flush outlet that is placed such that a back part of a body thereof is recessed in a hole (an embedding hole) cut in building part (e.g., a wall) (for example, JP Pub. No. 2003-249298 (hereinafter referred to as "Document 1")).

[0003] As shown in FIG. 11, the flush outlet includes receptacles 50 (receptacle contacts) which are disposed in inner sides of holes (pin insertion holes) which allow pins of a plug to be inserted into. By a fastening member (a terminal screw 58 and a nut 59), each receptacle 50 is electrically and mechanically connected with a wire (a conductor), of which wire insulation is stripped, in an electrical cable for power supply. Specifically, a terminal screw 58 is inserted into a hole in a terminal part 50a of each receptacle and the terminal screw 58 fits into a nut 59, thereby holding a conductor between the terminal part 50a of the receptacle 50 and one end of the fastening member (e.g., the nut 59).

[0004] In a terminal device of the aforementioned flush outlet, there is a possibility that electrical connection failure may occur between a wire (a conductor) and a terminal part 50a. That is, if a wire of which wire insulation is stripped is excessively inserted from an edge side of the terminal part 50a, the wire insulation may be bitten with the terminal part 50a and one end of a fastening member (e.g., a nut 59).

Summary of Invention

[0005] The present invention has been achieved in view of the above circumstances, and an object thereof is to provide a terminal device and an outlet with the same, capable of preventing excessive introduction of a wire.

[0006] A terminal device of the invention includes: a terminal part (61) which is shaped like a plate and configured to be electrically connected with a conductor (96a) of an end, of which wire insulation (96b) is stripped, of a wire (96); a terminal screw (8c) which is inserted into a hole (61a) of the terminal part (61); and a nut (8d) into which the terminal screw (8c) fits. The terminal device allows the conductor (96a) to be held between the terminal part (61) and the nut (8d) or between the terminal part (61) and a head of the terminal screw (8c). The terminal part (61) is provided with a stopper part (63) for preventing excessive introduction of the wire (96).

[0007] In an embodiment, the terminal part (61) is shaped like a rectangular plate. Lateral plates (62, 62) extend upright from two specified edges (61b, 61c), par-

allel with each other, of four edges of the terminal part (61) so as to protrude from a surface of the terminal part (61). The nut (8d) is disposed on a side of the surface of the terminal part (61). The head of the terminal screw (8c) is disposed on a side of another surface of the terminal part (61). The stopper part (63) extends upright from one edge (61d) of the terminal part (61) except for the two specified edges (61b, 61c).

[0008] An outlet of the invention includes the terminal device.

[0009] In the terminal device of the invention, it is possible to prevent excessive introduction of the wire.

[0010] In the outlet of the invention, it is possible to prevent excessive introduction of the wire.

Brief Description of Drawings

[0011] Preferred embodiments of the invention will now be described in further details. Other features and advantages of the present invention will become better understood with regard to the following detailed description and accompanying drawings where:

FIG. 1A is a perspective view of a body of an outlet housing a terminal device in a present embodiment, and FIG. 1B is a perspective view of a part of the terminal device;

FIG. 2 illustrates the terminal device connected with a conductor of a wire;

FIG. 3A is a perspective view of the outlet as viewed from a front side thereof, and FIG. 3B is a perspective view of the outlet as viewed from a back side thereof; FIG. 4 is an exploded perspective view of the outlet; FIGS. 5A, 5B and 5C are a top view, a front view and a bottom view of the outlet, respectively;

FIGS. 6A and 6B are a side view and a back view of the outlet, respectively;

FIG. 7 is a sectional view of the outlet attached to a pattrass;

FIG. 8 is a perspective view of a plug to be connected to the outlet;

FIG. 9A is a perspective view of a body of an outlet housing a terminal device in a comparison example, and FIG. 9B is a perspective view of the terminal device in the comparison example;

FIG. 10 illustrates the terminal device connected with a conductor of a wire in the comparison example; and FIG. 11 is an exploded perspective view of a related art flush outlet.

Description of Embodiments

[0012] A terminal device of the present embodiment is hereinafter explained with reference to FIGS. 1A, 1B and 2.

[0013] The terminal device of the embodiment includes a terminal part 61 and a fastening member (8c, 8d), and is configured to be electrically connected with an insulat-

ed conductor (a wire).

[0014] For example, the terminal part 61 is shaped like a flat (a plate), and configured to be electrically connected with a conductor 96a which is pulled out of an electrical cable for power supply (not shown) having two or more (e.g., three) insulated conductors (wires) and is stripped of wire insulation 96b. The electrical cable includes a wire 96 corresponding to Line (Hot) and a wire 96 corresponding to Neutral. In the embodiment, the electrical cable further includes a wire (a ground wire) corresponding to earth (ground) as an option. The conductor 96a is exposed with wire insulation 96b of an end (a right end in FIG. 2) of the wire 96 stripped. The fastening member includes a first terminal screw 8c, and a first nut 8d into which the first terminal screw 8c fits.

[0015] For example, the terminal part 61 is shaped like a rectangular plate having four edges. Lateral plates 62 extend upright from two specified edges, parallel with each other, of the four edges of the terminal part 61 so as to protrude from a surface (a first surface) of the terminal part 61. Specifically, the lateral plates 62 extend upright from a side of the first surface of the terminal part 61 toward a first side of one direction (a first direction) D1 perpendicular to the first surface. Hereinafter, for simplicity the first side of the first direction D1 is also called a "front side", and a second side of the first direction D1 is also called a "back side".

[0016] The terminal part 61 includes first and second edges 61b, 61c on first and second sides of a second direction D2 perpendicular to the first direction D1, respectively. First and second lateral plates 621, 622 respectively extend upright from the first and second edges 61b, 61c toward the first side of the first direction D1. Hereinafter, for simplicity the first side of the second direction D2 is also called a "left side", and the second side of the second direction D2 is also called a "right side".

[0017] Two spring parts 64, 64 extend from one ends (upper right ends in FIG. 1B) of the two lateral plates 62, 62, respectively. Specifically, the first lateral plate 621 has first and second edges 621a, 621b on first and second sides of a third direction D3 perpendicular to the second direction D2 (and the first direction D1), respectively. A first spring part 641 protrudes from the first edge 621a toward the first side of the third direction D3. Hereinafter, for simplicity the first side of the third direction D3 is also called an "upper side", and the second side of the third direction D3 is also called a "lower side". Similarly, a second lateral plate 622 has first and second edges 622a, 622b on the upper and lower sides, respectively, and a second spring part 642 protrudes from the first edge 622a toward the upper side.

[0018] In the embodiment, two spring parts 64, 64 constitute a receptacle (a receptacle contact) 6 configured to hold one pin 93 of two pins 93, 93 that protrude from a plug body 92 of a plug 91 (see FIG. 8). In the embodiment, the terminal part 61; the two lateral plates 62, 62; and the receptacle 6 formed of the two spring parts 64, 64 are formed integrally as a receptacle spring 60. In the

embodiment, metal material is used for material of the receptacle spring 60.

[0019] The terminal part 61 is formed with a first screw insertion hole 61a which allows a thread of the first terminal screw 8c to be inserted into. In an example of FIG. 1B, the first screw insertion hole 61a is a cut shaped like a U, and formed in an end, on the lower side, of the terminal part 61.

[0020] The aforementioned first nut 8d is disposed on the side of the first surface of the terminal part 61. A tip of the thread of the first terminal screw 8c is inserted into the first screw insertion hole 61a from a side of another surface (a second surface) of the terminal part 61 (a lower side in FIG. 1B) to fit into the first nut 8d. In other words, a head of the first terminal screw 8c is disposed on a side of the second surface of the terminal part 61. In the embodiment, the terminal part 61 constitutes a first screw terminal together with the first terminal screw 8c and the first nut 8d.

[0021] In the terminal device of the embodiment, the conductor 96a of the wire 96 is held between the terminal part 61 and one end of the fastening member (for example, but not limited to, the first nut 8d). Specifically, the conductor 96a is held between one end of the fastening member and part, on either side of the first screw insertion hole 61a (one side of the second direction D2), of the terminal part 61. Therefore, two conductors 96a can be electrically and mechanically connected to the terminal part 61. In an example of FIG. 2, the conductor 96a is held between one end of the fastening member and part, on the left, of the terminal part 61. As one example, the conductor 96a may be held between the terminal part 61 and the head of the first terminal screw 8c (one end of the fastening member). As another example, a washer or the like may be provided between the terminal part 61 and the head of the first terminal screw 8c so as to hold the conductor 96a between the washer and the terminal part 61. That is, the fastening member may further include the washer so as to hold the conductor 96a between the terminal part 61 and the washer (one end side of the fastening member). In the another example, it is possible to improve an electrical connection between the conductor 96a of the wire 96 and the terminal part 61 in comparison with a case where the conductor 96a is held between the terminal part 61 and the head of the first terminal screw 8c.

[0022] A stopper part 63 for preventing excessive introduction of the wire 96 extends upright from one edge of the terminal part 61 except for the two specified edges (an upper right edge in FIG. 1B). Specifically, the terminal part 61 further includes third and fourth edges 61d, 61e on the upper and lower sides, respectively, and the stopper part 63 protrudes from the third edge 61d toward the front side. In the example of FIG. 1B, the stopper part 63 is shaped like a flat rectangle, and formed between both first edges 621a, 622a of the first and second lateral plates 621, 622.

[0023] An outlet with the terminal device of the embod-

iment is hereinafter explained with reference to FIGS. 1 to 7.

[0024] For example, the outlet 20 of the embodiment is attached to a flush box (pattress) 90 recessed in a hole (an embedding hole), not shown, previously cut in building part such as a wall, not shown (see FIG. 7).

[0025] The outlet 20 includes a body 1, a cover 2 and an assembling screw 10. The body is shaped like a case (a rectangular case in the embodiment) having an opening 1a (see FIG. 4) on the first side of the first direction D1 (the front side). The cover covers a front side of the body 1. The assembling screw couples the body 1 and the cover 2.

[0026] The body 1 is made from thermosetting resin. The body 1 is provided with two partition walls 11a, 11b which protrude from an inner bottom of the body 1 and are arranged side by side so as to divide an inside of the body 1 into three regions. That is, first and second partition walls 11a, 11b are arranged on the first and second sides of the second direction D2 (the left and right sides), and three storage chambers 12 are formed inside the body 1. Hereinafter, for convenience of explanation, center, left and right storage chambers 12 are called first, second and third storage chambers 12a, 12b, 12c, respectively.

[0027] That is, the first storage chamber 12a is provided in a region intervened between the two partition walls 11a, 11b. The first storage chamber 12a houses part of a ground member (an earth clip) 5 configured to be in contact with two ground electrodes (protective-earth) 94, 94 of the plug body 92 of the plug 91. In FIG. 8, one ground electrode 94 of the two ground electrodes 94, 94 is illustrated.

[0028] A rib 13 (see FIG. 7) for determining the position of the ground member 5 protrudes from the inner bottom of the first storage chamber 12a.

[0029] A first projection 19 is provided on a back face (a right face in FIG. 7) of a bottom wall of the first storage chamber 12a to protrude backward (toward the back side). For example, the first projection 19 is shaped like a rectangular parallelepiped.

[0030] A first through hole 19a is provided on one end side (a lower end side in FIG. 7) of the first projection 19, and allows a head of a second terminal screw 8a to be inserted into. The second terminal screw is for electrically and mechanically connecting the ground wire of the electrical cable (not shown) to the ground member 5.

[0031] A first concavity 19b for housing the head 10a of the assembling screw 10 is provided on another end side (an upper end side in FIG. 7) of the first projection 19. A first insertion hole 19c into which a thread 10b of the assembling screw 10 is inserted is pierced in the bottom of the first concavity 19b.

[0032] The second storage chamber 12b is provided in a region intervened between one lateral wall (a first lateral wall) 27, on the left side, of the body 1 (see FIG. 4) and the first partition wall 11a. The third storage chamber 12c is provided in a region intervened between an-

other lateral wall (a second lateral wall) 29, on the right side, of the body 1 and the second partition wall 11b. Each of the second and third storage chambers 12b, 12c houses a receptacle spring 60 having a receptacle 6 as described above, configured to hold one pin 93 of the two pins 93, 93 protruding from the plug body 92.

[0033] The second storage chamber 12b has two wire insertion holes 14a, 14b that are formed in one end wall (a lower end wall) 28 thereof on one side of a direction perpendicular to a direction in which the two partition walls 11a, 11b are arranged side by side (the second side of the third direction D3). In the embodiment, the outlet 20 is configured so that, with a first wire 96 of the electrical cable inserted into any one of the two wire insertion holes 14a, 14b, the first wire 96 is electrically connected with a receptacle spring 60 on the inner side of the hole. The first wire 96 corresponds to Neutral. In the embodiment, if one wire of two wires for extended connection (not shown) is inserted into the other of the two wire insertion holes 14a, 14b, it can be electrically connected with the aforementioned receptacle spring 60.

[0034] A second projection 15 protrudes backward (see FIG. 3B) from a center part of a bottom wall of the second storage chamber 12b. The second projection 15 is formed with a first recess (not shown) in which a tip of one pin 93 of the two pins 93, 93 is disposed.

[0035] A second through hole 16 which allows the head of the first terminal screw 8c to be inserted into is formed in the bottom wall of the second storage chamber 12b on a side of the wire insertion holes 14a, 14b (the lower side in FIG. 3B).

[0036] The third storage chamber 12c has two wire insertion holes 14c, 14d that are formed in one end wall (a lower end wall) 30 thereof on the second side of the third direction D3 (see FIG. 4). In the embodiment, the outlet 20 is configured so that, with a second wire 96 of the electrical cable inserted into any one of the two wire insertion holes 14c, 14d, the second wire 96 is electrically connected with a receptacle spring 60 on the inner side of the hole. The second wire 96 corresponds to Line (Hot). In the embodiment, if one wire of two wires for extended connection is inserted into the other of the two wire insertion holes 14c, 14d, it can be electrically connected with the receptacle spring 60 on the inner side of the hole.

[0037] A third projection 17 protrudes backward (see FIG. 3B) from a center part of a bottom wall of the third storage chamber 12c. The projection 17 is formed with a second recess (not shown) in which a tip of another pin 93 of the two pins 93, 93 is disposed.

[0038] A third through hole 18 which allows the head of the first terminal screw 8c to be inserted into is formed in the bottom wall of the third storage chamber 12c on a side of the wire insertion holes 14c, 14d (the lower side in FIG. 3B).

[0039] As shown in FIG. 4, the ground member 5 is shaped like an inverse-Ω. Metal member may be used for material of the ground member 5.

[0040] The ground member 5 includes a base part 51,

two leg parts 52, 52 and contact parts 53, 53. The base part is shaped like a plate. The two leg parts extend upright from both ends of the base part 51. The contact parts are provided at tips of the leg parts 52, 52 and configured to be in contact with ground terminals 94, 94 of the plug 91, individually. In the embodiment, the base part 51 is shaped like a rectangle extending in the third direction D3. The two contact parts 53, 53 are therefore arranged on the upper and lower sides.

[0041] A second insertion hole 51a into which the thread 10b of the assembling screw 10 is inserted is formed in center part of the base part 51. A rib insertion hole 51b is formed in a first end, on the upper side (a right upper end in FIG. 4), of the base part 51 and allows the rib 13 protruding from the inner bottom of the first storage chamber 12a to be inserted into. A second screw insertion hole 51c is formed in a second end, on the lower side (a left lower end in FIG. 4), of the base part 51 and allows a thread of the second terminal screw 8a to be inserted into. A second nut 8b is disposed on a front side of the second end of the base part 51 (the upper surface side in FIG. 4) and allows the second terminal screw 8a to fit into. In the embodiment, the second terminal screw 8a and the second nut 8b constitute a second screw terminal.

[0042] The ground member 5 (especially, both ends thereof) has elasticity, and two contact parts 53, 53 thereof are bent so that tip parts thereof approach each other. Specifically, a distance between the contact parts 53, 53 is set to be smaller than a distance between the two ground terminals 94, 94 of the plug 91. Therefore, when the plug 91 is connected to the outlet 20, the tip parts of the contact parts 53, 53 are biased in a mutually approaching direction by an elastic force of the ground member 5. Each width dimension of the contact parts 53 is set to be smaller than each width dimension of the base part 51 and the leg parts 52.

[0043] The cover 2 is formed of a first cover 3 and a second cover 4. The first cover is made from thermosetting resin, and the second cover is made from thermoplastics resin.

[0044] The first cover 3 has a body 31 shaped like a plate. The body 31 is shaped like an ellipse in planar view. That is, a length of the first cover 3 in the third direction D3 is longer than a length of the first cover 3 in the second direction D2. The body 31 covers the front side of the body 1.

[0045] The body 31 is formed with two pin insertion holes 31a, 31a which allow the two pins 93, 93 of the plug 91 to be inserted into. The two pin insertion holes 31a, 31a are arranged at both sides of the body 31 in the second direction D2, and arranged at center part of the body 31 in the third direction D3.

[0046] Two lead-out cuts 31b are formed at both edges of the body 31 in the third direction D3 so that the two contact parts 53 of the ground member 5 protrude toward the front side of the body 31 (the upper surface side thereof in FIG. 4).

[0047] The body 31 is provided with a fourth projection 32 which protrudes backward from a back face thereof between the two pin insertion holes 31a, 31a (a lower face in FIG. 4). The fourth projection 32 is housed in the first storage chamber 12a of the body 1 so as to be in contact with the base part 51 of the ground member 5 (see FIG. 7).

[0048] A tapped hole 32a into which the assembling screw 10 fits is formed in part of the fourth projection 32, corresponding to the second insertion hole 51a of the ground member 5. A second concavity 32b is formed in part of the fourth projection 32, corresponding to the second screw insertion hole 51c of the ground member 5, and allows the second nut 8b to be housed in. A bottom of the second concavity 32b is provided with a third recess 32c which allows a tip of the thread of the second terminal screw 8a to be disposed in.

[0049] The second cover 4 has a storage part 42 and a plate 41 shaped like a frame. The storage part 42 protrudes backward from a face, on the back side, of the second cover 4 so as to form a concavity which is shaped like a hollow cylinder and has a bottom 42a in which a hole is formed. The first cover 3 is housed in the storage part 42 so that the body 31 closes the hole of the bottom 42a. The plate 41 extends sideways from lateral parts 42b, on an opening side, of the storage part 42. As shown in FIG. 4, a periphery of the plate 41 is shaped like, but not limited to, a rectangle.

[0050] For example, an inside of the storage part 42 is shaped like a cylinder having a bottom in which holes are cut. An opening of the storage part 42 is shaped like, but not limited to, a circle and may be also in a shape corresponding to a planar shape of the plug body 92. In the embodiment, the plug body 92 is shaped like a circle in planar shape.

[0051] The bottom 42a of the storage part 42 (see FIG. 7) is intervened between the body 31 of the first cover 3 and the body 1. The bottom 42a is formed with a window hole 42c which is larger than each pin insertion hole 31a to allow the two pin insertion holes 31a, 31a of the body 31 to be inserted into.

[0052] Two guide grooves 43, 43 are provided in insides of lateral parts 42b of the storage part 42 and configured to guide two ribs 95, 95 of the plug body 92 (see FIG. 8). In FIG. 8, one rib 95 of the two ribs 95, 95 is illustrated.

[0053] Two slits 44, 44 (see FIG. 4) are provided in the lateral parts 42b of the storage part 42 and allow the two contact parts 53, 53 of the ground member 5 to be put in the storage part 42 from a back side of the second cover 4 (a right side in FIG. 7). Each slit 44 is shaped like an L between the bottom 42a and a lateral part 42b of the storage part 42 (see FIG. 3A). Accordingly, in the outlet 20 of the embodiment, the two contact parts 53, 53 can be inserted into the storage part 42 through the two slits 44, 44. Therefore, in the outlet 20 of the embodiment, if the plug body 92 of the plug 91 is plugged in the storage part 42, the two contact parts 53, 53 are allowed to be in

contact with the two ground terminals 94, 94 of the plug body 92.

[0054] Hereinafter, assembling procedures of the outlet 20 of the embodiment are explained.

[0055] In the embodiment, the second terminal screw 8a is inserted into the second screw insertion hole 51c in the base part 51 of the ground member 5 from a back side of the base part 51 (the right side in FIG. 7). The second terminal screw 8a is screwed into the second nut 8b. In the embodiment, the ground member 5 is then housed in the first storage chamber 12a of the body 1 with the rib 13 of the body 1 inserted into the rib insertion hole 51b of the ground member 5 and with the head of the second terminal screw 8a inserted into the first through hole 19a of the body 1.

[0056] In the embodiment, a first terminal screw 8c is inserted into the first screw insertion hole 61a in the terminal part 61 of one receptacle spring 60 (hereinafter called a "first receptacle spring 60") of the two receptacle springs 60, 60 from a back side of the terminal part 61 (a lower side in FIG. 4). The first terminal screw 8c is screwed into a first nut 8d. In the embodiment, the first receptacle spring 60 is then housed in the second storage chamber 12b of the body 1 with the head of the first terminal screw 8c inserted into the second through hole 16 of the body 1.

[0057] In the embodiment, another first terminal screw 8c is inserted into the first screw insertion hole 61a in the terminal part 61 of another receptacle spring 60 (hereinafter called a "second receptacle spring 60") of the two receptacle springs 60, 60 from the back side of the terminal part 61. The first terminal screw 8c is screwed into another first nut 8d. In the embodiment, the second receptacle spring 60 is then housed in the third storage chamber 12c of the body 1 with the head of the first terminal screw 8c inserted into the third through hole 18 of the body 1.

[0058] In the embodiment, the two contact parts 53, 53 of the ground member 5 are inserted into the storage part 42 through the two slits 44, 44 of the second cover 4, and the second cover 4 is disposed at the front side of the body 1.

[0059] In the embodiment, the first cover 3 is housed in the storage part 42 of the second cover 4 so that the two contact parts 53, 53 inserted into the storage part 42 of the second cover 4 are led out from the two lead-out cuts 31b, 31b of the first cover 3. In the embodiment, the fourth projection 32 of the first cover 3 is exposed from the window hole 42c of the second cover 4.

[0060] In the embodiment, the assembling screw 10 is inserted into the first insertion hole 19c of the body 1 and the second insertion hole 51a of the ground member 5 from the back side of the body 1, and then screwed into the tapped hole 32a of the fourth projection 32 of the first cover 3. In the outlet 20 of the embodiment, the bottom 42a of the storage part 42 of the second cover 4 is intervened between the body 31 of the first cover 3 and the body 1. Thus, the outlet 20 can be assembled.

[0061] The plate 41 is provided with two or more (two in the embodiment) metal fittings 80 for attaching the outlet 20 to the flush box 90 (see FIG. 4). Specifically, the plate 41 is formed with two or more (two in the embodiment) first mounting screw insertion holes 41b each of which allows a mounting screw 9a for attaching a metal fitting 80 to the plate 41 to be inserted into.

[0062] The metal fitting 80 has a base part 81 shaped like a plate, two leg parts 82, 82 extending upright from both ends of the base part 81, and nails 83 formed at tips of the leg parts 82.

[0063] A second mounting screw insertion hole 81a is formed in center part of each base part 81, and allows a mounting screw 9a to be inserted into. Two or more (two in the embodiment) fourth storage chambers 45 are provided in outsides of lateral parts 42b of the storage part 42 in the second cover 4 and configured to house the base parts 81 of the metal fittings 80. A third nut 9b into which a mounting screw 9a fits is disposed at a back side of each base part 81 (a lower face side in FIG. 4).

[0064] Hereinafter, procedures for attaching the outlet 20 of the embodiment to the flush box 90 are explained. In the explanation of the embodiment, the flush box 90 is shaped like a rectangular box having an opening on a front face thereof for example. Also, in the explanation of the embodiment, the flush box 90 is made from, for example, synthetic resin (e.g., thermosetting resin or the like).

[0065] In the embodiment, each mounting screw 9a is inserted into a first mounting screw insertion hole 41a and a second mounting screw insertion hole 81a of a metal fitting 80 from a front side of the second cover 4 (an upper side in FIG. 4), and temporarily screwed into a third nut 9b.

[0066] In the embodiment, the outlet 20 is put in the flush box 90 with each metal fitting 80 temporarily fixed to the second cover 4.

[0067] In the embodiment, the outlet 20 can be attached to the flush box 90 as a result of biting of the nails 83 of the metal fittings 80 into an inner face of the flush box 90 by tightening the mounting screws 9a into the third nuts 9b.

[0068] FIGS. 9 and 10 show configuration of a terminal device as a comparison example. FIGS. 9 and 10 show part of an outlet with the terminal device as the comparison example. Like elements are assigned the same reference numerals as depicted in the outlet 20 of the embodiment, and explanation thereof is appropriately omitted.

[0069] Like the terminal device of the embodiment, the terminal device of the comparison example includes terminal parts 23 and first terminal screws 8c. Each terminal part is shaped like a plate and configured to be electrically connected with a conductor 96a of an end, of which wire insulation 96b is stripped, of a wire 96. The terminal device of the comparison example also includes washers 25 for holding the conductors 96a between the terminal parts 23 and the washers.

[0070] For example, each terminal part 23 is shaped like a rectangular plate. In an example of FIG. 9B, lateral plates 24 extend upright from two specified edges, parallel with each other, of four edges of each terminal part 23 so as to protrude from one surface (an upper face side in FIG. 9B) of each terminal part 23.

[0071] Two spring parts 26, 26 are respectively extended from one ends of the two end edges 24, 24 (the upper right end in FIG. 9B). In the terminal device of the comparison example, two spring parts 26, 26 constitute a receptacle 22 configured to hold one pin 93 of two pins 93, 93 protruding from the plug body 92. In the terminal device of the comparison example, a terminal part 23, two lateral plates 24, 24, and a receptacle 22 formed of two spring parts 26, 26 integrally constitute one receptacle spring 21. In the terminal device of the comparison example, metal material is used for material of each receptacle spring 21.

[0072] Each terminal part 23 is formed with a third insertion hole 23a which allows a thread of a first terminal screw 8c to be inserted into. Each of the washers 25 is disposed on a side of one surface (a first surface) of a terminal part 23. In the embodiment, the first terminal screws 8c are inserted into the third insertion holes 23a via the washers 25 from sides of the first surfaces of the terminal parts 23. In the embodiment, the first terminal screws 8c inserted into the third insertion holes 23a are screwed into tapped holes (not shown) in bottom walls of a second storage chamber 12b and a third storage chamber 12c.

[0073] The terminal device of the comparison example has structure without the stopper parts 63 in the terminal device of the embodiment. In the terminal device of the comparison example, as shown in FIG. 10, if the wire 96 is excessively inserted, electrical connection failure may occur between the conductor 96a of the wire 96 and the terminal part 23 with the wire insulation 96b of the wire 96 bitten with the terminal part 23 and the washer 25.

[0074] On the other hand, in the terminal device of the embodiment, since each terminal part 61 is provided with a stopper part 63 for preventing a wire 96 from being excessively inserted, it is possible to prevent the wire 96 from being excessively inserted.

[0075] In the terminal device of the embodiment, since it is possible to prevent excessive introduction of the wire 96, it is possible to prevent the wire insulations 96b of the wires 96 from being bitten with the terminal parts 61 and the first nuts 8d. Thus, in the terminal device of the embodiment, it is possible to prevent electrical connection failure from occurring between a conductor 96a of a wire 96 and a terminal part 61.

[0076] In the terminal device of the embodiment, since it is possible to prevent excessive introduction of a wire 96, it is possible to prevent a wire 96 from being inserted into a receptacle 6 of a receptacle spring 60. Accordingly, in the terminal device of the embodiment, electrical connection failure can be prevented from occurring between each pin 93 of the plug 91 and each receptacle 6.

[0077] The terminal device of the embodiment is used for the outlet 20, but is not limited to this. For example, it may be used for a switch.

[0078] As described above, the terminal device of the embodiment includes: a terminal part 61 which is shaped like a plate and configured to be electrically connected with a conductor 96a of an end, of which wire insulation 96b is stripped, of a wire 96; a terminal screw (a first terminal screw) 8c which is inserted into a hole (a first screw insertion hole) 61a of the terminal part 61; and a nut (a first nut) 8d into which the terminal screw 8c fits. The terminal device of the embodiment allows the conductor 96a to be held between the terminal part 61 and the nut 8d. The terminal part 61 is provided with a stopper part 63 for preventing excessive introduction of the wire 96. It is therefore possible to prevent excessive introduction of the wire 96.

[0079] The outlet of the embodiment includes the terminal device of the embodiment, and can accordingly prevent excessive introduction of the wire 96.

[0080] Although the present invention has been described with reference to certain preferred embodiments, numerous modifications and variations can be made by those skilled in the art without departing from the true spirit and scope of this invention, namely claims.

[0081] For example, in the embodiment, the plug 91 includes, as first and second male connectors, two pins 93, 93 corresponding to Line (Hot) and Neutral such as CEE7/4 plug, but a plug which can be applied to the outlet of the present invention is not limited to this. That is, the plug which can be applied to the outlet of the present invention is not limited to two round pins such as BS4573 plug, CEE7/4 plug, CEE7/5 plug, CEE7/17 plug, 107-20-D1 plug, CEI23-16/VII plug, SEV1011 plug, IEC60906-1 plug, TIS166-2549 plug and the like. For example, the plug which can be applied to the outlet of the present invention may include as first and second male connectors: two blades each of thickness direction is in parallel with the second direction D2, such as JIS C 8303 plug, NEMA1-15 plug, NEMA5-15 plug or the like; two blades each of which has a thickness direction in parallel with the third direction D3 such as BS1363 or the like; or two blades shaped like a V or an inverted V such as CPCS-CCC plug, AS/NZS3112 plug or the like.

[0082] In the embodiment, the plug 91 further includes the ground terminal 94 as a ground connector (option), but the plug which can be applied to the outlet of the present invention is not limited to this. For example, the plug which can be applied to the outlet of the present invention may include as the ground connector: a ground pin which has a U-shaped section or is shaped like a hollow cylinder; a ground blade such as AS/NZS3112 plug, BS1363 plug or the like; a half round ground pin such as 107-2-D1 plug; or a round ground pin such as CEI23-16/VII plug, SEV1011 plug, NEMA5-15 plug, TIS166-2549 plug or the like.

[0083] Thus, the outlet of the invention may be an outlet configured to be connected with any of the various plugs.

In short, the outlet of the invention is provided with a following terminal device. That is, the terminal device includes a terminal part (61) configured to be in direct contact with a conductor (96a) of a wire (96), and the terminal part (61) is provided with a stopper part 63 which extends upright from one edge (61d) of the terminal part (61) so as to be in contact with or in the proximity of a tip of the conductor (96a) when the conductor (96a) is in direct contact with the terminal part (61).

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Claims

1. A terminal device, comprising:

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a terminal part which is shaped like a plate and configured to be electrically connected with a conductor of an end, of which wire insulation is stripped, of a wire;

a terminal screw which is inserted into a hole of the terminal part; and

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a nut into which the terminal screw fits, wherein the terminal device allows the conductor to be held between the terminal part and the nut or between the terminal part and a head of the terminal screw, and

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the terminal part is provided with a stopper part for preventing excessive introduction of the wire.

2. The terminal device of claim 1, wherein

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the terminal part is shaped like a rectangular plate, lateral plates extend upright from two specified edges, parallel with each other, of four edges of the terminal part so as to protrude from a surface of the terminal part,

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the nut is disposed on a side of the surface of the terminal part,

the head of the terminal screw is disposed on a side of another surface of the terminal part, and

the stopper part extends upright from one edge of the terminal part except for the two specified edges.

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3. An outlet, comprising a terminal device of claim 1 or 2.

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FIG. 1 A

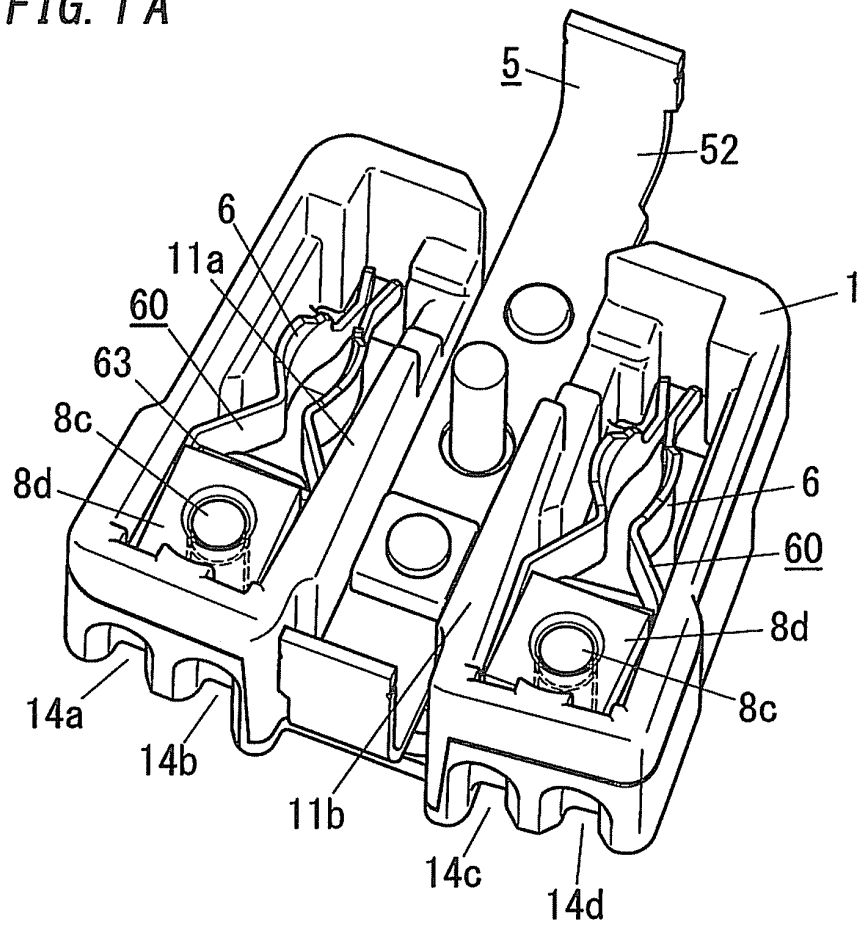


FIG. 1 B

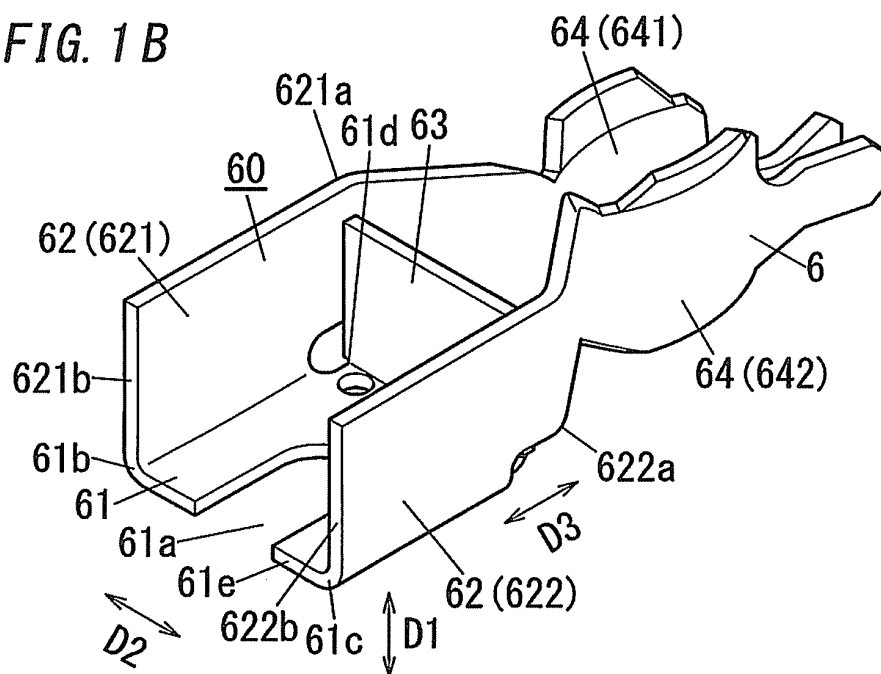


FIG. 2

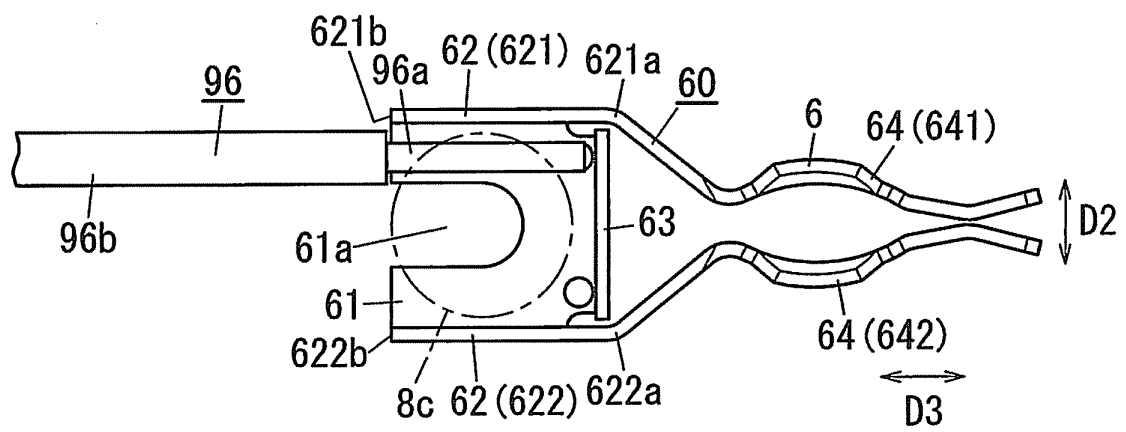


FIG. 3A

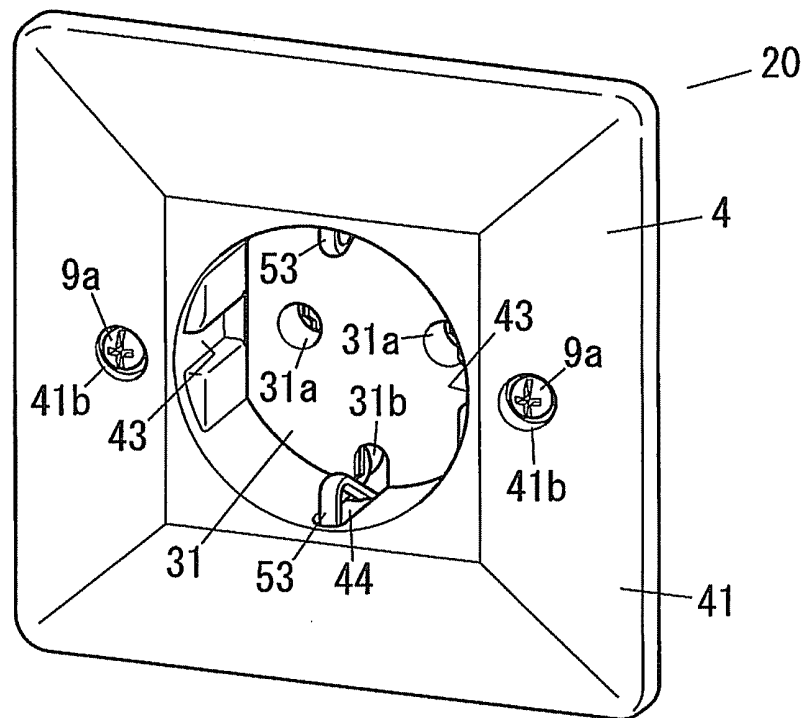


FIG. 3B

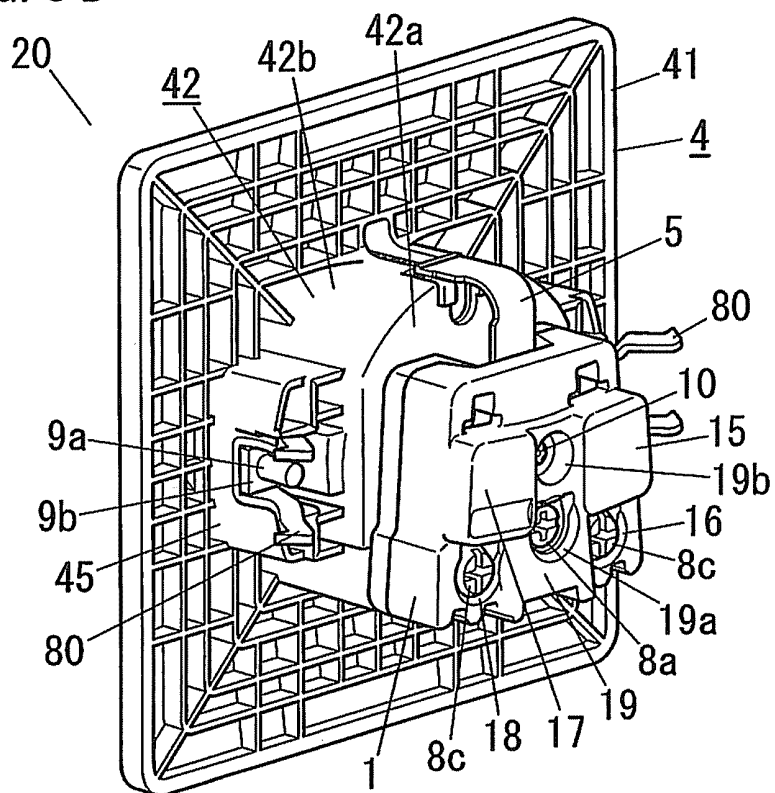


FIG. 4

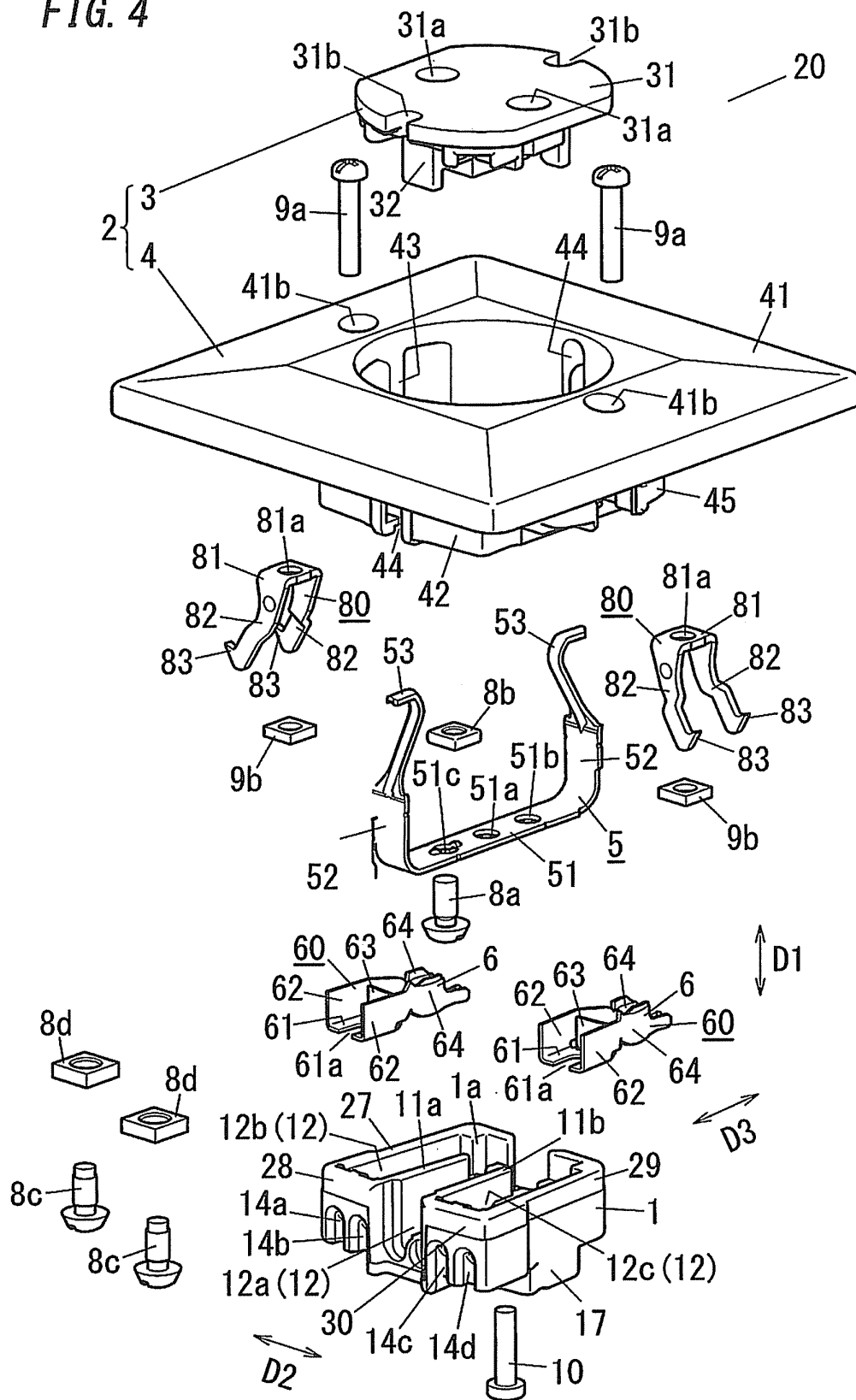


FIG. 5A

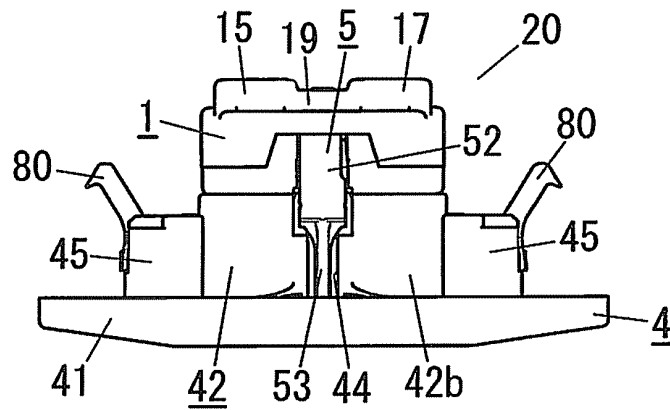


FIG. 5B

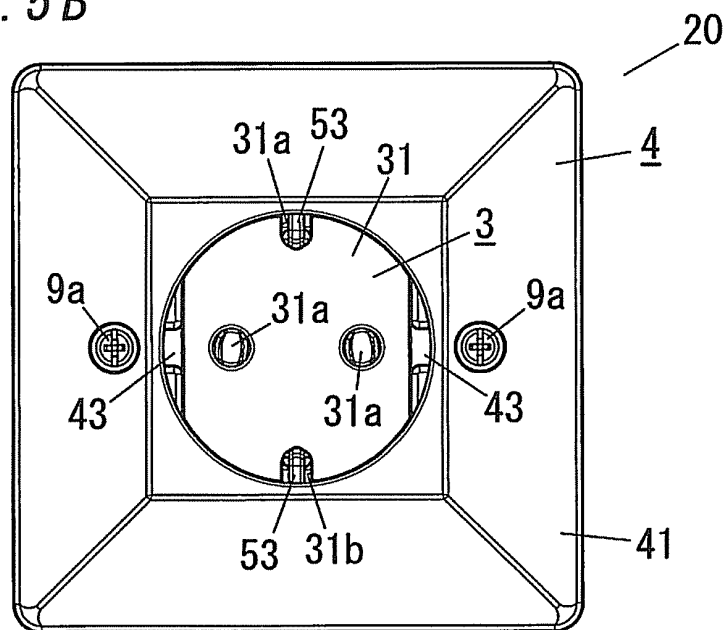


FIG. 5C

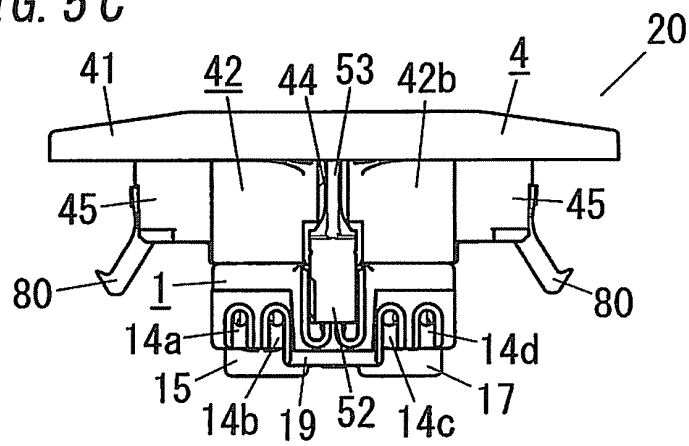


FIG. 6A

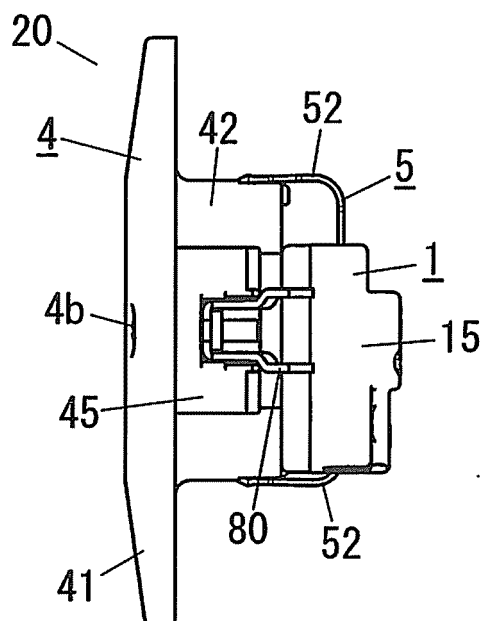


FIG. 6B

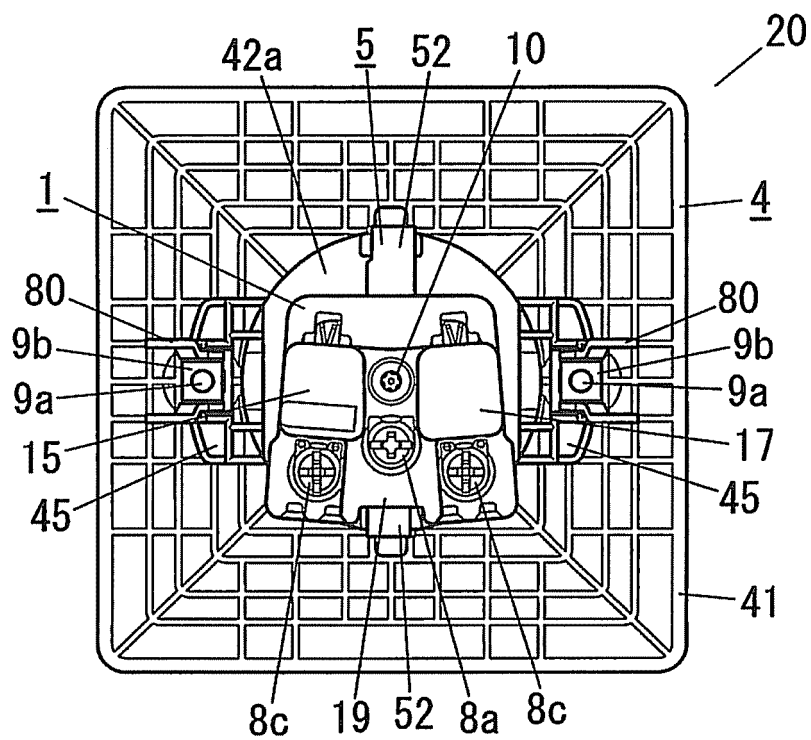


FIG. 7

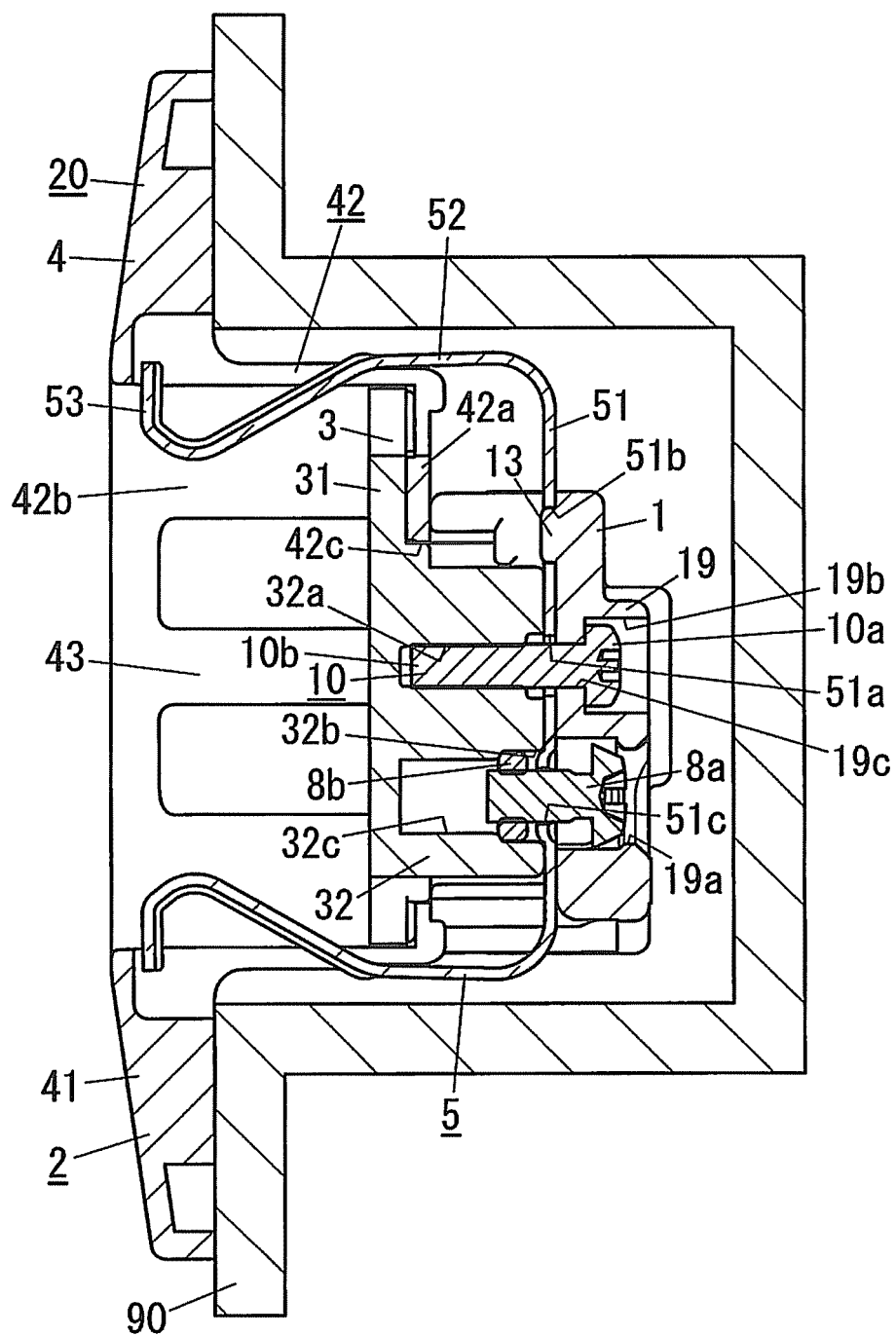


FIG. 8

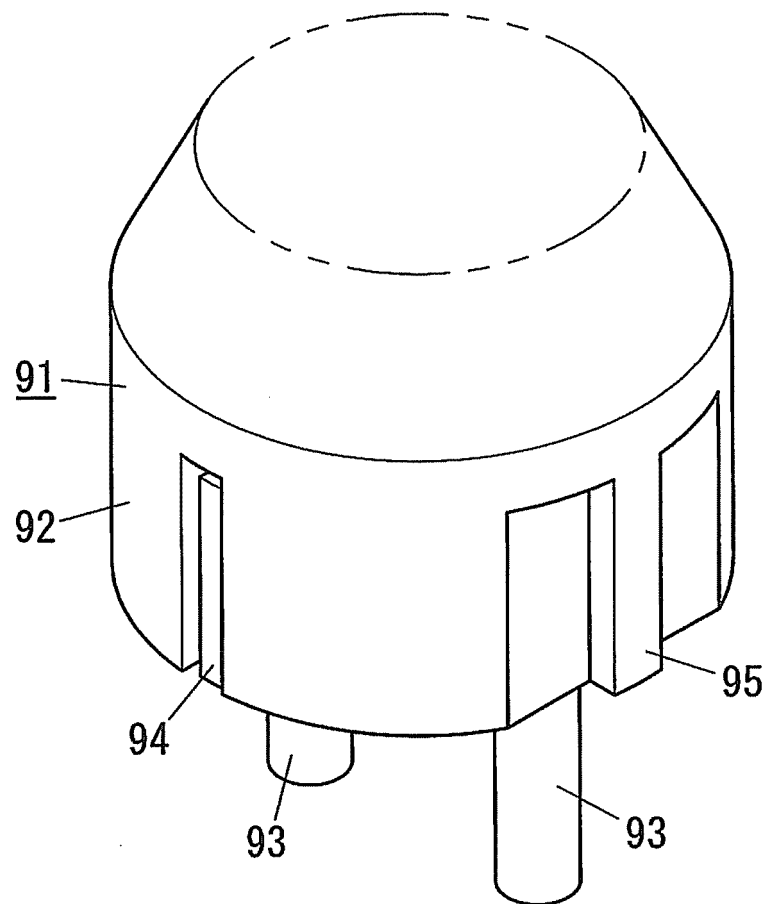


FIG. 9A

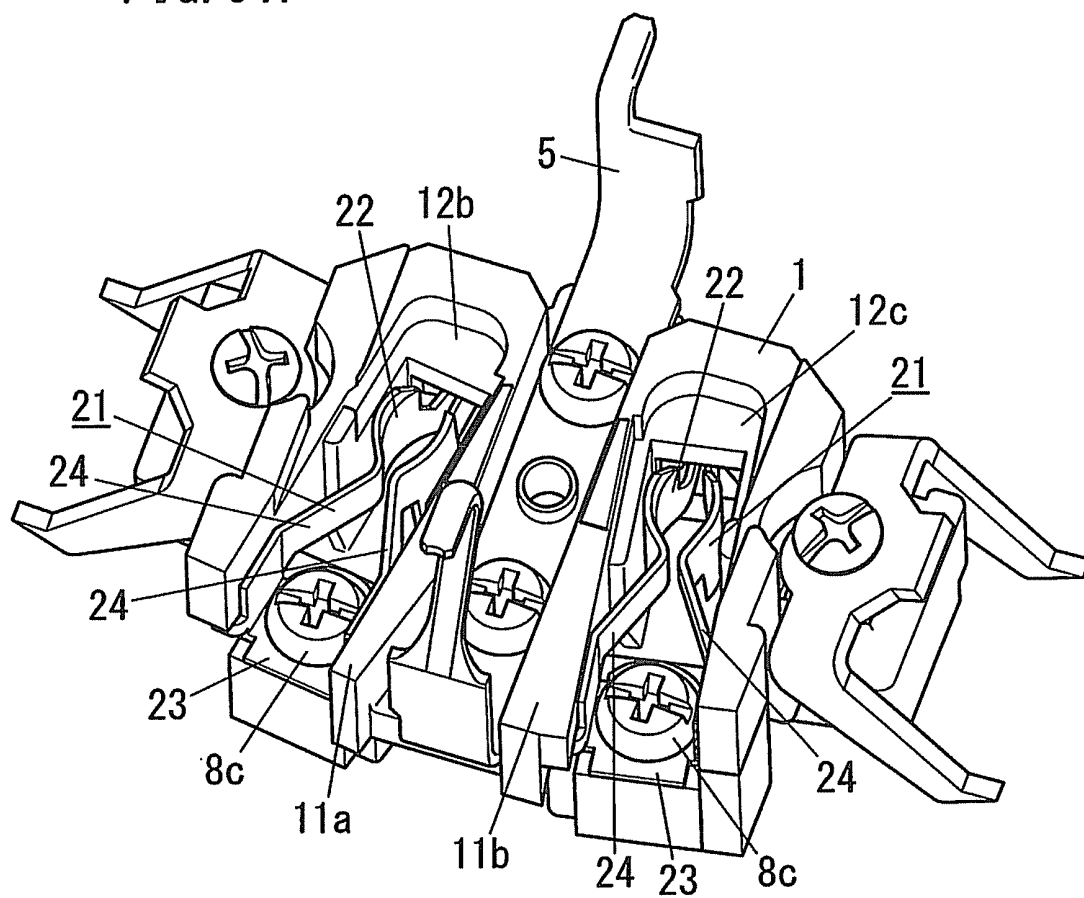


FIG. 9B

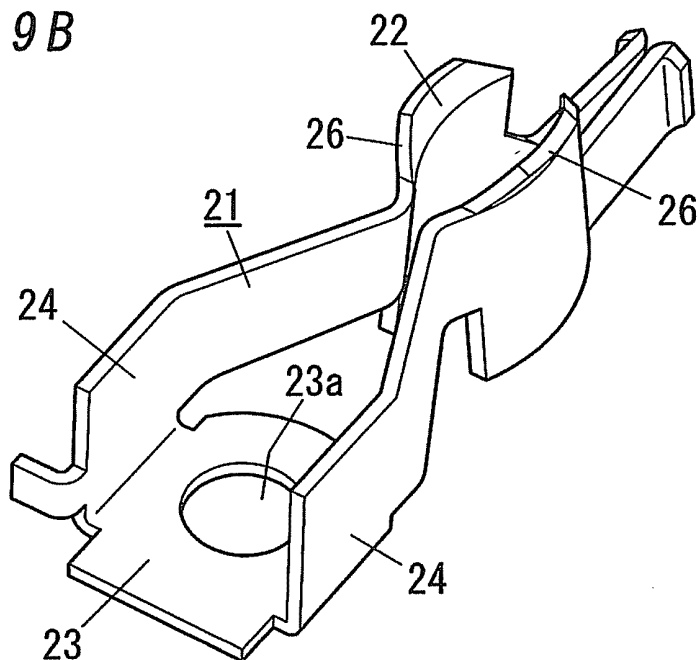


FIG. 10

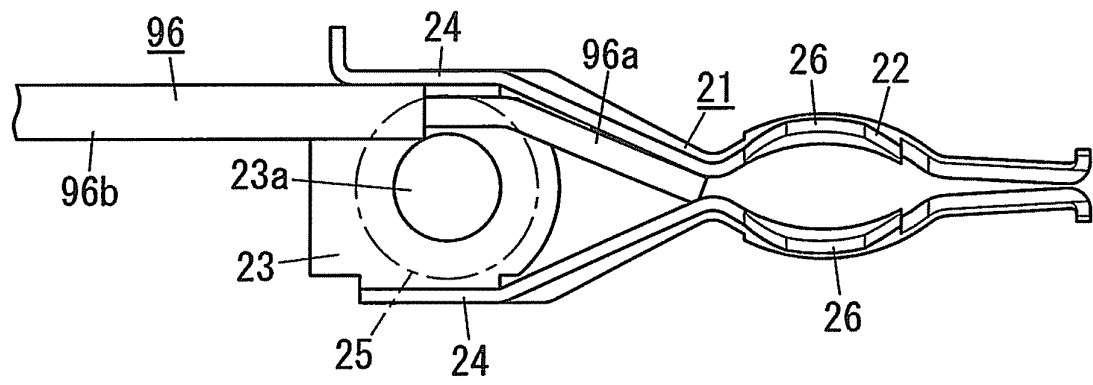
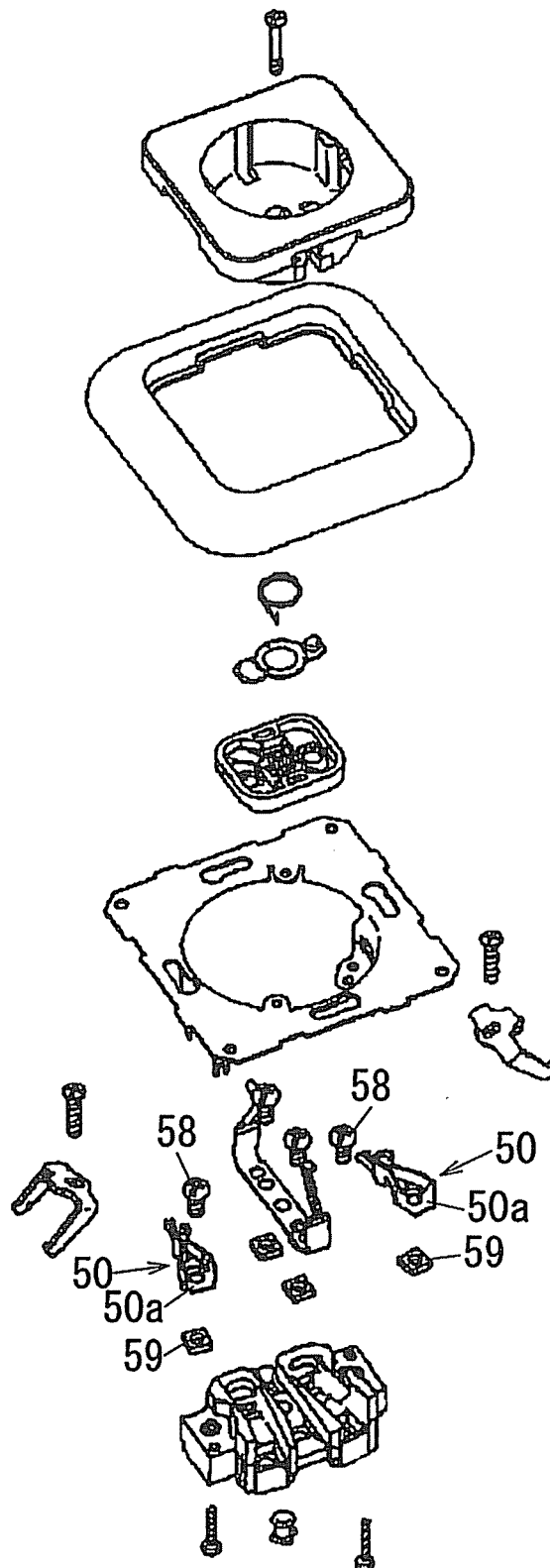


FIG. 11



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/004926

A. CLASSIFICATION OF SUBJECT MATTER

H01R9/00(2006.01)i, H01R13/11(2006.01)i, H01R13/502(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)

H01R9/00, H01R13/11, H01R13/502

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2013
Kokai Jitsuyo Shinan Koho	1971-2013	Toroku Jitsuyo Shinan Koho	1994-2013

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.
Y	JP 2003-249298 A (Matsushita Electric Works, Ltd.), 05 September 2003 (05.09.2003), paragraphs [0026] to [0034]; fig. 11 to 15 (Family: none)	1-3
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 157386/1988 (Laid-open No. 77866/1990) (Aiphone Co., Ltd.), 14 June 1990 (14.06.1990), specification, page 3, line 2 to page 4, line 18; fig. 1 (Family: none)	1-3



Further documents are listed in the continuation of Box C.



See patent family annex.

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search
11 November, 2013 (11.11.13)Date of mailing of the international search report
19 November, 2013 (19.11.13)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/004926

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 111229/1985 (Laid-open No. 20471/1987) (Matsushita Seiko Co., Ltd.), 06 February 1987 (06.02.1987), specification, page 3, line 5 to page 4, line 17; fig. 1 to 3 (Family: none)	1-3

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003249298 A [0002]