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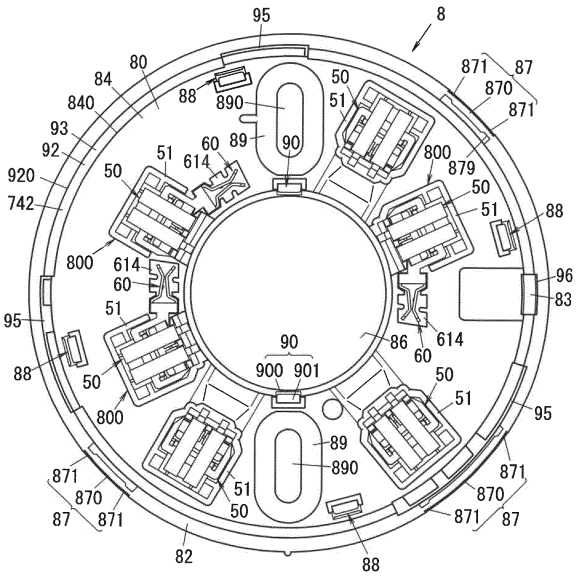
(54) BASE FOR FIRE SENSOR AND FIRE SENSOR

(57) An object of the present invention is to provide a fire detector base and a fire detector, which can reduce a space to be needed for connecting an internal terminal and an external connection terminal. Respective internal terminals (60) correspond to external connection terminals (50) in one-to-one. Each of the internal terminals (60) is electrically connected to a target external connection terminal (50) that is one corresponding to each internal terminal (60) noted, of the external connection terminals (50). In each of the internal terminals (60), a distance from each internal terminal (60) noted to the target external connection terminal (50) is shorter than a distance from the each internal terminal (60) noted to any other one of the internal terminals (60), and shorter than a distance from the target external connection terminal (50) to any other one of the external connection terminals (50).

FIG. 5



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Description

Technical Field

[0001] This invention relates generally to a fire detector base and a fire detector, and more particularly relates to a fire detector base with a connection terminal, and a fire detector with the fire detector base.

Background Art

[0002] As a conventional example, there has been a composite fire detector disclosed in a Patent Literature 1 below. The composite fire detector disclosed in the Patent Literature 1 includes an attachment base (fire detector base) and four contact parts located on a lower surface of the attachment base. Each contact part includes a pair of spring pieces (internal terminal). Four pairs of spring pieces are electrically connected to four quick connection terminals (external connection terminal) provided separately therefrom.

[0003] However, according to the composite fire detector in the Patent Literature 1, each contact part is located near the other contact parts, but away from a corresponding external connection terminal. Accordingly, the composite fire detector has a disadvantage that a relatively large space is needed for electrically connecting the internal terminal and the external connection terminal.

Citation List

Paten Literature

[0004] Patent Literature 1: JP 2015-153026 A

Summary of Invention

[0005] An object of the present invention is to provide a fire detector base and a fire detector, which can reduce a space to be needed for connecting an internal terminal and an external connection terminal.

[0006] To solve the above-mentioned problem, a fire detector base according to an aspect of the present invention includes a pedestal, external connection terminals and internal terminals. The pedestal includes a bottom wall. The pedestal is configured to attach thereto a detector body. The detector body includes an electric circuit for detecting fire. The external connection terminals are fixed to the bottom wall. The internal terminals are fixed to the bottom wall. The external connection terminals are configured to be electrically connected to an external wiring. To the internal terminals, the electric circuit is electrically connected. The respective internal terminals correspond to the external connection terminals in one-to-one. Each of the internal terminals is electrically connected to a target external connection terminal that is one corresponding to each internal terminal noted, of the external connection terminals. In each of the internal terminals, a distance from each internal terminal noted to the target external connection terminal is shorter than a distance from the each internal terminal noted to any other one of the internal terminals. Furthermore, in each of the internal terminals, the distance from each internal terminal noted to the target external connection terminal is shorter than a distance from the target external connection terminal to any other one of the external connection terminals.

[0007] A fire detector according to an aspect of the present invention includes the fire detector base and the detector body.

Brief Description of Drawings

[0008]

FIG. 1 is a cross-sectional view of a fire detector according to an exemplary embodiment of the present invention.

FIG. 2 is a perspective view of the fire detector attached to a construction surface, when viewed from the downside thereof.

FIG. 3 is a top view of a fire detector base according to an exemplary embodiment of the present invention.

FIG. 4 is a perspective view of an essential part of the fire detector base, when viewed from the upside thereof.

FIG. 5 is a top view of the fire detector base in which an upper base thereof is removed.

FIG. 6 is a perspective view of an essential part of the fire detector base in which the upper base thereof is removed, when viewed from the upside thereof.

FIG. 7 is a bottom view of the fire detector base.

FIG. 8 is a perspective view of an essential part of the fire detector base, when viewed from the downside thereof.

FIG. 9 is a perspective view of an essential part of the fire detector base in which a lower base thereof is removed, when viewed from the downside thereof.

FIG. 10 is a perspective view of an external connection terminal and an internal terminal of the fire detector base, when viewed from the upside thereof.

FIG. 11 is a perspective view of a detector body of the fire detector.

FIGS. 12A to 12C are schematic drawings of external connection terminals and internal terminals of the fire detector base.

FIG. 13A is a bottom view of a fire detector base according to a variation of an exemplary embodiment of the present invention. FIG. 13B is a cross-sectional view taken along line C-C in FIG. 13A.

Description of Embodiments

[0009] Hereinafter, a fire detector base and a fire de-

tector according to an exemplary embodiment will be explained with reference to drawings. FIG. 1 is a cross-sectional view taken along line A-A in FIG. 3. Unless otherwise specifically noted in the following explanations, respective sides on which a fire detector base 2 and a detector body 3 of a fire detector 1 shown in FIG. 1 are located are referred to as an "upside" and a "downside", for example.

[0010] As shown in FIG. 2, the fire detector 1 according to the present embodiment is attached to a construction surface 500. The fire detector 1 includes the fire detector base 2 and the detector body 3. The fire detector base 2 is configured such that an external wiring 600 passing through a hole formed in the construction surface 500 is inserted thereinto.

[0011] As shown in FIG. 1, the detector body 3 includes a casing 300, a cover 310, an electric circuit 320, an optical base 330 and an insect proof cover 340.

[0012] As shown in FIG 7, the fire detector base 2 includes a pedestal 4, two or more external connection units 5 (six in the example of the drawing), and two or more contact parts 6 (three in the example of the drawing). As shown in FIG. 3, the pedestal 4 includes a lower base 8 and an upper base 7. The upper base 7 is attached so as to cover a second bottom portion 80 of the lower base 8 (refer to FIG. 5).

[0013] As shown in FIG. 5, the lower base 8 includes the second bottom portion 80 with a disk shape, a first circumference wall 82 (circumference wall) with a cylindrical shape, and a second circumference wall 83 with a cylindrical shape (refer to FIGS. 7 and 8).

[0014] The second bottom portion 80 has a second upper surface 84 and a second lower surface 85 (refer to FIG. 7). The second lower surface 85 is positioned on the opposite side of the second bottom portion 80 to the second upper surface 84. The second upper surface 84 and second lower surface 85 have annular shapes. The second bottom portion 80 further has a circle-shaped opening 86 in the center in a radial direction thereof. The opening 86 is concentric with the second upper surface 84. The second bottom portion 80 further has a projecting base 92 adjacent to a circumferential edge 840 of the second upper surface 84. The projecting base 92 has an annular shape, and disposed around the second upper surface 84. The projecting base 92 projects upward with respect to the second upper surface 84.

[0015] As shown in FIG. 6, the first circumference wall 82 protrudes upward from the second bottom portion 80. As shown in FIG. 8, the second circumference wall 83 protrudes downward from the second bottom portion 80. As shown in FIG. 7, the first circumference wall 82 and second circumference wall 83 are concentric with each other, when viewed along an up-down direction. The first circumference wall 82 is slightly larger in diameter than the second circumference wall 83. The first circumference wall 82 protrudes from a circumferential edge 81 of the second bottom portion 80 (refer to FIG. 8). As shown in FIG. 5, the first circumference wall 82 is inscribed in a circumferential edge 920 of the projecting base 92. The second circumference wall 83 protrudes from a position slightly inside the first circumference wall 82 in the radial direction of the second bottom portion 80. More specifically, when viewed along the up-down direction, the second circumference wall 83 is at a position of partially overlapping with the projecting base 92.

[0016] As shown in FIGS. 7 and 8, the second circumference wall 83 includes in an outside surface 830 thereof three recessed parts 831. Each recessed part 831 of the second circumference wall 83 is recessed inward in a radial direction of the second circumference wall 83. The second circumference wall 83 further includes in the outside surface 830 thereof six recesses 832. Each recess 832 of the second circumference wall 83 is recessed inward in the radial direction of the second circumference wall 83. One of the three recessed parts 831 is provided as integrally communicated with three of the six recesses 832. The other one of the three recessed parts 831 is provided as integrally communicated with the other two of the six recesses 832. The remaining one of the three recessed parts 831 is provided as integrally communicated with the remaining one of the six recesses 832.

[0017] As shown in FIGS. 5 and 6, the first circumference wall 82 further includes three knockout parts 87. Each knockout part 87 includes a wall portion 870 and two side portions 871. The first circumference wall 82 has an end 820 in a protruding direction 821 (upward) in which the first circumference wall 82 is protruded (refer to FIG. 1), and each side portion 871 is provided to extend from the end 820 in the protruding direction 821. That is, the side portions 871 are extended from the end 820 toward the second bottom portion 80 (i.e., downward). Each side portion 871 has a width along a circumferential direction of the first circumference wall 82. The wall portion 870 is disposed between the two side portions 871. The wall portion 870 is adjacent to the two side portions 871. Also the wall portion 870 is provided integrally with the two side portions 871.

[0018] As shown in FIG. 4, the knockout part 87 is surrounded in all directions by a first edge 872 as an upside edge, a second edge 873 as a downside edge, a third edge 874 and a fourth edge 875. The third edge 874 and fourth edge 875 each connects the first edge 872 and the second edge 873. The first edge 872 is included in the end 820 of the first circumference wall 82. The second edge 873 is substantially linear to be in parallel to the first edge 872. Each of the third edge 874 and fourth edge 875 is an edge on the opposite side of a corresponding side portion 871 to the wall portion 870. The whole of the second edge 873, third edge 874 and fourth edge 875 has a substantially U-shape, when viewed from the radial direction of the first circumference wall 82. More specifically the second edge 873 and third edge 874 are curved into arc-shapes at near an intersection point 876 at which they intersect with each other. Similarly the second edge 873 and fourth edge 875 are curved into arc-shapes at near an intersection point 877 at which they intersect with

each other. Each side portion 871 has an edge 878 on the side of the wall portion 870. The edge 878 passes through a corresponding intersection point (876 or 877).

[0019] As shown in FIG. 5, the knockout part 87 is provided such that the inside and outside thereof in the radial direction of the first circumference wall 82 are recessed with respect to a portion around the knockout part 87, of the first circumference wall 82. Accordingly, the knockout part 87 is smaller in thickness than the portion around the knockout part 87, of the first circumference wall 82. Furthermore, the side portion 871 has an inner surface 879 in the radial direction of the first circumference wall 82, and the inner surface 879 is recessed outward in the radial direction of the first circumference wall 82 with respect to the wall portion 870. For that reason, the side portion 871 is smaller in thickness than the wall portion 870.

[0020] As shown in FIGS. 5 and 6, the lower base 8 further includes four projected parts 88 that are projected upward from the vicinity of the projecting base 92 on the second upper surface 84 of the second bottom portion 80. The four projected parts 88 are arranged at equal intervals along a circumferential direction of the second bottom portion 80. Each projected part 88 includes a columnar part 880 with a rectangular parallelepiped shape, protruded from the second bottom portion 80, and a claw part 881 provided near an end in a protruding direction (upward), of the columnar part 880. The columnar part 880 has elasticity capable of warping outward in the radial direction of the second bottom portion 80. The claw part 881 is protruded from the columnar part 880 inward in the radial direction of the second bottom portion 80.

[0021] The lower base 8 further includes two projected parts 89 that are projected upward from the second upper surface 84 of the second bottom portion 80. Each projected part 89 has a tubular shape. The projected part 89 is provided between the opening 86 and the projecting base 92. The two projected parts 89 face each other so that the opening 86 is interposed therebetween. Each projected part 89 has an elliptic shape long in the radial direction of the second bottom portion 80, when viewed along the up-down direction. The projected part 89 also has in the inside thereof an opening 890, when viewed along the up-down direction.

[0022] The lower base 8 further includes two projected parts 90 that are projected upward from the second upper surface 84 of the second bottom portion 80. The respective two projected parts 90 correspond to the two projected parts 89 in one-to-one. Each projected part 90 is provided between a corresponding projected part 89 and the opening 86 in the second bottom portion 80. The projected part 90 includes a columnar part 900 with a rectangular parallelepiped shape, protruded from the second bottom portion 80, and a claw part 901 provided near an end in a protruding direction (upward), of the columnar part 900. That is, the projected part 90 has a shape similar to that of the projected part 88. The columnar part 900 has elasticity capable of warping inward in the radial direction of the second bottom portion 80. The claw part 901 is protruded from the columnar part 900 outward in the radial direction of the second bottom portion 80.

[0023] As shown in FIG. 9, the upper base 7 includes a first bottom portion 70 with a disk shape (refer to FIG. 3) and a circumference wall portion 701 protruded downward from a circumferential edge 71 of the first bottom portion 70, and the upper base 7 therefore has a disk shape as a whole. The first bottom portion 70 has a first upper surface 74 with an annular shape (refer to FIG. 3) and a first lower surface 75 with an annular shape. As shown in FIG. 1, the first upper surface 74 is positioned on the opposite side of the first bottom portion 70 to the first lower surface 75.

[0024] The first bottom portion 70 of the upper base 7 is attached to the second bottom portion 80 in a state where the first lower surface 75 of the first bottom portion 70 faces the second upper surface 84 of the second bottom portion 80 of the lower base 8. In other words, the first bottom portion 70 faces the second bottom portion 80 in the protruding direction 821 of the first circumference wall 82. Accordingly, the end 820 of the first circumference wall 82 is closer to the first upper surface 74 than the second lower surface 85 in the protruding direction 821. The first bottom portion 70 of the upper base 7 is slightly smaller in diameter than the first circumference wall 82 of the lower base 8, and disposed in an inside space of the first circumference wall 82. In other words, the first upper surface 74 of the first bottom portion 70 is disposed in the inside space of the first circumference wall 82. The circumference wall portion 701 of the upper base 7 is placed on an upper face 93 (refer to FIG. 6) of the projecting base 92 (refer to FIG. 6) of the second bottom portion 80. The fire detector includes an isolator (not shown) that is provided in a space 700 formed between the first bottom portion 70 and the second bottom portion 80. The isolator has a function of detecting short-circuiting in the fire detector 1 and electrically cutting off the short-circuiting. Also the fire detector has a gap 94 between the circumference wall portion 701 and the first circumference wall 82. As shown in FIG. 3, the upper face 93 of the projecting base 92 is adjacent to the first upper surface 74 in a direction orthogonal to the protruding direction 821 (refer to FIG. 1) of the first circumference wall 82. The direction orthogonal to the protruding direction 821 of the first circumference wall 82 corresponds to a radial direction of the first bottom portion 70.

[0025] As shown in FIGS. 1 and 5, a surface including the upper face 93 of the projecting base 92 is referred to as a "water collecting surface 742". The water collecting surface 742 is disposed in the inside space of the first circumference wall 82. The gap 94 corresponds to a "groove" surrounded by the water collecting surface 742, the first circumference wall 82 and the circumference wall portion 701. That is, since the circumference wall portion 701 protruded from the first bottom portion 70 is placed on the upper face 93 of the water collecting surface 742 as described above, the gap 94 has a groove-shape, a

bottom of which is a portion between the first circumference wall 82 and the circumference wall portion 701, of the water collecting surface 742. Thus, the gap 94 has the groove-shape, recessed with respect to the first upper surface 74 (that corresponds to a first surface 44 described later), and constituted by the water collecting surface 742, the first circumference wall 82 and the circumference wall portion 701.

[0026] As described above, the first circumference wall 82 is inscribed in the circumferential edge 920 of the projecting base 92, and the first upper surface 74 is disposed in the inside space of the first circumference wall 82. Therefore, a part along the circumferential edge 920, of the water collecting surface 742, surrounds the first upper surface 74. In other words, at least a part of the water collecting surface 742 surrounds the first upper surface 74 (that corresponds to the first surface 44 described later).

[0027] The water collecting surface 742 has therein three holes 95. The projecting base 92 is projected with respect to the second upper surface 84 so as to avoid a region where each hole 95 is provided. As shown in FIG. 7, the respective three holes 95 correspond to the three recessed parts 831 of the second circumference wall 83 in one-to one. Each hole 95 is provided at the same location as a corresponding recessed part 831, when viewed along the up-down direction. More specifically the hole 95 penetrates the second bottom portion 80 and the second circumference wall 83 from the upper face 93 (refer to FIG. 5) of the projecting base 92 (refer to FIG. 5) to the corresponding recessed part 831. That is, the hole 95 penetrates from the water collecting surface 742 to the outside of the second circumference wall 83 in the radial direction of the second bottom portion 80. In other words, the hole 95 penetrates from the water collecting surface 742 to an outside of the pedestal 4. The "outside" of the pedestal 4 mentioned herein means a space outside the inside space of the first circumference wall 82. The three holes 95 are arranged at substantially equal intervals along the radial direction of the second bottom portion 80.

[0028] The water collecting surface 742 further has therein one hole 96. The projecting base 92 (refer to FIG. 5) is projected with respect to the second upper surface 84 (refer to FIG 5) so as to avoid a region where the hole 96 is provided. The hole 96 is larger in width than the second circumference wall 83 in the radial direction of the second bottom portion 80. The hole 96 penetrates the second bottom portion 80 from the upper face 93 (refer to FIG 5) of the projecting base 92 to the second lower surface 85 in a region partially overlapping with the second circumference wall 83, when viewed along the up-down direction. Furthermore the hole 96, as shown in FIG. 1, penetrates the second circumference wall 83 along the radial direction of the second circumference wall 83 on the side of the second lower surface 85. In other words, the hole 96 penetrates from the water collecting surface 742 to the outside of the pedestal 4.

[0029] As described above, the pedestal 4 includes the upper base 7 and the lower base 8. Accordingly, the pedestal 4 includes a bottom wall 40 that includes the first bottom portion 70 of the upper base 7 and the second bottom portion 80 of the lower base 8.

[0030] The bottom wall 40 includes the first upper surface 74 of the first bottom portion 70. In the bottom wall 40, a surface including the first upper surface 74 is referred to as the "first surface 44" of the bottom wall 40. The first surface 44 in the present embodiment corresponds to the first upper surface 74. The bottom wall 40 further includes the second surface 45. The second surface 45 is disposed opposite to the first surface 44 along the protruding direction 821. The second surface 45 includes the second lower surface 85 of the second bottom portion 80. The second surface 45 in the present embodiment corresponds to the second lower surface 85.

[0031] The first upper surface 74 includes a flat surface 744 and an inclined surface 745 inclined to the flat surface 744. More specifically the inclined surface 745 is inclined to be closer to the second surface 45 at its end adjacent to the water collecting surface 742 (refer to FIG. 3) than at its end remote from the water collecting surface 742 along the direction (the radial direction of the first bottom portion 70) orthogonal to the protruding direction 821. As shown in FIG. 3, the first bottom portion 70 further has a circle-shaped opening 76 in the center in a radial direction thereof. The opening 76 is concentric with the circumferential edge 71 of the first bottom portion 70. The inclined surface 745 is provided around the opening 76, and has an annular shape concentric with the circumferential edge 71. In short, the inclined surface 745 is shaped like a side surface of a truncated cone. The flat surface 744 is provided around the inclined surface 745, and has an annular shape concentric with the circumferential edge 71. The flat surface 744 is formed integrally with the inclined surface 745 and continuously from the inclined surface 745 to the circumferential edge 71 of the first bottom portion 70 in the radial direction of the first bottom portion 70. The first upper surface 74 is provided without a projection (e.g., surrounding the inclined surface 745 and having a relatively long projection length with respect to the first upper surface 74).

[0032] The upper base 7, as shown in FIGS. 3 and 4, further includes four projected parts 77 projected from the vicinity of the circumferential edge 71 on the first upper surface 74 of the first bottom portion 70. The four projected parts 77 are arranged at equal intervals along the circumferential direction of the first bottom portion 70. Each projected part 77 is shaped like a tubular shape and has an opening 771 inside thereof, when viewed along the up-down direction. The projected part 77 further has a recess 772 inside thereof in the radial direction of the first bottom portion 70. The recess 772 is recessed downward. Each projected part 77 is configured such that a corresponding projected part 88 of the lower base 8 is fitted thereinto. The recess 772 is configured such that the claw part 881 (refer to FIG. 6) of the projected

part 88 is caught thereby.

[0033] The upper base 7 further includes two projected parts 78 and two projected parts 79, all of which are projected upward from the first upper surface 74 of the first bottom portion 70. All of the two projected parts 78 and the two projected parts 79 are provided between the opening 76 and the circumferential edge 71. The two projected parts 78 and the two projected parts 79 are arranged at equal intervals along the circumferential direction of the first bottom portion 70, and more specifically, they are alternately arranged in that order of one projected part 78, one projected part 79, the other projected part 78 and the other projected part 79 in the circumferential direction of the first bottom portion 70. Each projected part 78 is shaped like a tubular shape, and has therein an opening 780. Each projected part 79 has a columnar shape. The projected parts 78 and the projected parts 79 have elliptic shapes long in the radial direction of the first bottom portion 70, when viewed along the up-down direction. The projected part 78 has a recess 781 (refer to FIG. 9) on the side of the opening 76. The recess 781 is recessed downward. The opening 780 of each projected part 78 is configured such that a corresponding projected part 89 of the lower base 8 is fitted thereinto. The recess 781 of each projected part 78 is configured such that a corresponding projected part 90 of the lower base 8 is positioned inside thereof in the radial direction of the first bottom portion 70. The recess 781 is configured such that the claw part 901 (refer to FIG. 5) of the projected part 90 is caught thereby.

[0034] As shown in FIG. 9, the first bottom portion 70 of the upper base 7 includes six pairs of ribs 100, namely, twelve ribs 100 in total (only four ribs are shown in FIG. 9). Each rib 100 protrudes from the first lower surface 75 of the first bottom portion 70 toward the second bottom portion 80 (refer to FIG 1). That is, the ribs 100 are protruded downward. The ribs 100 have long rectangular parallelepiped shapes. The two ribs 100 paired are arranged in parallel to each other so as to direct longitudinal directions thereof to the radial direction of the first bottom portion 70. The first bottom portion 70 further includes six ribs 101 (only three ribs are shown in FIG. 9). Each rib 101 protrudes from the first lower surface 75 toward the second bottom portion 80 (i.e., downward). The ribs 101 have rectangular parallelepiped shapes long in the circumferential direction of the first bottom portion 70.

[0035] As shown in FIG. 6, each external connection unit 5 includes an external connection terminal 50, an external connection terminal block 51 and a release button 52 (refer to FIG. 8).

[0036] The external connection terminal block 51 has a square cylindrical shape, and is protruded upward from the second upper surface 84 of the second bottom portion 80. The external connection terminal block 51 is formed integrally with the second bottom portion 80. The external connection terminal block 51 has a space 510 inside thereof. As shown in FIG. 8, the second bottom portion 80 is provided in the second lower surface 85 with an opening 520. The opening 520 is communicated with the space 510. The release button 52 is fitted into the opening 520. As shown in FIG. 6, the external connection terminal block 51 houses, in the space 510, the external connection terminal 50. In other words, the second bottom portion 80 holds the external connection terminal 50 via the external connection terminal block 51. The external connection terminal 50 has two springs 54 (refer to FIG. 10), which are located on the upside thereof and exposed to the outside of the second bottom portion 80. The first bottom portion 70 (refer to FIG. 1) covers the external connection terminal 50 from the two springs 54 side (i.e., the upside).

[0037] As shown in FIG. 10, the external connection terminal 50 includes a terminal part 53, the two springs 54 and two coupling parts 55. The terminal part 53, the two springs 54 and the two coupling parts 55 are integrally as the whole made of an electrically conductive metal material and the like.

[0038] The terminal part 53 includes a frame 530, two contact pieces 531 (refer to FIG 9) and a projection piece 532, and they are integrally formed. The frame 530 is shaped like a rectangular flat plate shape elongated, and has a rectangular-shaped opening 533 inside thereof. The frame 530 is substantially orthogonal to the up-down direction with the external connection terminal 50 being fixed to the second bottom portion 80 (refer to FIG. 6). That is, the frame 530 is substantially in parallel to the second upper surface 84 (refer to FIG. 6) of the second bottom portion 80. The two contact pieces 531 are protruded upward obliquely from the frame 530 so as to partially cover the opening 533. The two contact pieces 531 are provided to be arranged along a longitudinal direction of the frame 530. The projection piece 532 is protruded downward obliquely from the frame 530 so as to partially cover the opening 533. The projection piece 532 is located to face the two contact pieces 531 such that the opening 533 is interposed between the projection piece 532 and the two contact pieces 531 in the frame 530.

[0039] Each coupling part 55 includes a first piece 550 and a second piece 551, which are integrally formed into an L-shape plate in cross-section as a whole. The first piece 550 and the frame 530 are on the same plane. The first piece 550 is connected to the frame 530. The second piece 551 is protruded upward and perpendicularly from an end 552 of the first piece 550.

[0040] Each spring 54 is shaped into a substantially U-shape plate in cross section. The spring 54 includes a first plate 540, a second plate 541, and a curved plate 542 connecting the first plate 540 and the second plate 541 and having a semicircle shape in cross section, all of which are integrally formed. The spring 54 is located on the upside of the terminal part 53. The first plate 540 is located to face the first lower surface 75 (refer to FIG. 9) of the first bottom portion 70 (refer to FIG. 9). The respective two first plates 540 are protruded from upper ends of the second pieces 551 of the two coupling parts 55 to face the frame 530 of the terminal part 53. The

respective second plates 541 are located below the first plates 540 to face them. The respective two springs 54 correspond to the two contact pieces 531 in one-to-one. The second plate 541 of each spring 54 is in contact with a corresponding contact piece 531. From the second plate 541 of each spring 54, two operation pieces 58 are protruded. The operation pieces 58 are located inside the opening 533 not to overlap with the contact piece 531, when the external connection terminal 50 is viewed from the downside.

[0041] As shown in FIG. 9, each external connection terminal 50 is in contact with corresponding one pair of ribs 100 and one rib 101 in the protruding direction 821 (refer to FIG. 1) of the first circumference wall 82 (refer to FIG. 1). More specifically, each external connection terminal 50 is located below the ribs 100 with the frame 530 being in contact with the lower surfaces of the pair of ribs 100 and the lower surface of the one rib 101. The lower surfaces of the pair of ribs 100 are surfaces of ends 102 in a protruding direction (downward), of the ribs 100, and the lower surface of the one rib 101 is a surface of an end 103 in a protruding direction (downward), of the rib 101.

[0042] As shown in FIG. 8, the second bottom portion 80 is provided in the second lower surface 85 with six hollow parts 56 (refer to FIG. 7). The respective six hollow parts 56 correspond to six external connection terminal blocks 51 in one-to-one (refer to FIG. 6). Each hollow part 56 is located inside the space 510 (refer to FIG. 6) in a corresponding external connection terminal block 51, in the radial direction of the second bottom portion 80. In other words, the hollow part 56 is adjacent to the space 510. The hollow part 56 in the second lower surface 85 is recessed upward. Each hollow part 56 is provided in the bottom thereof with one or two insertion holes 57. The one or two insertion holes 57 of each hollow part 56 are communicated with the space 510 in the corresponding external connection terminal block 51.

[0043] The external wiring 600 (refer to FIG. 2), inserted into the fire detector base 2 from the upside, is inserted into the insertion hole 57. The external wiring 600 is inserted between the second plate 541 of the spring 54 and the contact piece 531 corresponding to the spring 54 while elastically deforming the spring 54 of the external connection terminal 50 shown in FIG 10. Thus, the external connection terminal 50 holds the external wiring 600 by pinching the external wiring 600 between the second plate 541 and the contact piece 531 to be electrically connected to the external wiring 600. In short, the external connection terminal 50 is a so-called "quick connection terminal". By pressing the release button 52 (refer to FIG. 8) from the downside, the operation pieces 58 are pressed upward to elastically deform the spring 54, and the second plate 541 can be therefore separated from the terminal part 53. Accordingly, the external wiring 600 held by the external connection terminal 50 can be removed from the external connection terminal 50. Note that the external wiring 600 may be inserted into the fire detector base 2 from a knockout hole formed by removing the wall portion 870 of the knockout part 87 shown in FIG. 4.

[0044] Each of the three contact parts 6, as shown in FIG. 7, includes an internal terminal 60, and an internal terminal block 61 fixed to the second bottom portion 80 of the lower base 8. Respective three internal terminals 60 (internal terminal blocks 61) correspond to three of the six external connection terminals 50, in one-to-one.

[0045] Each internal terminal block 61 is formed integrally with the second bottom portion 80. Each internal terminal block 61 is located on the second lower surface 85 of the second bottom portion 80. Each internal terminal block 61 is provided to be adjacent to a corresponding external connection unit 5, along the circumferential direction of the second bottom portion 80. As shown in FIG. 8, the internal terminal block 61 includes two projection plates 610 with rectangular shapes and a projection plate 611 with a rectangular shape. The two projection plates 610 are projected downward from the second lower surface 85 so as to face each other in parallel. The projection plate 611 is projected downward from the second lower surface 85. The projection plate 611 is provided to be substantially orthogonal to both of the two projection plates 610, and connected to one side 612 in a projecting direction (up-down direction), of each projection plate 610. The projection plate 611 has an opening 613 formed along the up-down direction. The internal terminal block 61 houses therein the internal terminal 60 between the two projection plates 610. The second bottom portion 80 has a through-hole 614 (refer to FIG. 7) between the two projection plates 610. The through-hole 614 penetrates from the second upper surface 84 (refer to FIG. 6) to the second lower surface 85, of the second bottom portion 80.

[0046] The internal terminal 60, as shown in FIG 10, includes two metal pieces 62. The metal pieces 62 have plate shapes. The two metal pieces 62 are fixed with facing each other and being substantially in contact with each other. The two metal pieces 62, when displaced to be separated from each other, can apply, by spring elasticity, force in a direction of approaching each other. Accordingly, each internal terminal 60 can pinch a blade 322 (refer to FIG 11) of the electric circuit 320 (refer to FIG. 1) of the detector body 3 (refer to FIG. 1) between the two metal pieces 62, thereby being electrically connected to the electric circuit 320.

[0047] The external connection terminal 50 and the internal terminal 60 are connected to each other with a coupling piece 65 interposed therebetween. The internal terminal 60 is therefore electrically connected to the corresponding external connection terminal 50. The external connection terminal 50 is located above the internal terminal 60. The coupling piece 65 includes a bottom plate 651 and two side plates 652. The bottom plate 651 is provided to extend from the frame 530 of the external connection terminal 50. Each side plate 652 is provided to extend downward from the bottom plate 651 to a cor-

responding metal piece 62 of the internal terminal 60. As shown in FIG. 5, the external connection terminal 50 is held by the external connection terminal block 51, and accordingly, the external connection terminal 50 and the internal terminal 60 are fixed to the second bottom portion 80.

[0048] As described above, the respective three internal terminals 60 correspond to three of the six external connection terminals 50 in one-to-one. That is, each internal terminal 60 and one external connection terminal 50 corresponding to the internal terminal 60 constitute a terminal group 800. Three terminal groups 800 mutually have the same shape. Each of the three internal terminals 60 are formed integrally with the corresponding external connection terminal 50. Accordingly, distances L1, L2 and L3 (refer to FIGS. 12A to 12C) from the respective internal terminals 60 to the external connection terminals 50 are zero.

[0049] The relationship between the three external connection terminals 50 and the three internal terminals 60, of the three terminal groups 800, will be explained. FIGS. 12A to 12C are drawings schematically showing arrangements of the three terminal groups 800, when viewed from the same view point as FIG. 5. In FIGS. 12A to 12C, for mutually distinguishing the three terminal groups 800, they are referred to as terminal groups 800A, 800B and 800C. The terminal group 800A includes the external connection terminal 50A and the internal terminal 60A. The terminal group 800B includes the external connection terminal 50B and the internal terminal 60B. The terminal group 800C includes the external connection terminal 50C and the internal terminal 60C.

[0050] As shown in FIG. 12A, the distance L1 from the internal terminal 60A to the external connection terminal 50A, of the terminal group 800A, is shorter than any of respective distances L61 and L62 from the internal terminal 60A of the terminal group 800A to the internal terminals 60B and 60C of the terminal groups 800B and 800C. Also the distance L1 is shorter than any of respective distances L51 and L52 from the external connection terminal 50A of the terminal group 800A to the external connection terminals 50B and 50C of the terminal groups 800B and 800C.

[0051] The distance L1 from the internal terminal 60A to the external connection terminal 50A, of the terminal group 800A, represents a length of the shortest line segment joining the internal terminal 60A and the external connection terminal 50A. Similarly, the respective distances L61 and L62 represent lengths of the shortest line segments joining: the internal terminal 60A; and the internal terminals 60B and 60C. The respective distances L51 and L52 represent lengths of the shortest line segments joining: the external connection terminal 50A; and the external connection terminals 50B and 50C.

[0052] FIG. 12A shows the distances according to the terminal group 800A. Also in the case of each of the terminal groups 800B and 800C, the distances between the terminals meet the relationship similar to that of the terminal group 800A.

[0053] That is, the distance L2 from the internal terminal 60B to the external connection terminal 50B, of the terminal group 800B, as shown in FIG. 12B, is shorter than any of respective distances L61 and L63 from the internal terminal 60B to the internal terminals 60A and 60C. Also the distance L2 is shorter than any of respective distances L51 and L53 from the external connection terminal 50B to the external connection terminals 50A and 50C.

[0054] Furthermore, the distance L3 from the internal terminal 60C to the external connection terminal 50C, of the terminal group 800C, as shown in FIG. 12C, is shorter than any of respective distances L62 and L63 from the internal terminal 60C to the internal terminals 60A and 60B. Also the distance L3 is shorter than any of respective distances L52 and L53 from the external connection terminal 50C to the external connection terminals 50A and 50B.

[0055] The other three without the internal terminals 60, of the six external connection terminals 50 in FIG. 5, may be connected to wirings to be unused, or to input sides and output sides of wirings to be used for relaying the input sides to output sides.

[0056] The casing 300 of the detector body 3, as shown in FIG. 2, includes a tubular part 301 and a basket part 306. The tubular part 301 includes a circumference wall 302 with a cylindrical shape and a bottom wall 303 located at a lower end of the circumference wall 302. The tubular part 301 is formed into a cylindrical shape with a bottom, as a whole. The basket part 306 includes a circumference wall 307 with a lattice and cylindrical shape, and a bottom wall 308 located at a lower end of the circumference wall 307. The basket part 306 is formed into a cylindrical shape with a bottom, as a whole. The circumference wall 302 of the tubular part 301 is larger in diameter than the circumference wall 307 of the basket part 306. The bottom wall 303 of the tubular part 301 is connected to the circumference wall 307 of the basket part 306.

[0057] As shown in FIG. 11, the circumference wall 302 of the tubular part 301 includes six protrusions 304 inside thereof. The respective six protrusions 304 correspond to the six recesses 832 (refer to FIG. 8) formed in the second circumference wall 83 (refer to FIG. 8) of the pedestal 4 (refer to FIG. 8) of the fire detector base 2 (refer to FIG 8) in one-to-one. The detector body 3 is attached to the fire detector base 2 by the six protrusions 304. More specifically, as an exemplary assembly procedure, each protrusion 304 of the detector body 3 may be inserted upward from the downside with respect to a corresponding recess 832 of the fire detector base 2 while the detector body 3 is removed from the fire detector base 2. Then, the detector body 3 may be turned in the circumferential direction thereof such that each protrusion 304 is moved to a location not adjacent to the recess 832 in the recessed part 831 (refer to FIG. 8). The detector body 3 can be therefore attached to the fire detector base 2.

[0058] Also as shown in FIG. 1, the bottom wall 303 of the tubular part 301 has, in an inside surface 400 thereof, a water discharge groove 401. The water discharge groove 401 is an annular shaped groove, and located near the circumference wall 302. The water discharge groove 401 is recessed downward in the inside surface 400. The water discharge groove 401 has therein two holes 402 (refer to FIG. 11) penetrating the bottom wall 303. The two holes 402 are provided at locations symmetric to each other in the water discharge groove 401.

[0059] The inside surface 400 of the bottom wall 303 includes an inclined surface 403 between the water discharge groove 401 and the circumference wall 302. The inclined surface 403 is located around the water discharge groove 401, and inclined to be lower to at its end adjacent to the inside in the radial direction of the circumference wall 302 than at its end remote from the inside.

[0060] In the radial direction of the circumference wall 302, an impervious wall 404 is provided inside the water discharge groove 401. The impervious wall 404 is adjacent to the water discharge groove 401, and protruded upward from the inside surface 400 of the bottom wall 303. The impervious wall 404 can prevent water, which has flowed in the water discharge groove 401, from entering a space inside the impervious wall 404 in the radial direction of the circumference wall 302.

[0061] The cover 310 as shown in FIG. 11 has a disk shape. The cover 310 is configured to cover a major portion of the bottom wall 303 of the tubular part 301, when the detector body 3 is viewed from the upside. That is, the cover 310 as shown in FIG. 1 is located below the fire detector base 2 such that an upper surface 311 thereof faces the fire detector base 2. The cover 310 is located above the impervious wall 404 so as to cover it. Also the cover 310 is configured such that an outer edge 312 thereof is outside the impervious wall 404 in the radial direction of the circumference wall 302 of the tubular part 301. The upper surface 311 is inclined like a circular arc shape, such that the vicinity of the outer edge 312 is lower at its outer end than at its inner end. The upper surface 311 includes an inclined surface 313. The inclined surface 313 has an apex corresponding to a center 314 of the upper surface 311, and is inclined to be lower at its outer end than at its apex in the radial direction of the cover 310. Furthermore, as shown in FIG. 11, two walls 315 are protruded from the upper surface 311. The two walls 315 are provided along the inclined surface 313 on the upper surface 311. The two walls 315 are provided to face each other such that the center 314 of the upper surface 311 is interposed therebetween. On the upper surface 311, three projecting bases 316 are provided outside each wall 315 in the radial direction of the cover 310. Each projecting base 316 is projected from the upper surface 311, and has a flat upper face 317. The cover 310 has two or more through-holes 318 (three in the example of the drawing) in the upper face 317.

[0062] As shown in FIG. 1, the electric circuit 320 is disposed below the cover 310. The electric circuit 320 includes a substrate 321. The substrate 321 mounts thereon two or more blades 322 (refer to FIG. 11; three blades 322 in FIG. 11) according to the electric circuit 320, a thermal sensor 323, a smoke sensor 324, two confirmation lamps (not shown) and a light projector (not shown). The two confirmation lamps include a confirmation lamp for the thermal sensor and a confirmation lamp for the smoke sensor. Examples of each confirmation lamp include a light emitting element such as an LED element. Examples of the light projector include a light emitting element such as an LED element.

[0063] The substrate 321 is located inside the impervious wall 404 in the radial direction of the circumference wall 302 of the tubular part 301. Each blade 322 shown in FIG. 11 is made of an electrically conductive metal plate and the like. The respective three blades 322 pass through the three through-holes 318 of the cover 310, and are protruded upward from the cover 310. The respective three blades 322 correspond to the three internal terminals 60 in one-to-one (refer to FIG. 7). Each blade 322 is electrically connected to a corresponding internal terminal 60. That is, each blade 322 is pinched by the two metal pieces 62 (refer to FIG. 10) of the corresponding internal terminal 60. Thus, the electric circuit 320 (refer to FIG. 1) is electrically connected to the external wiring 600 (refer to FIG. 2).

[0064] The thermal sensor 323 in FIG. 1 is configured to detect fire by sensing an ambient temperature with a thermistor 325. If the fire is detected, the electric circuit 320 allows the confirmation lamp for the thermal sensor to emit light, and further inform an externally located receiver (not shown) of occurrence of the fire through the external wiring 600 (refer to FIG. 2). The light emitted from the confirmation lamp is output to the outside of the detector body 3. The thermal sensor 323 may be configured to detect the ambient temperature with a bimetal instead of the thermistor 325.

[0065] The smoke sensor 324 and the light projector are located to be surrounded by the optical base 330. The optical base 330 is provided below the substrate 321. The smoke sensor 324 includes a lens 331 and a photodetector (not shown) fixed to face the lens 331. Light from the light projector is diffusely reflected by smoke particles, which have entered the optical base 330, and therefore the light enters the lens 331. Accordingly, the photodetector detects the light from the light projector. Thus the smoke sensor 324 detects the fire. If the fire is detected, the electric circuit 320 allows the confirmation lamp for the smoke sensor to emit light, and further inform an externally located receiver (not shown) of occurrence of the fire through the external wiring 600 (refer to FIG. 2). The light emitted from the confirmation lamp is output to the outside of the detector body 3.

[0066] The insect proof cover 340 is provided to cover the optical base 330. The insect proof cover 340 as shown in FIG. 2 includes a disk-shaped bottom wall 341 and a lattice-shaped lattice part 343 protruded, from an outer edge 342 of the bottom wall 341, upward in a di-

rection perpendicular to the bottom wall 341.

[0067] Next, in the fire detector base 2 and the fire detector 1 according to the present embodiment, when water is on the first upper surface 74 of the first bottom portion 70 of the upper base 7 in FIG. 1, how the water is discharged to the outside of the fire detector 1 will be described.

[0068] When water is on the inclined surface 745 of the first upper surface 74, the water flows along the inclined surface 745. More specifically, since the water flows outward in the radial direction of the first bottom portion 70, the water can reach the circumferential edge 71 of the first bottom portion 70 from the inclined surface 745 via the flat surface 744. Furthermore the water flows into the side of the second bottom portion 80 (i.e., downside) from the gap 94 between the first bottom portion 70 and the first circumference wall 82. The water can be discharged to the downside of the fire detector base 2, after passing through the hole 95 or the hole 96 located in the water collecting surface 742 (refer to FIG. 5) of the second bottom portion 80. Then the water then drops on the inclined surface 403 of the bottom wall 303 of the tube part 301 in the detector body 3. The water further flows inward along inclination of the inclined surface 403 in the radial direction of the tube part 301. Therefore the water can flow into the water discharge groove 401 and be discharged from the hole 402 (refer to FIG. 11) to the outside of the fire detector 1.

[0069] If water enters the detector body 3 for example via not the hole 95 or the hole 96 but the opening 76 and the opening 86 located in the center of the fire detector base 2, the water reaches the upper surface 311 of the cover 310. The water then flows outward along inclination of the inclined surface 313 of the upper surface 311 in the radial direction of the cover 310, and drop on the inclined surface 403 of the bottom wall 303 of the tube part 301 from the outer edge 312 of the cover 310. Accordingly, the water can flow along inclination of the inclined surface 403, flow into the water discharge groove 401, and be discharged from the hole 402 (refer to FIG. 11) to the outside of the fire detector 1.

[0070] As apparent from the foregoing description, a fire detector base 2 according to a first aspect includes a pedestal 4, external connection terminals 50 and internal terminals 60. The pedestal 4 includes a bottom wall 40. The pedestal 4 is configured to attach thereto a detector body 3. The detector body 3 includes an electric circuit 320 for detecting fire. The external connection terminals 50 are fixed to the bottom wall 40. The internal terminals 60 are fixed to the bottom wall 40. The external connection terminals 50 are configured to be electrically connected to an external wiring 600. To the internal terminals 60, the electric circuit 320 is electrically connected. The respective internal terminals 60 correspond to the external connection terminals 50 in one-to-one. Each of the internal terminals 60 is electrically connected to a target external connection terminal 50 that is one corresponding to each internal terminal 60 noted, of the external connection terminals 50. In each of the internal terminals 60, a distance (L1, L2 or L3) from each internal terminal 60 noted to the target external connection terminal 50 is shorter than a distance (L61, L62; L61, L63; or L62, L63) from the each internal terminal 60 noted to any other one of the internal terminals 60. Furthermore, in each of the internal terminals 60, the distance (L1, L2 or L3) from each internal terminal 60 noted to the target external connection terminal 50 is shorter than a distance (L51, L52; L51, L53; or L52, L53) from the target external connection terminal 50 to any other one of the external connection terminals 50.

[0071] According to the fire detector base 2 with the above-mentioned configuration, the external connection terminals 50 and the internal terminals 60 are provided closely to each other. Accordingly, the fire detector base 2 can reduce a space to be needed for connecting the external connection terminals 50 and the internal terminals 60, compared with the conventional fire detector base where the external connection terminals and the internal terminals are provided separately from each other. Therefore the fire detector base 2 can secure a larger space for arranging the components or wiring thereof.

[0072] In a fire detector base 2 according to a second aspect, which may be implemented in conjunction with the first aspect, the pedestal 4 further includes a first circumference wall 82 (circumference wall). The first circumference wall 82 has a tubular shape. The first circumference wall 82 protrudes in a direction intersecting the bottom wall 40 from a circumferential edge 81 of the bottom wall 40. The first circumference wall 82 includes a knockout part 87. The knockout part 87 includes two side portions 871 and a wall portion 870. The two side portions 871 extend in a protruding direction 821 of the first circumference wall 82 from an end 820 of the first circumference wall 82. The end 820 is one end in the protruding direction 821, of the first circumference wall 82 protruding. The wall portion 870 is disposed between the two side portions 871 to be adjacent to the two side portions 871. Each of the two side portions 871 is smaller in thickness than the wall portion 870.

[0073] According to the above-mentioned configuration, since each of the two side portions 871 of the knockout part 87 is smaller in thickness than the wall portion 870, the knockout part 87 can be easily cut along the side portions 871. Accordingly, it is possible to easily form a knockout hole in the first circumference wall 82 (circumference wall) by removing the wall portion 870. Then, it is possible to make the external wiring 600 pass through the knockout hole formed in the first circumference wall 82 to be inserted inside of the first circumference wall 82. In addition, the knockout part 87 can be easily formed, compared with a knockout part where the vicinity of a lower edge (second edge 873) of the wall portion 870 is small in thickness to the same level as the side portion 871.

[0074] In a fire detector base 2 according to a third aspect, which may be implemented in conjunction with

the first or the second aspect, each of the internal terminals 60 is integrally with at least a part of the target external connection terminal 50 corresponding thereto.

[0075] According to the fire detector base 2 with the above-mentioned configuration, each of the internal terminals 60 is integrally with at least the part of the target external connection terminal 50 corresponding thereto. The fire detector base 2 can therefore reduce the number of components of the internal terminals 60 and the target external connection terminal 50, and omit the manufacturing process for connecting those.

[0076] A fire detector 1 according to a fourth aspect includes the fire detector base 2 of any one of the first to the third aspects and the detector body 3.

[0077] According to the fire detector 1 with the above-mentioned configuration, the external connection terminals 50 and the internal terminals 60 of the fire detector base 2 are provided closely to each other. Accordingly, the fire detector 1 can reduce a space to be needed for connecting the external connection terminals 50 and the internal terminals 60, compared with the conventional fire detector base where the external connection terminals and the internal terminals are provided separately from each other. Therefore the fire detector 1 can secure a larger space for arranging the components or wiring thereof. Thus even if the size of the fire detector base 2 is substantially the same as that of the conventional fire detector base, the fire detector 1 can be made to increase the number of components or wirings of fire detector base 2 to mount therein the larger number of sensors or display lamps.

[0078] Next a fire detector base according to a variation of the present embodiment will be explained with reference to FIGS. 13A and 13B. Note that, components similar to those of the fire detector base 2 of the present embodiment are assigned with the same signs and explanations thereof are omitted.

[0079] As shown in FIGS. 13A and 13B, a fire detector base 2 according to the present variation includes two or more pairs of internal terminals 60 and external connection terminals 50 (three pairs in FIG. 13A). The respective internal terminal 60 are arranged along a protruding direction 821 (up-down direction) of a first circumference wall 82 with respect to the corresponding external connection terminals 50. More specifically as shown in FIG. 13A, a second lower surface 85 of a second bottom portion 80 is provided in its part adjacent to an opening 86 with insertion holes 57. Release buttons 52 are disposed outside the insertion holes 57 in a radial direction of the second lower surface 85. Furthermore, the internal terminals 60 and internal terminal blocks 61 are disposed outside the release buttons 52 in the radial direction of the second lower surface 85. As shown in FIG. 13B, the external connection terminals 50 are located above the release buttons 52, the internal terminals 60 and the internal terminal blocks 61.

[0080] Even in the arrangement of the internal terminals 60 and external connection terminals 50 according to the present variation, in each of the internal terminals 60, a distance from each internal terminal 60 noted to a target external connection terminal 50 is shorter than a distance from the each internal terminal 60 noted to any other one of the internal terminals 60, as well as the above embodiment. Furthermore, in each of the internal terminals 60, the distance from each internal terminal 60 noted to the target external connection terminal 50 is shorter than a distance from the target external connection terminal 50 to any other one of the external connection terminals 50, as well as the above embodiment.

[0081] Each internal terminal 60 of the above embodiment is provided adjacent to the corresponding external connection terminal 50 along a circumferential direction of the second bottom portion 80 on the second lower surface 85 of the second bottom portion 80. On the other hand, each internal terminal 60 of the variation is provided below the corresponding external connection terminal 50. The internal terminals 60 and the external connection terminals 50 are however not limited to such the arrangements. For example, each internal terminal 60 may be adjacent to the corresponding external connection terminal 50 in a radial direction of the second bottom portion 80. In that case, each external connection terminal 50 is preferably provided adjacent to the opening 86 shown in FIG. 5, and the corresponding internal terminal 60 is preferably disposed outside of each external connection terminal 50 in a radial direction of the second upper surface 84. According to such the arrangement, the external wiring 600 drawn out from the opening 86 can be easily connected to the external connection terminal 50.

[0082] The arrangement of the external connection terminals 50 and internal terminals 60 may be different from that shown in FIG. 5 and 13A. That is, as long as the distance (L1, L2 or L3) is shorter than any of the distance (L61, L62; L61, L63; or L62, L63) and the distance (L51, L52; L51, L53; or L52, L53), the arrangement is not limited in particular.

[0083] The first circumference wall 82 does not necessarily include the knockout part 87.

[0084] Each internal terminal 60 is not necessarily integrally with the corresponding external connection terminals 50. More specifically, each internal terminal 60 may be provided separately from the corresponding external connection terminals 50 and then electrically connected to the corresponding external connection terminals 50.

[0085] Also in any of those cases, the external connection terminals 50 and the internal terminals 60 of the fire detector base 2 of the present embodiment are provided closely to each other, compared with the conventional fire detector base where the external connection terminals and the internal terminals are provided separately from each other. Therefore the fire detector base 2 can reduce a space to be needed for connecting the external connection terminals 50 and the internal terminals 60. Thus, the fire detector base 2 can secure a larger space for arranging the components or wiring thereof.

[0086] Each internal terminal 60 may be connected to the spring 54, instead of the terminal part 53 of the corresponding external connection terminal 50.

[0087] The terminal part 53 of the external connection terminal 50 may be formed separately from the spring 54. In this case, the spring 54 can be replaced with another spring with a different spring constant, depending on a diameter of the external wiring 600, and the external connection terminal 50 can be therefore connected to the external wirings 600 with various diameters.

[0088] The number of terminal groups 800, namely the number of groups in each of which the external connection terminals 50 and the single internal terminals 60 correspond to each other in one-to-one, is not limited to three, but may be two or more.

[0089] The embodiments described above are merely examples of various embodiments according to the present invention. Therefore the present invention is not limited to those embodiments. The embodiments may be made various modifications based on designs or the like, as long as the object of the present invention can be achieved.

Reference Signs List

[0090]

1 Fire Detector
2 Fire Detector Base
3 Detector Body
4 Pedestal
40 Bottom Wall
50 External Connection Terminal
60 Internal Terminal
81 Circumferential Edge
82 First Circumference Wall (Circumference Wall)
87 Knockout Part
320 Electric Circuit
600 External Wiring (Wiring)
820 End
821 Protruding Direction
870 Wall Portion
871 Side Portion
L1, L2, L3, L51, L52, L53, L61, L62, L63 Distance

Claims

1. A fire detector base, comprising:

a pedestal configured to attach thereto a detector body, the pedestal including a bottom wall, and the detector body including an electric circuit for detecting fire;
external connection terminals configured to be electrically connected to an external wiring, the external connection terminals being fixed to the bottom wall; and
internal terminals to which the electric circuit is electrically connected, the internal terminals being fixed to the bottom wall,
the respective internal terminals corresponding to the external connection terminals in one-to-one,
each of the internal terminals being electrically connected to a target external connection terminal that is one corresponding to each internal terminal noted, of the external connection terminals,
in each of the internal terminals, a distance from each internal terminal noted to the target external connection terminal being shorter than a distance from the each internal terminal noted to any other one of the internal terminals, and shorter than a distance from the target external connection terminal to any other one of the external connection terminals.

2. The fire detector base of claim 1, wherein
the pedestal further includes a circumference wall having a tubular shape, the circumference wall protruding in a direction intersecting the bottom wall from a circumferential edge of the bottom wall,
the circumference wall includes a knockout part,
the knockout part includes:

two side portions extending in a protruding direction of the circumference wall from an end in the protruding direction, of the circumference wall; and
a wall portion disposed between the two side portions to be adjacent to the two side portions, and

each of the two side portions is smaller in thickness than the wall portion.

3. The fire detector base of claim 1 or 2, wherein
each of the internal terminals is integrally with at least a part of the target external connection terminal corresponding thereto.

4. A fire detector, comprising: the fire detector base of any one of claims 1 to 3; and the detector body.

FIG. 1

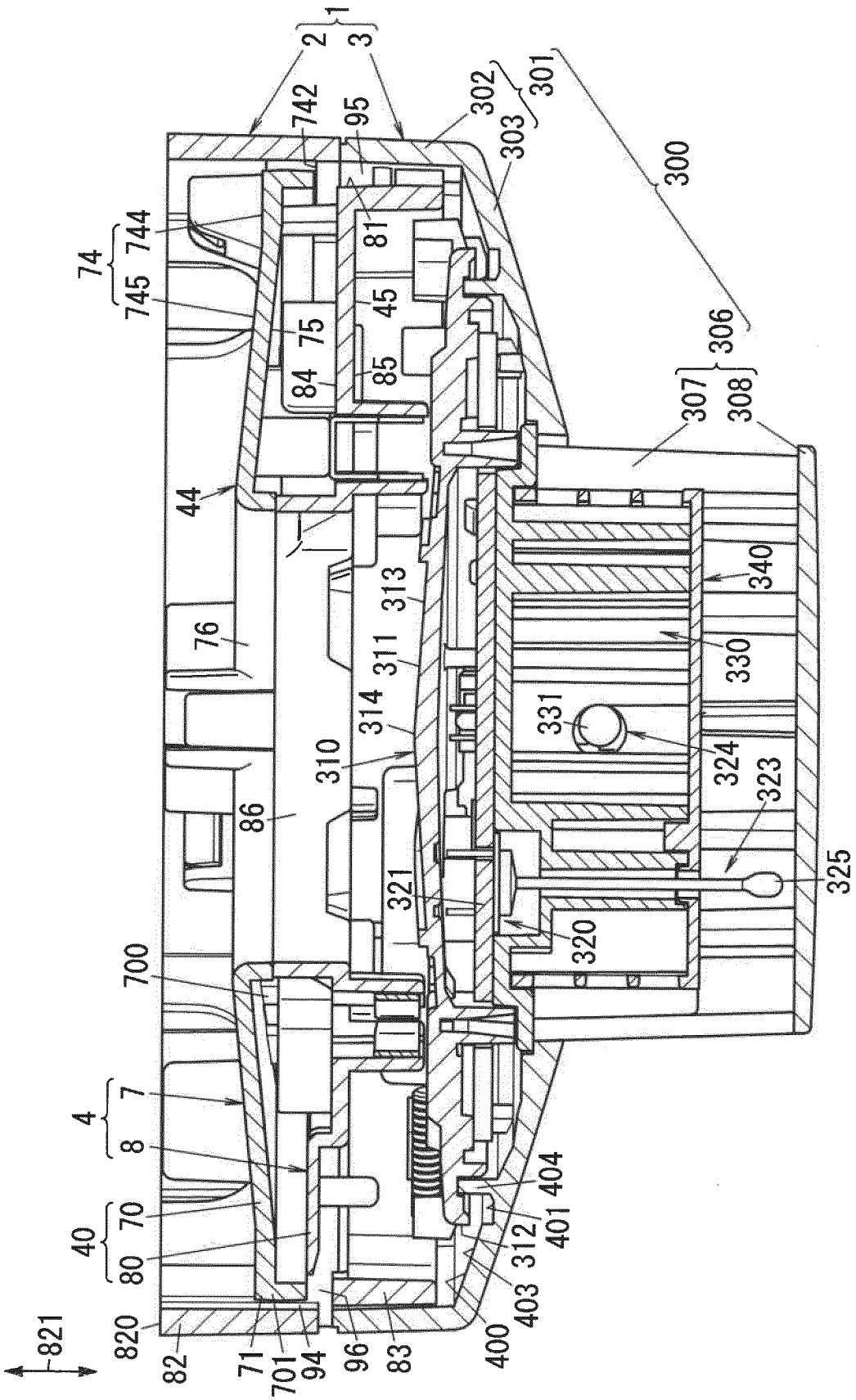
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FIG. 2

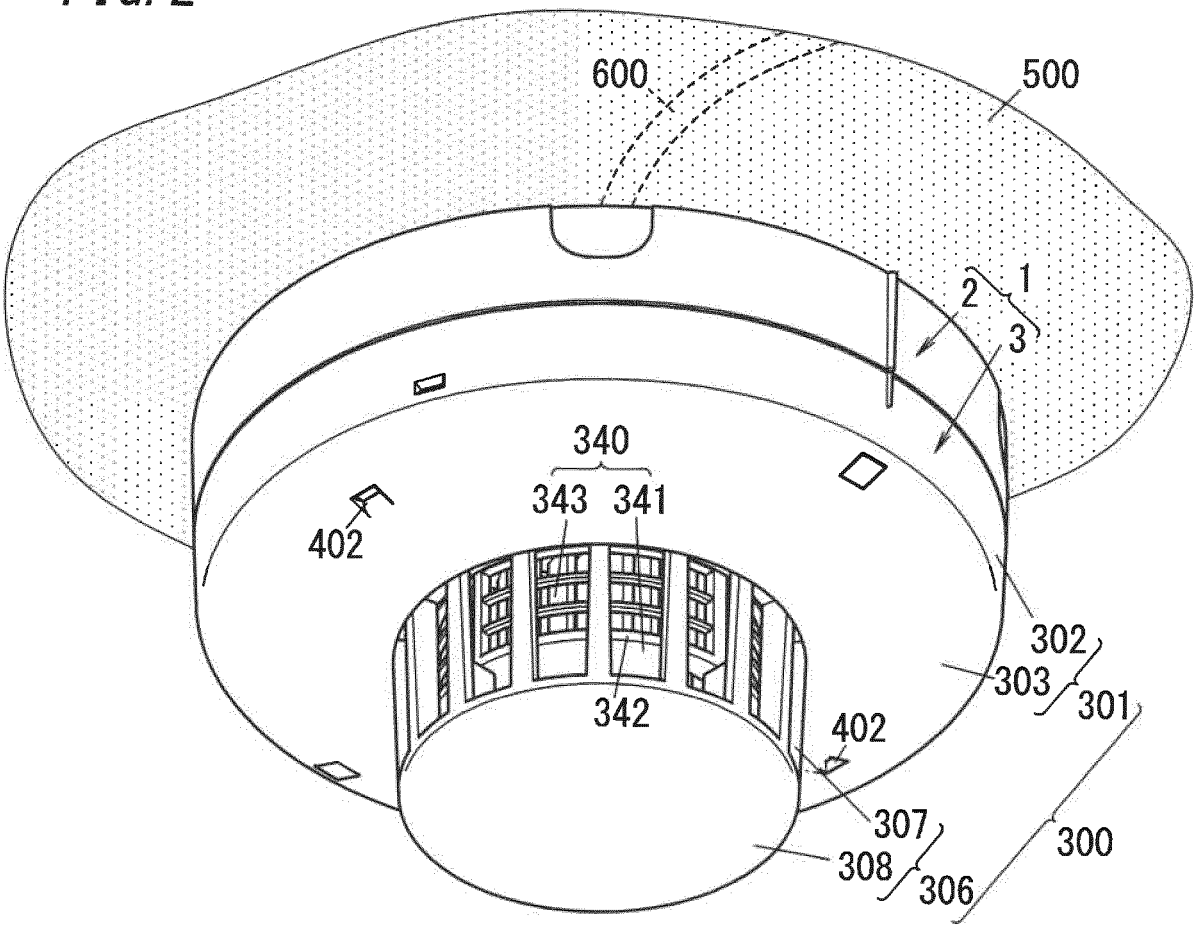
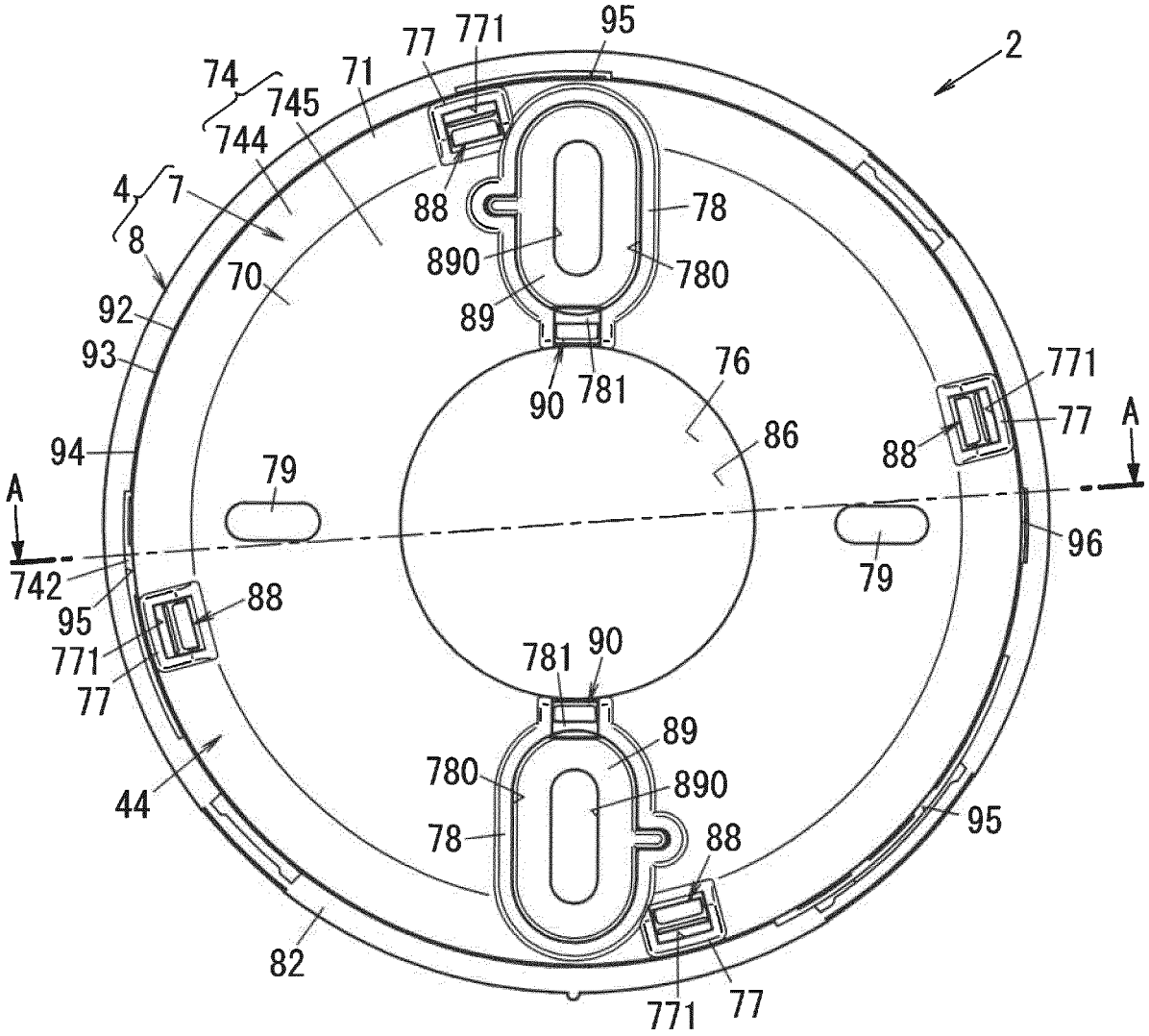


FIG. 3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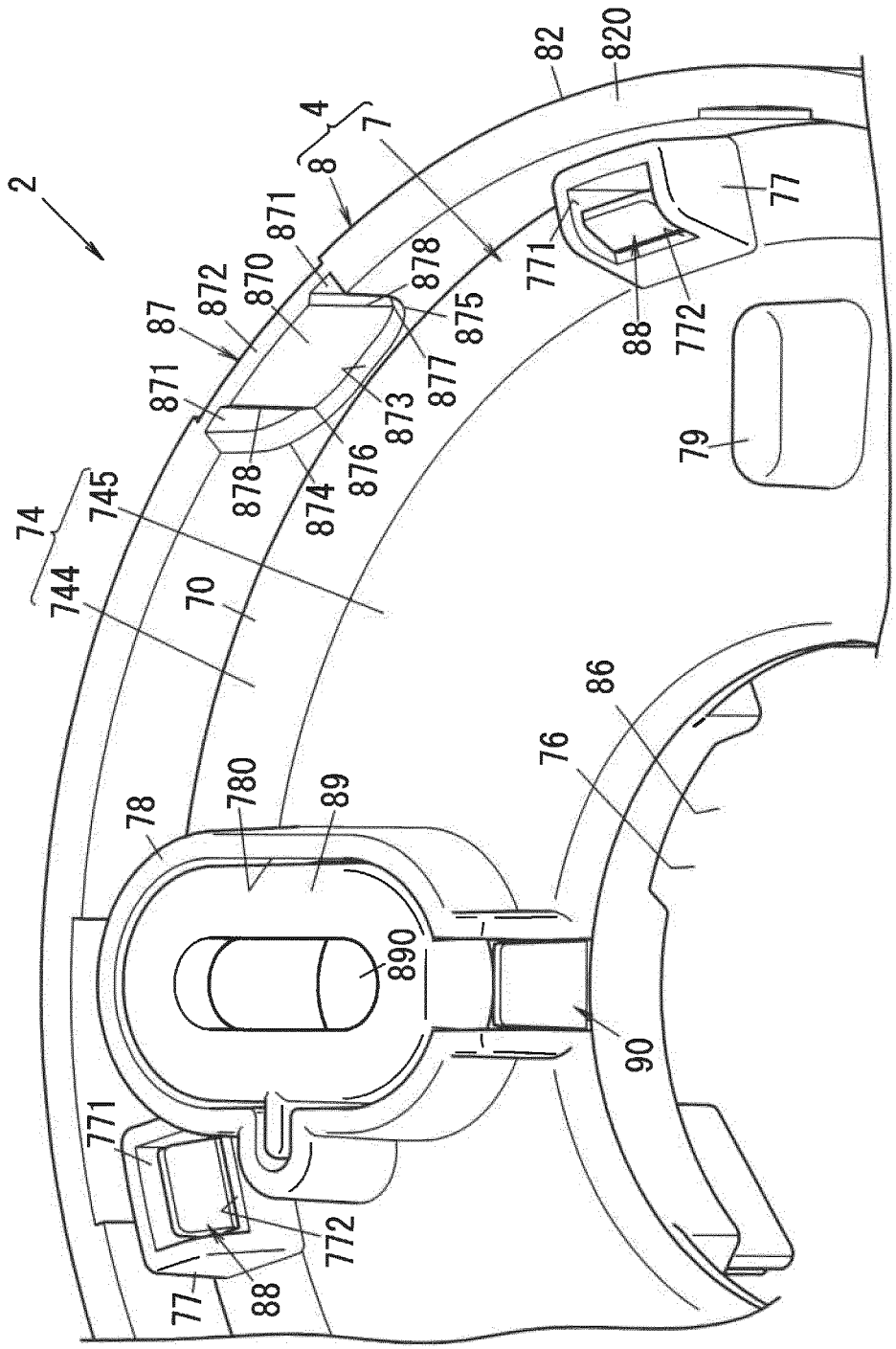
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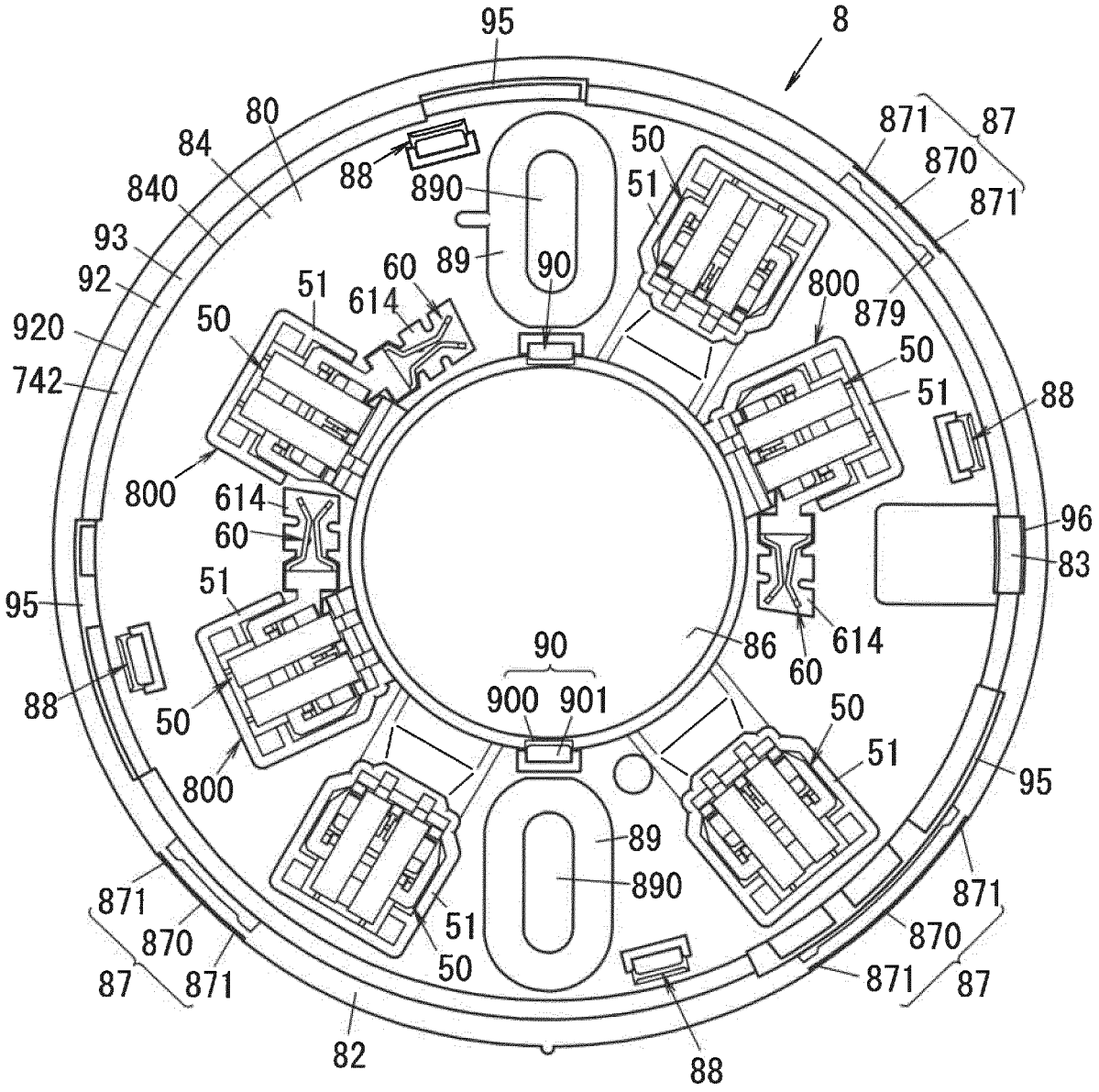
FIG. 4

FIG. 5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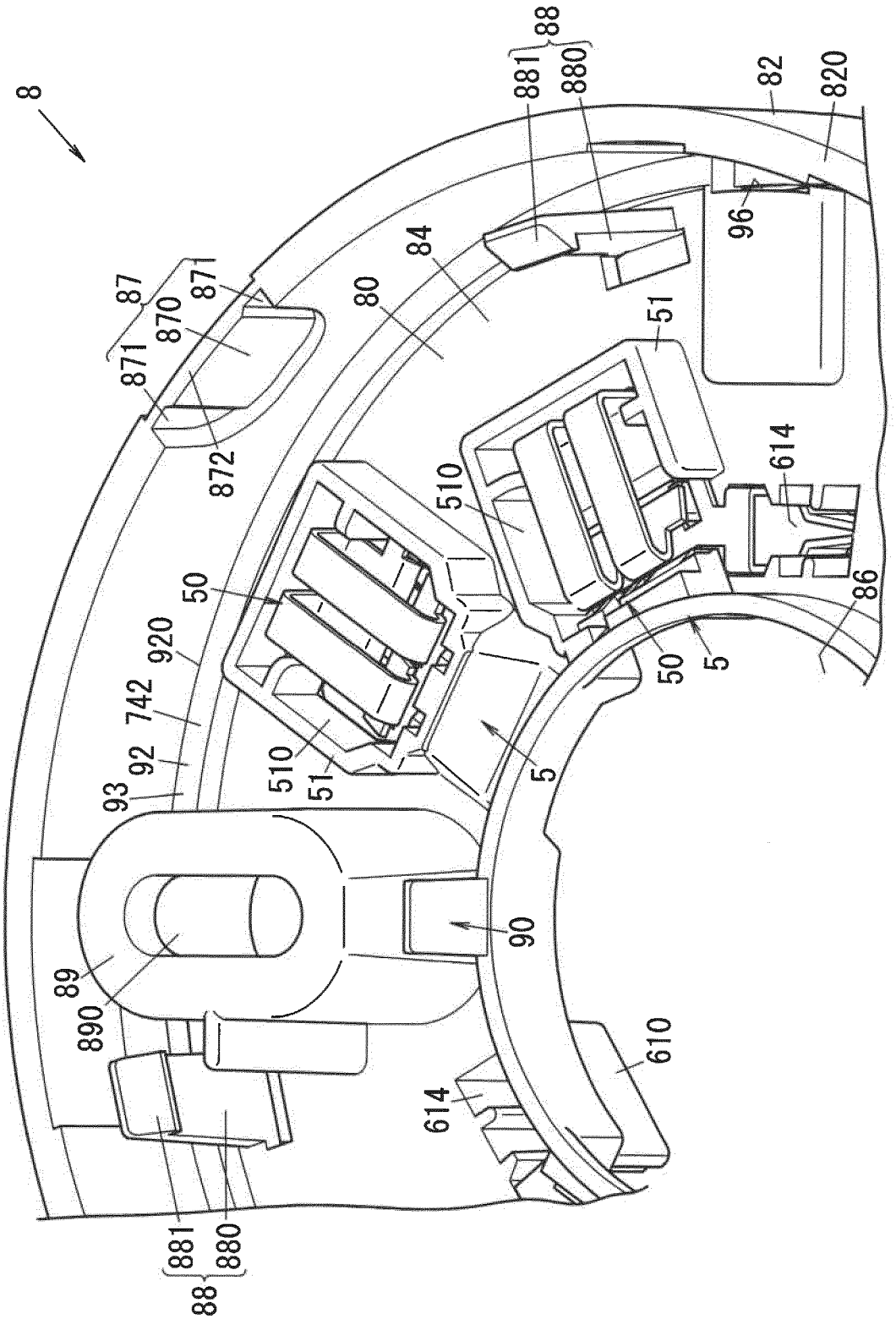
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FIG. 6

FIG. 7

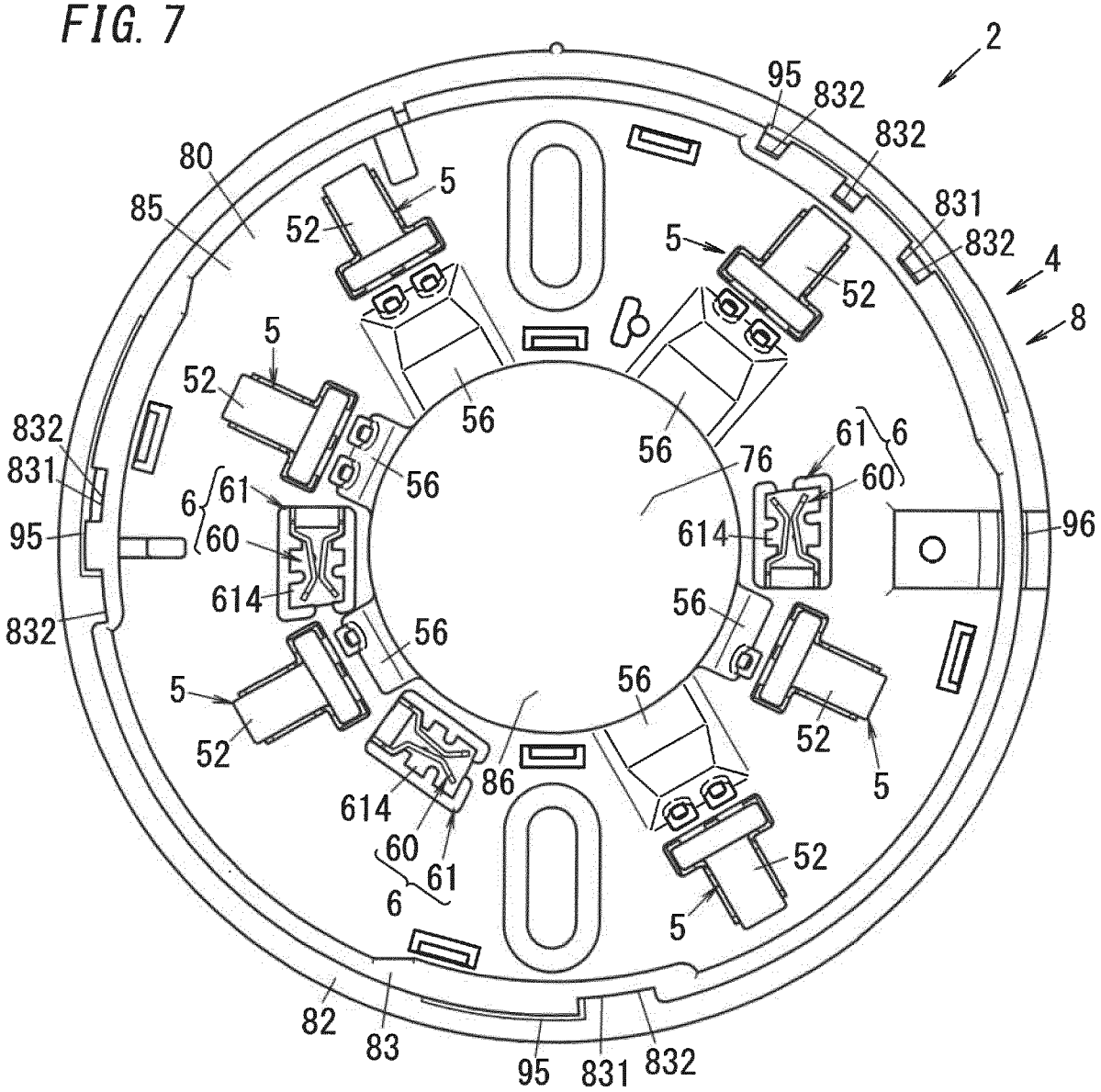
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FIG. 8

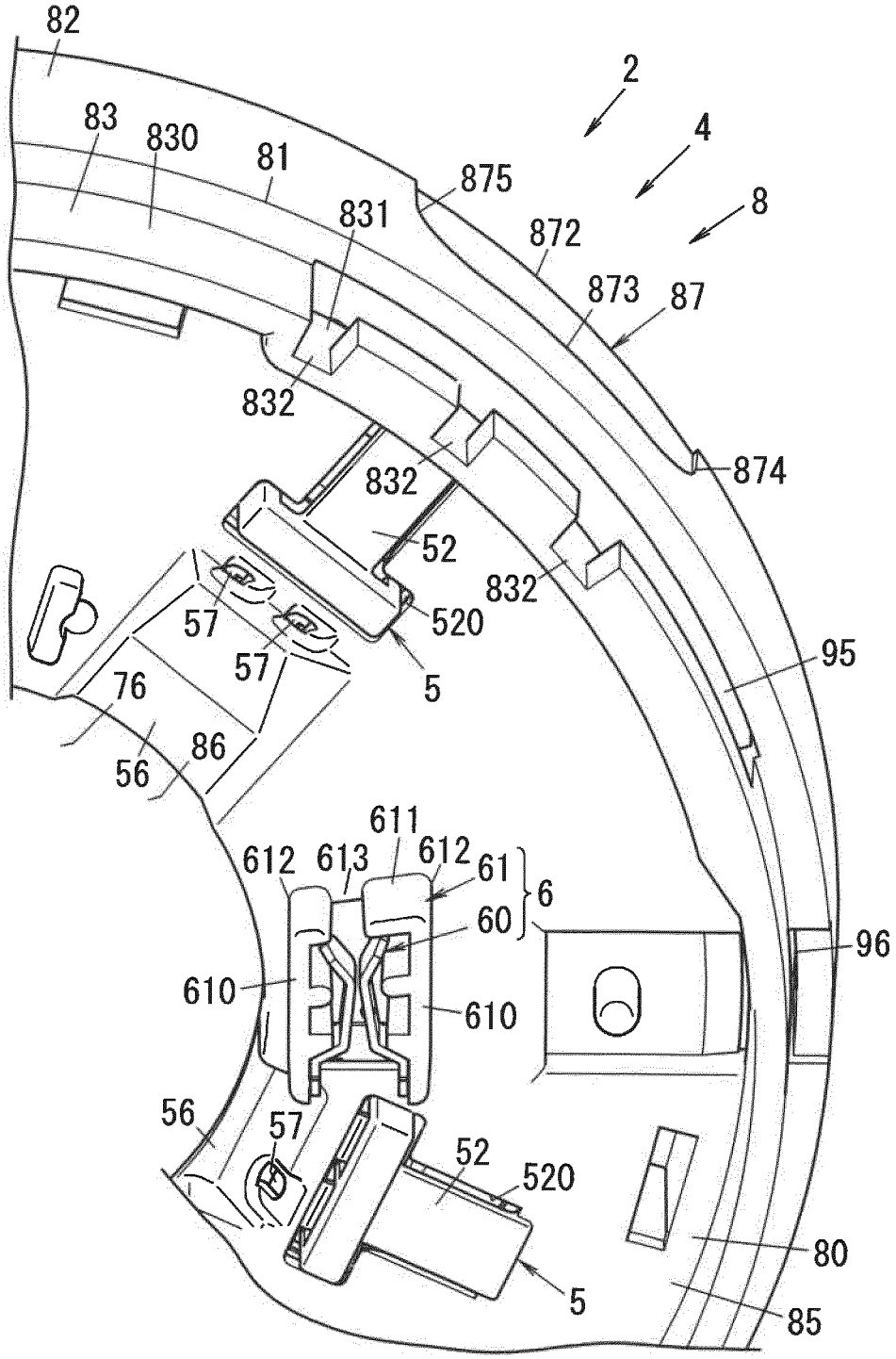
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FIG. 9

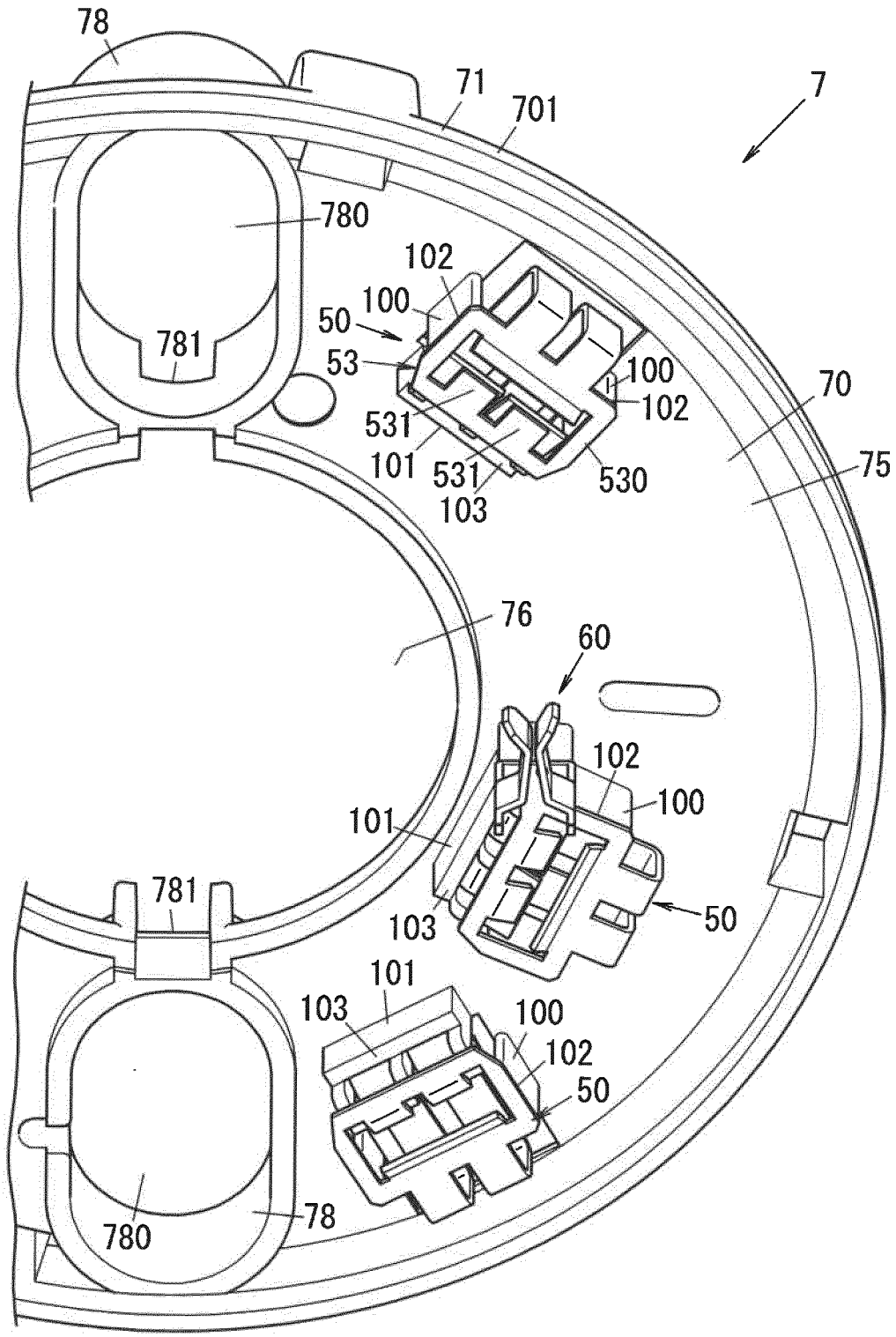
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FIG. 10

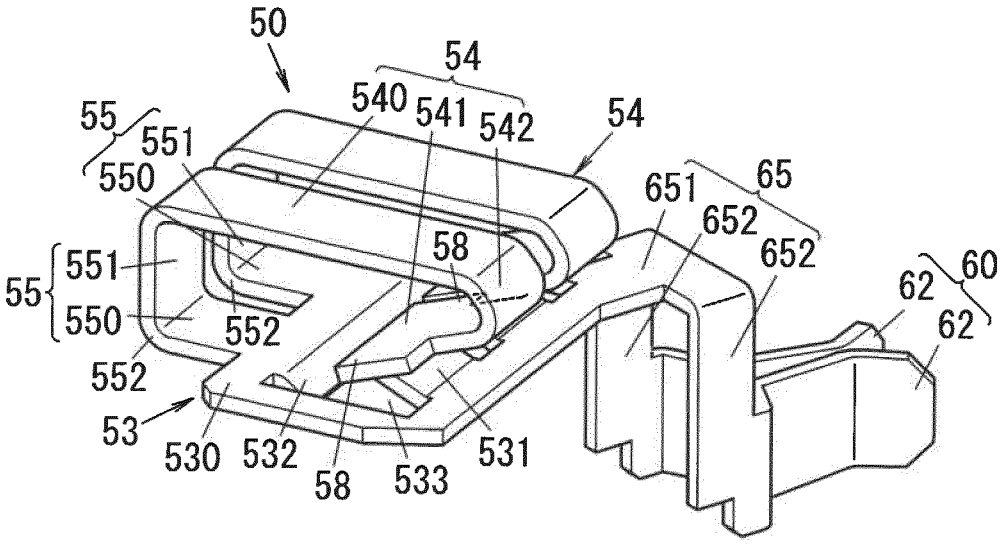
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FIG. 11

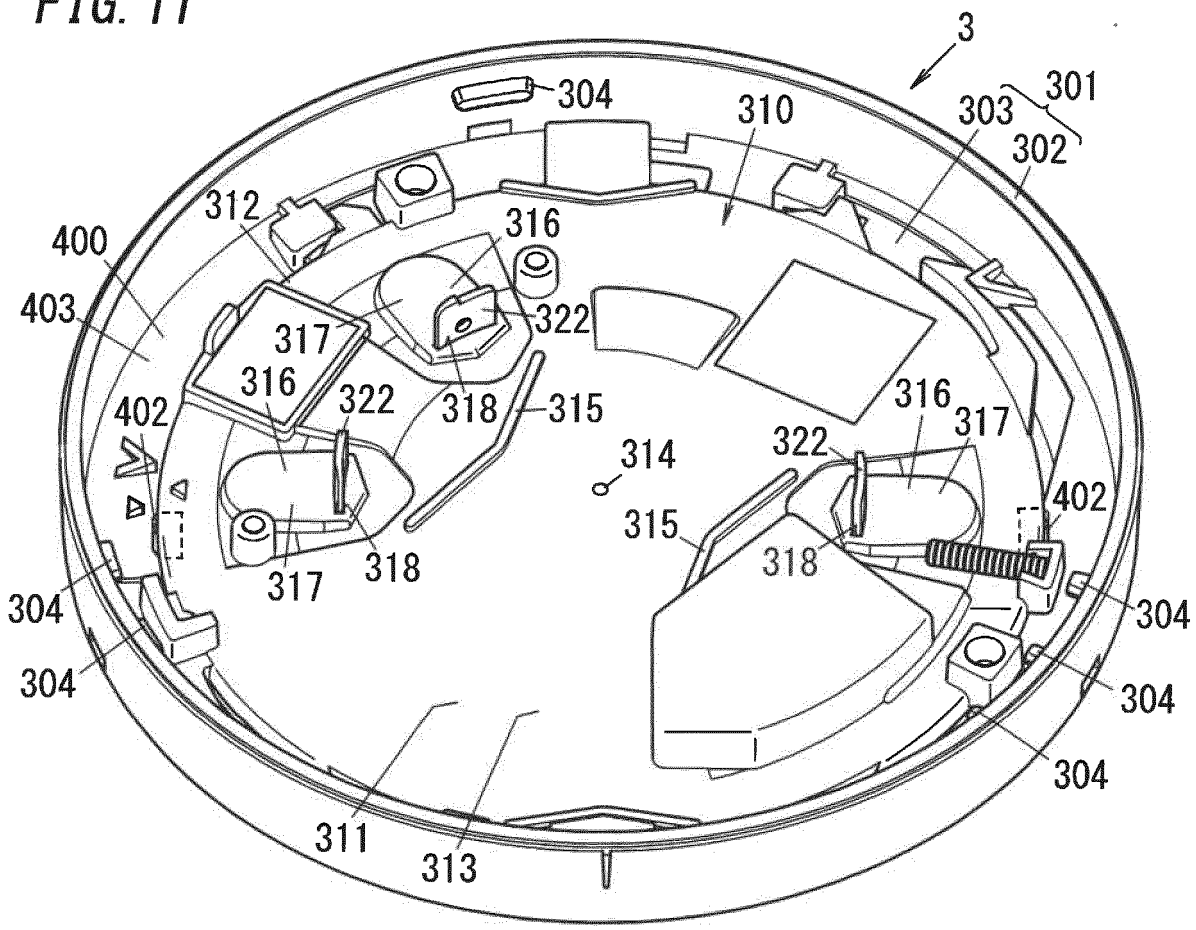
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FIG. 12A

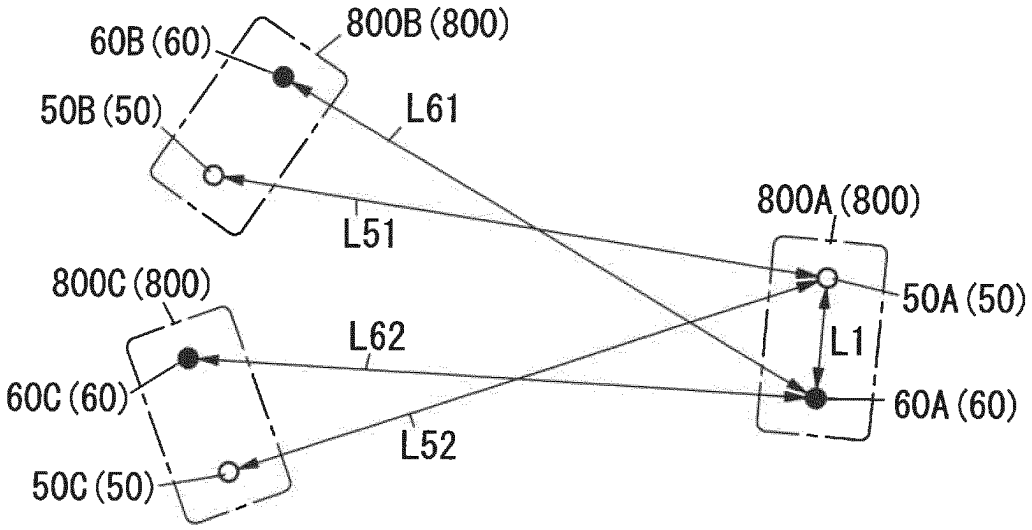


FIG. 12B

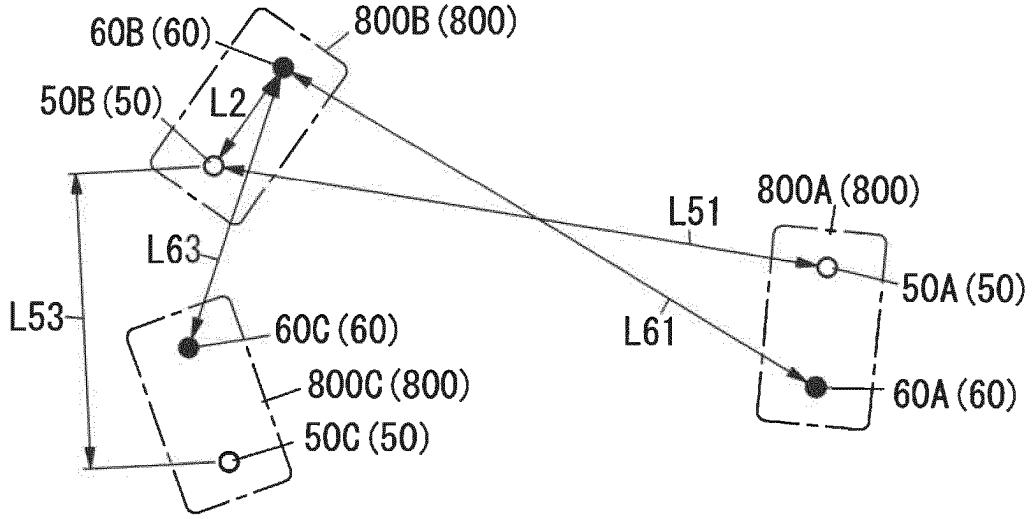


FIG. 12C

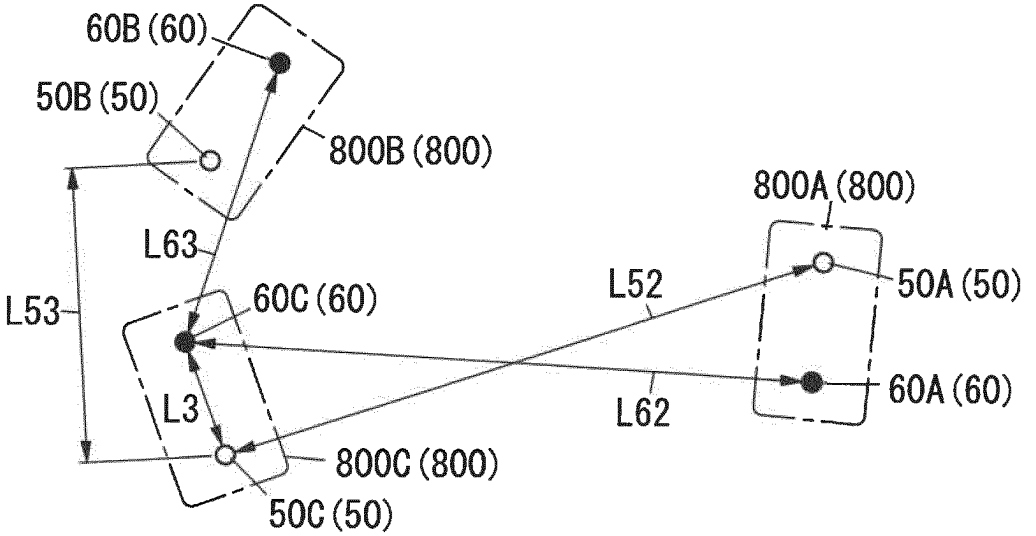


FIG. 13A

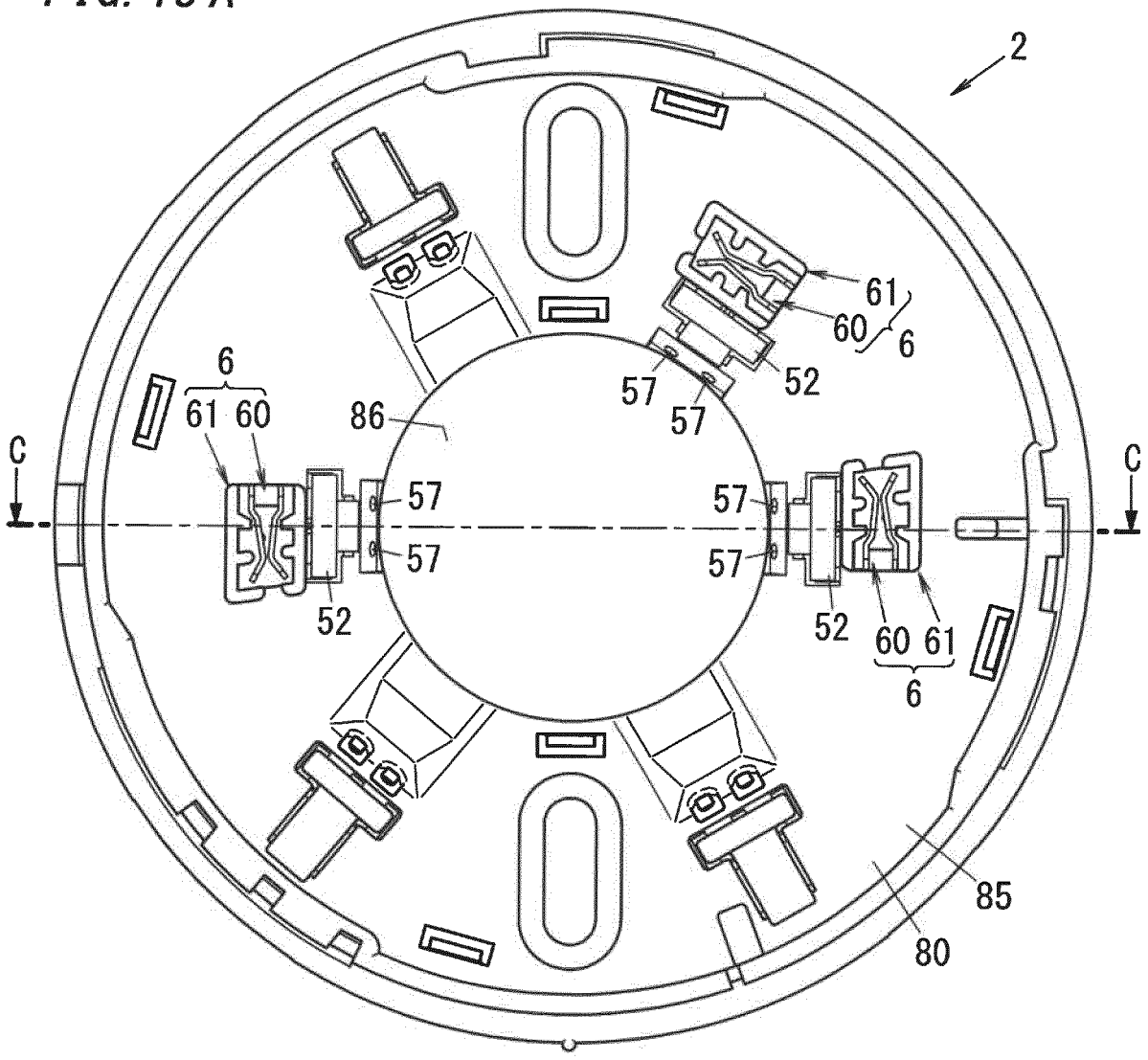
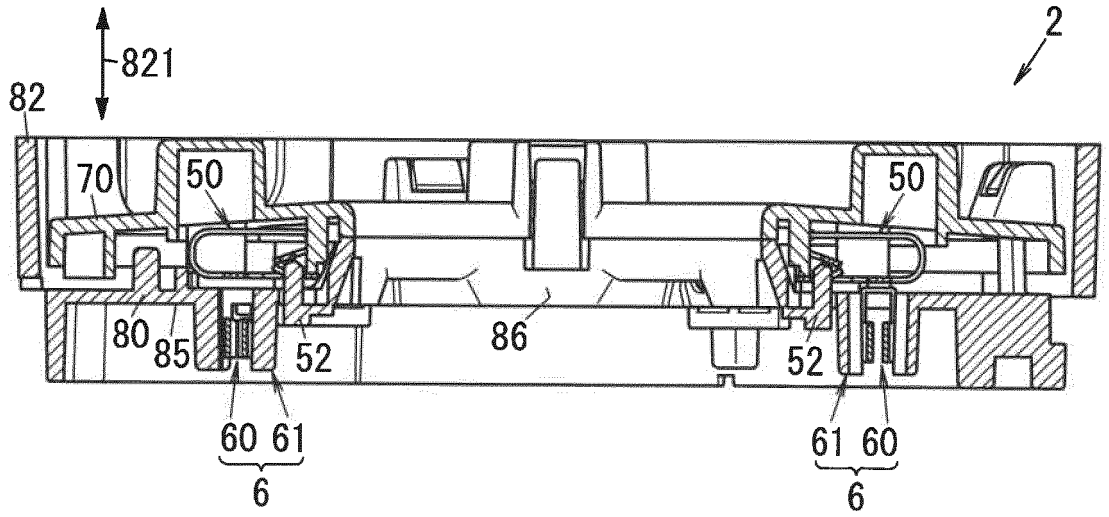


FIG. 13B



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/031291

A. CLASSIFICATION OF SUBJECT MATTER
G08B17/00(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)
G08B17/00

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	1996-2017
Kokai Jitsuyo Shinan Koho	1971-2017	Toroku Jitsuyo Shinan Koho	1994-2017

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.
X Y	CD-ROM of the specification and drawings annexed to the request of Japanese Utility Model Application No. 22247/1993(Laid-open No. 9062/1994) (Nohmi Bosai Ltd.), 04 February 1994 (04.02.1994), paragraphs [0005], [0011] to [0017]; fig. 1 to 10 (Family: none)	1,4 2,3
Y	JP 2010-102417 A (Nohmi Bosai Ltd.), 06 May 2010 (06.05.2010), paragraph [0032]; fig. 8 & KR 10-2010-0044689 A & CN 101727724 A & TW 201025204 A	2,3

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 October 2017 (30.10.17)	07 November 2017 (07.11.17)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/031291

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 56-111990 A (Matsushita Electric Works, Ltd.), 04 September 1981 (04.09.1981), page 2, lower right column, lines 6 to 17; fig. 5 (Family: none)	3

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Patent documents cited in the description

- JP 2015153026 A **[0004]**