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## (54) Plug connector assembly

(57) A plug connector assembly is provided in which an inserting force is obtained reliably when a pressing part is pressed. The plug connector assembly (P) comprises: housing (100) having a body (110), a central plug part (120) extending from the body (110) towards the fitting side, and a plurality of leg parts (130) extending from the body (110) towards the fitting side; and a control member (200) having a plate-like operating member (210), and a plurality of guiding members (220) extending from the operating member (210) towards the fitting side. When the hooking parts (131) of the leg parts (130) are pressed towards the central plug part (120), the hooking parts (131) will be displaced to approach towards the central plug part (120), and when the hooking parts (131) are pulled towards the fitting side, the hooking parts (131) will be restrained from being displaced towards the central plug part (120).

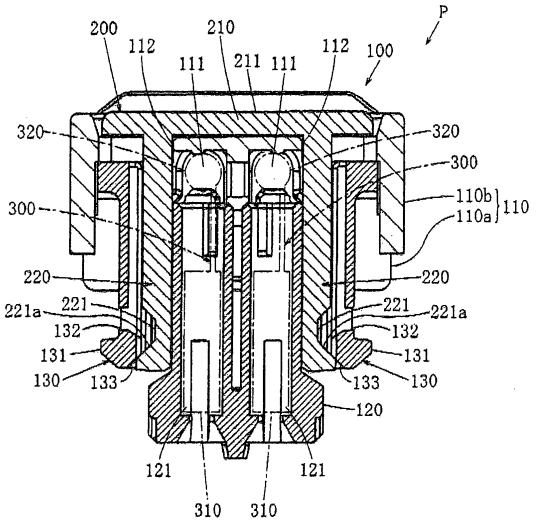
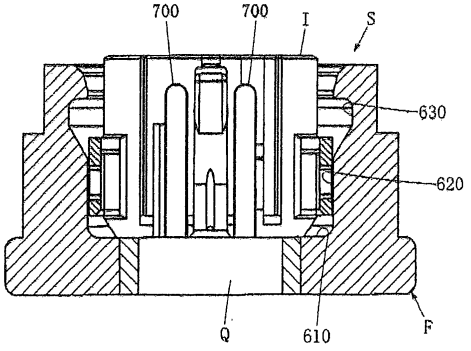



Fig. 1

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## Description

**[0001]** The present invention relates to electric connectors. More particularly the present invention relates to plug-type connectors which are arranged to be fitted in a counterpart socket and to be locked by a locking mechanism.

**[0002]** Japanese Patent Publication (unexamined) No. 2006-19297 discloses a plug-type connector comprising a housing having connecting parts and locking means, a housing cover, and a partial cover having two locking tongue pieces with a locking protrusion formed at the end thereof, respectively. Said locking means and said locking protrusions, together with curved parts of said housing, mechanically lock said plug-type connector, which is being inserted into the socket, in said socket. In this case, said locking tongue pieces engage said locking protrusions with annular groove provided in the inner walls of said socket, and said curved parts serve as the engaging parts for said locking tongue pieces. Said housing cover is provided with a concaved part for introducing a tool (such as a screw driver) for unlocking the lock of the partial cover.

**[0003]** When the plug-type connector of Japanese Patent Publication (unexamined) No. 2006-19297 is to be inserted into said socket, a pressing force is applied to said partial cover to push the plug-type connector into the socket. However, as the partial cover has a plate-like form which is so structured that its one face serves as a pressing face and two locking tongue pieces extend substantially parallel to each other from the other face, warpage of the plate-like part and flexion of the locking tongue pieces change depending on which part of the plate-like member is pressed. As a result, the load required for engaging said locking protrusions with said annular groove, in other words, the inserting force for engaging said locking protrusions with said annular groove changes depending on which part of said plate-like member is pressed, and in turn, the operability is erratic.

**[0004]** Various aspects and features of the present invention are defined in the appended claims.

**[0005]** The present invention was made in view of such points, and is intended to provide a plug connector assembly wherein a housing is provided with leg parts having a hooking part for fitting into an annular groove of a socket, and movements of said leg parts are controlled by a control member which is to be pressed towards said socket, thereby a load for engaging the hooking parts of the leg parts with the annular groove of said socket, in other words, an inserting force for engaging said hooking parts with said annular groove is obtained reliably whatever part of the pressing face of the control member may be pressed, thus the operability is enhanced.

**[0006]** According to one aspect of the present invention there is provided a plug connector assembly comprising:

a housing having a body being provided therein with the first receiving chambers for receiving the connecting part sides of electric terminals, a central plug part extending from the body towards the fitting side in the height direction and being provided therein with the second receiving chambers being communicatively connected to said first receiving chambers, opening on the fitting side and being to receive the contacting parts of said electric terminals, and a plurality of leg parts extending from a plurality of points of annular parts surrounding said central plug part, when seen in the height direction of said body, towards the fitting side in the height direction, respectively; and

a control member having a plate-like operating member of which non-fitting-side face serving as the pressing face and fitting-side face contacting the body of said housing, and a plurality of guiding members extending from the fitting-side face of the operating member substantially in parallel to each other towards the fitting side and slidably fitting in a plurality of through holes penetrating in the height direction between said central plug part and said plurality of leg parts of said body;

each of said leg parts being provided, on its fitting-side end, on the farther side from said central plug part, with a hooking part protruding towards the farther side from said central plug part;

each of said guiding members being provided, on its fitting-side end, on the farther side from said central plug part and in a position opposing to the fitting-side end of each of said leg parts, with a concaved part concaving towards said central plug part, the fitting-side face of the faces constituting each of the concaved parts substantially opposing to the top-end inner-side part being on the fitting-side top end of each of said leg parts and in a position on the closer side to said central plug part, and being formed into a guiding face so tilted to approach towards the non-fitting side when approaching towards said central plug part;

each of said leg parts being provided, on the non-fitting side of the hooking part and on the closer side to said central plug part, with a sheltering part concaving towards the farther side from said central plug part to hold the fitting-side end of each of said guiding members when said guiding members being sled towards the non-fitting side; and

said plug connector assembly being so structured that when said hooking parts are pressed towards said central plug part, each of said top-end inner-side parts is guided by each of said guiding faces and displaced to bring each hooking part closer to said central plug part, and when each of said hooking parts is pulled towards the fitting side, each of said top-end inner-side parts is held by each of said guiding faces to restrain the displacement of each hooking part towards said central plug part.

**[0007]** When electric terminals are received in the first receiving chambers and the second receiving chambers of the plug connector assembly, the plug connector is completed. Then, to insert this plug connector into the socket wherein the annular groove is provided in the circumferential wall of its inner walls, a pressing force is applied to the pressing face of the operating member of said control member and said plug connector is pushed into said socket in the height direction. As a result, each of said hooking parts is pressed by the circumferential wall of the inner walls of said socket towards said central plug part, and each of said top-end inner-side parts is so guided by each of said guiding faces that each hooking part is displaced to close towards said central plug part, and in turn said central plug part is inserted into the socket, then each of said hooking parts displaces due to restoring force in a direction of moving away from said central plug part and fits into the annular groove of said socket, and this completes locking of said plug connector in the socket. Now, if said plug connector is to be pulled out of the socket, each of said hooking parts is pulled towards the fitting side, however, as each of said top-end inner-side parts is held by each of said guiding faces and each hooking part is prevented from being displaced towards said central plug part, thus said plug connector is prevented from being pulled out of the socket. Moreover, if the control member is made to slide towards the non-fitting side with respect to the housing, it will become possible for the fitting-side end of each of said guiding members to enter the sheltering part of each of said leg parts, thus when said plug connector is pulled from the socket towards the non-fitting side, each of said hooking parts will be pushed by the circumferential wall of the inner walls of said socket towards said central plug part and come off from said annular groove to undo the locking, and in turn said plug connector will be withdrawn from said socket.

**[0008]** In said conventional plug-type connector, two locking tongue pieces extend from the plate-like partial cover, however, in the plug connector assembly of the present invention, a plurality of leg parts extend from the body of the housing, and the body constitutes a three-dimensional structure surrounding the first receiving chambers and has a higher rigidity than that of said plate-like partial cover. Furthermore, although warpage of the operating member and flexion of the guiding members might vary depending on which part of the pressing face of the operating member is pressed, the pressing force being exerted to the operating member is hardly transmitted to the leg parts due to relative movements between the guiding members and the leg parts. Hence, when to insert said plug connector into said socket, a pressing force is applied to the operating member of said control member and said plug connector is forced into said socket in the height direction, flexion of said leg parts will not change irrespective of any part of the pressing face of said control member being pressed, and the load for making the hooking parts of said leg parts engage with the annular groove of said socket, in other words, the inserting force for making said hooking parts engage with said annular groove will be generated reliably, and in turn the operability will be enhanced.

**[0009]** The plug connector assembly of the present invention may be so arranged that the numbers of said leg parts and said guiding members are two, respectively, said two guiding members are provided, when seen in the height direction, in positions substantially opposing to each other with the second receiving chambers of said central plug part in between, and said two leg parts are provided, when seen in the height direction, in farther positions from said central plug part than said two guiding members and in positions substantially opposing to each other with the second receiving chambers of said central plug part in between.

**[0010]** With this arrangement, the plug connector assembly of the present invention is realized with few leg parts and guiding members.

**[0011]** The plug connector assembly of the present invention may be so arranged that the top-end inner-side part of each of said leg parts is formed into a sloped face which slopes towards the non-fitting side when approaching towards said central plug part,

**[0012]** With this arrangement, in comparison with a case wherein the edge is left as it is without forming such a sloped face, the contact pressure when the top-end inner-side part of each of said leg parts contacts the guiding face is restrained, and a more stable contact is made.

**[0013]** Embodiments of the invention will now be described with reference to the accompanying drawings, throughout which like parts are referred to by like references, and in which:

Fig. 1 is a sectional view showing the first embodiment of the plug connector assembly and the socket of the present invention. The squib is not sectioned.

Fig. 2 is a perspective view showing the first embodiment of said plug connector assembly and said socket.

Fig. 3 is a side view showing the first embodiment of said plug connector assembly and said socket.

Fig, 4 is a rear view showing the first embodiment of said plug connector assembly and said socket.

Fig. 5 is an exploded perspective view showing the first embodiment of said plug connector assembly and said socket.

Fig. 6 is an enlarged sectional view of a relevant part of the first embodiment of said plug connector assembly and said socket. Therein the plug connector assembly is being inserted into the socket. The arrow indicates the direction of displacement of the top-end inner-side part.

Fig. 7 is an enlarged sectional view of a relevant part of the first embodiment of said plug connector assembly and said socket. The plug connector assembly is inserted in the socket and locked in the socket. The arrow indicates the direction of movement of the

top-end inner-side part when the hooking part is pulled towards the fitting side.

Fig. 8 is a diagram corresponding to Fig. 1. The plug connector assembly is inserted in the socket and is locked in the socket.

Fig. 9 is a diagram corresponding to Fig. 1. The control member is slid from the state of Fig. 8 towards the non-fitting side.

Fig. 10 is a diagram corresponding to Fig. 1. The plug connector assembly is pulled out of the socket from the state of Fig. 9.

Fig. 11 is a perspective view showing the second embodiment of the plug connector assembly of the present invention.

Fig. 12 is a side view showing the second embodiment of the plug connector assembly of the present invention.

**[0014]** In the following, some embodiments of the present invention will de described. Fig. 1 through Fig. 10 show the first embodiment of the plug connector assembly of the present invention. When electric terminals 300 are assembled in a plug connector assembly P, the plug connector is completed, and when this plug connector is inserted into a counterpart socket S, this plug connector will be locked in the socket S and the electric terminals 300 of the plug connector will be connected to electric terminals 700 of said socket S. In the case of this embodiment, the socket S is provided by concaving the outer surface of a housing F of an inflator in the height direction. The receiving space being said concavity is formed by a bottom wall 610 facing substantially in the height direction and a circumferential wall 620 surrounding the bottom wall 610 into a cylindrical form substantially. The inner walls of the socket S are comprised of the bottom wall 610 and the circumferential wall 620. Said electric terminals 700 are formed of a conductive material in rod forms and rise from said bottom wall 610 in the height direction. In the housing F of said inflator, a squib Q, which receives electric energy to generate heat, is fixed on the rear side of the socket S, and an igniter and a gas generator are arranged around the squib Q. The squib Q has a built-in heater, and said electric terminals 700 are a pair of pins which are provided to be conductive to the heater and protrude from the squib Q. On the rear side of the inflator, a deflated airbag is stored. It is so structured that when electricity is passed through said electric terminals 700 to make the heater generate heat, the igniter will be ignited and this in turn will make the gas generator generate gas, and this gas will deploy the airbag. However, it should be understood that this description does not limit in any way construction of the structure of the socket according to the present invention. It is sufficient for the socket that it has a receiving space being concaved in the height direction and has electric terminals being arranged in said receiving space; the number of said electric terminals is determined according to a predetermined number of poles, and is not limited to two poles by this embodiment. In the following, when "fitting-side" or "non-fitting-side" is used in relation to a member or a part, if the member or part is provided in/on the plug connector assembly, it means the fitting-side or the non-fitting-side of the relevant plug connector assembly, and if the member or part is provided in/on the counterpart socket, it means the fitting-side or the non-fitting-side of the relevant counterpart socket. The fitting-side means the side to be fitted, and the non-fitting-side is the side opposite to said fitting-side.

**[0015]** As shown in Fig. 1, an annular groove 630 is formed in the circumferential wall 620 of said socket S. This annular groove 630 is provided in the middle, in the height direction, of said circumferential wall 620, and is concaved in a direction of going away from the center when seen in the height direction. In this embodiment, the annular groove 630 is annularly continuous when seen in the height direction, but a plurality of grooves may be provided in a discontinuous manner.

**[0016]** As shown in Fig. 1, Fig. 2 and Fig. 5, a short-circuit insert I for short-circuiting said pair of electric terminals 700 is fitted in said socket S. This short-circuit insert I is comprised of a housing of an insulating material, which fits in said socket S, and a short-circuit piece (not illustrated) of a conductive material, which is provided in the housing. This short-circuit piece contacts said pair of electric terminals 700 to short-circuit them, and it is so arranged that when said plug connector is inserted into the socket S, said short-circuit piece will be pushed away by the plug connector in a direction of moving away from said pair of electric terminals 700 and in turn the continuity between said pair of electric terminals 700 will be broken.

**[0017]** As shown in Fig. 1, Fig. 2 and Fig. 5, said plug connector assembly P is provided with a housing 100 and a control member 200. In this embodiment, both the housing 100 and the control member 200 are made of insulating material, however, it is necessary at least that any part of the housing which is to contact the electric terminals to be stored in said housing be made of an insulating material. Said housing 100 is provided with a body 110 in which the first receiving chambers 111 are provided. As shown in Fig. 5, this body 110 is provided with a fitting-side member 110a and a non-fitting-side member 110b overlapping and engaging with the fitting-side member 110a. Comparatively speaking, the non-fitting-side member 110b is arranged on the non-fitting side of the fitting-side member 110a. Said electric terminal 300 is made, as a whole, in a substantially L-shaped form of a conductive material, and on one end thereof is provided with a tubular contacting part 310 extending in the height direction, and on the other end thereof is provided with a connecting part 320 extending in a direction being substantially perpendicular to the height direction, said contacting part 310 is to be fitted with the electric terminal 700 of said socket S, and the connecting part 320 is to be connected to the core wire of an electric wire W. As the electric terminals 300 of this embodiment are of a crimp type, the connecting parts 320 are structured

to have barrels, but the connecting parts may be of other forms. Between said fitting-side member 110a and said non-fitting-side member 110b are provided the first receiving chambers 111, and the connecting part 320 side of said electric terminal 300 is arranged to be received in the first receiving chamber 111. More specifically, the connecting part 320 sides of two of said electric terminals 300 being arranged substantially parallel to each other are to be received in the first receiving chambers 111, and the two electric wires W being connected to these connecting parts 320 are lead out of an end of said body 110. The expression . "the connecting part 320 side of the electric terminal 300" is counter to "the contacting part 310 side of the electric terminal 300." In this embodiment, in addition to the connecting part 320, a portion between the connecting part 320 and the contacting part 310 is also received in the first receiving chamber 111; however, it may be arranged that only the connecting part be received therein. With the use of such a structure, said body 110 is made to have a three-dimensional structure enclosing the first receiving chambers 111, and in turn has a higher rigidity than that of a plate-like member. In this embodiment, as described above, said body 110 is divided into the fitting-side member 110a and the non-fitting-side member 110b; however, the body may be provided as a single member without any division and the first receiving chambers for receiving the connecting part sides of the electric terminals may be provided therein.

**[0018]** Said body 110 is provided with a central plug part 120. This central plug part 120 extends from said body 110 towards the fitting side in the height direction. The central plug part 120 is the part to be inserted into the receiving space of said socket S, and said short-circuit insert I is formed to have a receiving part for receiving the central plug part 120. Inside the central plug part 120, two second receiving chambers 121 are provided, which are communicatively connected to said first receiving chambers 111 and open to the fitting side and are to receive the contacting parts 310 of said two electric terminals 300. In this embodiment, in addition to the contacting parts 310, the parts between the contacting parts 310 and the connecting parts 320 are received in the second receiving chambers 121; however, only the contacting parts may be received.

**[0019]** Said body 110 is provided with a plurality of leg parts 130. These leg parts 130 extend from a plurality of points of the annular parts surrounding said central plug part 120 when seen in the height direction of said body 110, along the height direction towards the fitting side, respectively. In this embodiment, the number of the leg parts 130 is two; however, three or more leg parts may be provided. In this embodiment, the leg parts 130 are provided on the fitting-side member 110a of the body 110; however, they may be provided on the non-fitting-side member 110b.

**[0020]** Said control member 200 has a plate-like operating member 210, and a plurality of guiding members 220 provided on the operating member 210. Of this operating member 210, its non-fitting-side face serves as the pressing face 211, and the fitting-side face contacts the body 110 of said housing 100. Said plurality of guiding members 220 extend from the fitting-side face of said operating member 210 substantially in parallel to each other towards the fitting side. The plurality of guiding members 220 respectively and slidably fit in a plurality of through holes 112 which penetrate said body 110 in the height direction between said central plug part 120 and said plurality of leg parts 130. In this embodiment, the number of the guiding members 220 is two; however, three or more guiding members may be provided.

**[0021]** In this embodiment, as described above, the number of said leg parts 130 and the number of the guiding members 220 are two, respectively. These two guiding members 220, when seen in the height direction, are provided in positions substantially opposing to each other with the second receiving chambers 121 of said central plug part 120 in between. Moreover, said two leg parts 130, when seen in the height direction, are provided in farther positions from said central plug part 120 than said guiding members 220 and in positions substantially opposing to each other with the second receiving chambers 121 of said central plug part 120 in between. Said two guiding members 220 are, when seen in the height direction, in positions substantially symmetrical to each other with respect to a virtual line being parallel to the extending directions of the connecting parts 320 of said electric terminals 300 and passing through the center of the second receiving chambers 121 of said central plug part 120, and similarly said two leg parts are in positions substantially symmetrical to each other with respect to said line.

**[0022]** Each of said leg parts 130 is provided with, on its fitting-side end and on the farther side from said central plug part 120, a hooking part 131 protruding towards the farther side from said central plug part 120.

**[0023]** As shown in Fig. 1 and Fig. 6, each of said guiding members 220 is provided, on its fitting-side end, at a part being on the farther side from said central plug part 120 and in a position opposing to the fitting-side end of each of said leg parts 130, with a concaved part 221 concaving towards said central plug part 12Q. Of the faces constituting each of said concaved parts 221, the fitting-side face substantially opposes to the top-end inner-side part 133 which is on the fitting-side top end of each of said leg parts 130 and is in a position on the closer side to said central plug part 120. Moreover, these faces are formed, respectively, into guiding faces 221a which are so tilted that the faces approach towards the non-fitting side as they approach towards said central plug part 120.

**[0024]** As shown in Fig. 1 and Fig. 6, each of said leg parts 130 is provided with a sheltering part 132 on the non-fitting side of the hooking part 131 and on the side closer to said central plug part 120, said sheltering part 132 concaving towards the farther side from said central plug part 120 and serving to receive the fitting-side end

of each of said guiding members 220 when said guiding member 220 is sled towards the non-fitting side. In this embodiment, the sheltering part 132 penetrates the leg part 130 from the face closer to the central plug part 120 to the face farther therefrom; however, it is sufficient to be concaved towards the farther side from the central plug part, and such penetration may be avoided.

**[0025]** Now, it is so arranged that when said hooking parts 131 are pressed towards said central plug part 120, respectively, as shown in Fig.6 by the arrow, each of said top-end inner-side part 133 will be guided by each of said guiding faces 221a, and each of said hooking parts 131 will be displaced to come closer to said central plug part 120, and when said hooking parts 131 are pulled towards the fitting side, respectively, as shown in Fig. 7 by the arrow, each of said top-end inner-side parts 133 will be held by each of said guiding faces 221a, and each of the hooking parts 131 will be restrained from being displaced towards said central plug part 120. In this case, even if the top-end inner-side parts 133 are in a free state or are not overlapping with the guiding faces 221a when seen in the height direction, once said hooking parts 131 are pulled towards the fitting side, due to bending moments generated thereby, the leg parts 130 will be tilted a little and said top-end inner-side parts 133 will be displaced a little in a direction of closing to said central plug part 120; thus said top-end inner-side parts 133 will be held by said guiding faces 221a, respectively.

**[0026]** The top-end inner-side part 133 of each of said leg parts 130 is formed into a sloped face which slopes towards the non-fitting side when approaching towards said central plug part 120.

**[0027]** Next, the action and effect of said embodiment will be described. When electric terminals 300 are received in the first receiving chambers 111 and the second receiving chambers 121 of the plug connector assembly P, the plug connector is completed. Then, to insert this plug connector into the socket S wherein the annular groove 630 is provided in the circumferential wall 620 of its inner walls, a pressing force is applied to the pressing face 211 of the operating member 210 of said control member 200 and said plug connector is pushed into said socket S in the height direction. As a result, each of said hooking parts 131 is pressed by the circumferential wall 620 of the inner walls of said socket S towards said central plug part 120, and each of said top-end inner-side parts 133 is so guided by each of said guiding faces 221a that each hooking part 131 is displaced to close towards said central plug part 120, and in turn said central plug part 120 is inserted into the socket S, then each of said hooking parts 131 displaces due to restoring force in a direction of moving away from said central plug part 120 and fits into the annular groove 630 of said socket S, and this completes locking of said plug connector in the socket S. Now, if said plug connector is to be pulled out of the socket S, each of said hooking parts 131 is pulled towards the fitting side, but as each of said top-end inner-side parts 133 is held by each of said guiding faces 221a and each hooking part 131 is restrained from being displaced towards said central plug part 120, said plug connector is prevented from being pulled out of the socket S. If the control member 200 is made to slide towards the non-fitting side in relation to the housing 100, it will become possible for the fitting-side end of each of said guiding members 220 to enter the sheltering part 132 of each of said leg parts 130, thus when said plug connector is pulled from the socket S towards the non-fitting direction, each of said hooking parts 131 will be pushed by the circumferential wall 620 of the inner walls of said socket S towards said central plug part 120 and come off from said annular groove 630 to undo the locking, and in turn said plug connector will be withdrawn out of said socket S.

**[0028]** In said conventional plug-type connector, two locking tongue pieces extend from the plate-like partial cover; however, in the plug connector assembly P of the present invention, a plurality of leg parts 130 extend from the body 110 of the housing 100, and the body 110 constitutes a three-dimensional structure surrounding the first receiving chambers 111 and has a higher rigidity than that of said plate-like partial cover. Furthermore, although warpage of the operating number 210 and flexion of the guiding members 220 might vary depending on which part of the pressing face 211 of the operating member 210 is pressed, the pressing force being exerted to the operating member 210 is hardly transmitted to the leg parts 130 due to relative movements between the guiding members 220 and the leg parts 130, Hence, when to insert said plug connector into said socket S, a pressing force is applied to the operating member 210 of said control member 200 and said plug connector is forced into said socket S in the height direction, flexion of said leg parts 130 will not change irrespective of any part of the pressing face 211 of said control member 200 being pressed, and the load for making the hooking parts 131 of said leg parts 130 engage with the annular groove 630 of said socket S, in other words, the inserting force for making said hooking parts 131 engage with said annular groove 630 will be generated reliably, and in turn the operability will be enhanced.

**[0029]** In the plug connector assembly of the present invention, the numbers of the legs and the guiding members, and positions in which the legs and the guiding members are to be provided on/in the body of the housing are not limited. Among such a variety of embodiments, the plug connector assembly P of said embodiment has two leg parts 130 and two guiding members 220, respectively, and these two guiding members 220 are provided, when seen in the height direction, in positions substantially opposing to each other with the second receiving chambers 121 of said central plug part 120 in between, and said two leg parts 130 are provided, when seen in the height direction, in positions farther from said central plug part 120 than said two guiding members 220 and in positions substantially opposing to each other with the second receiving chambers 121 of said central plug part 120 in between. When arranged as described above, the

plug connector assembly P of the present invention is accomplished with few leg parts 130 and guiding members 220, and the effect of the plug connector assembly of the present invention is fully exhibited.

**[0030]** In the plug connector assembly according to the present invention, the configuration of the top-end inner-side part of each of said leg parts is not limited. Among such a variety of embodiments, in the plug connector assembly P of said embodiment, the top-end inner-side part 133 of each of said leg parts 130 is formed into a sloped face which approaches towards the non-fitting side when approaching towards said central plug part 120. With this arrangement, in comparison with the case wherein it is left as the edge without provision of such a sloped face, the contact pressure being generated when the top-end inner-side part 133 of the leg part 130 contacts the guiding face 221a is restrained, and the leg part 130 and the guiding member 220 contact with each other more stably.

**[0031]** Fig. 11 and Fig. 12 show the second embodiment of the plug connector assembly according to the present invention. The construction of said first embodiment is quoted without modification for the second embodiment, and any differences in construction from the first embodiment construction will be described additionally. In said first embodiment, the numbers of said leg parts 130 and said guiding members 220 are two, respectively; however, in the second embodiment, the numbers of said leg parts 130 and said guiding members 220 are three, respectively. More specifically, these leg parts 130 extend, respectively, when seen in the height direction of said body 110, from three positions on the annular parts surrounding said central plug part 120 towards the fitting side in the height direction. In this embodiment, the leg parts 130 are provided on the fitting-side member 110a of the body 110, however, they may be provided on the non-fitting-side member 110b. The three guiding members 220 of said control member 200 extend, substantially parallel to each other, from the fitting-side face of said operating member 210 towards the fitting-side. Moreover, these three guiding members 220 slidably fit in three through holes 112, respectively, said three through holes 112 penetrating said body 110 in the height direction between said central plug part 120 and said three leg parts 130 of said body 110, respectively. Two of said three guiding members 220 are provided in positions which, when seen in the height direction, substantially oppose to each other with the second receiving chambers 121 of said central plug part 120 in between. Moreover, two of said three leg parts 130 are provided, when seen in the height direction, in farther positions from said central plug part 120 than said two guiding members 220 and in positions substantially opposing to each other with the second receiving chambers 121 of said central plug part 120 in between. Said two guiding members 220 are, when seen in the height direction, in positions substantially symmetrical to each other with respect to a virtual line being parallel to the extending directions of the connccting parts 320 of said electric terminals 300 and passing through the center of the second receiving chambers 121 of said central plug part 120, and similarly said two leg parts are in positions substantially symmetrical to each other with respect to said line. The remaining one of said guiding members 220 is provided, when seen in the height direction, in a position substantially opposing to the drawing-out side of the electric wires W with the second receiving chambers 121 of said central plug part 120 in between. Furthermore, the remaining one of said leg parts 130 is provided, when seen in the height direction, in a farther position from said central plug part 120 than the remaining one of said guiding members 220 and in a position substantially opposing to the drawing-out side of the electric wires W with the second receiving chambers 121 of said central plug part 120 in between. The structures other than those mentioned above of the body 110 of the housing 100, the central plug part 120 and the leg parts 130, the operating member 210 and the guiding members 220 of the control member 200, and the electric terminals 300 are similar to those of the first embodiment, and the structures of the housing F of the inflator to be connected to, the squib Q, and the bottom wall 610, the circumferential wall 620, the annular groove 630 and the electric terminals 700 of the socket S are similar to those of the first embodiment. In the second embodiment, as the numbers of said leg parts 130 and said guiding members 220 are set at three, respectively, the configuration of the short-circuit insert is adjusted correspondingly. The action and effect provided by said first embodiment are also provided by this second embodiment.

**[0032]** The present invention includes embodiments wherein features of said embodiments and/or their variations are combined. Moreover, the embodiments described so far merely indicate few examples of the plug connector assembly according to the present invention. Accordingly, the plug connector assembly according to the present invention must not be construed limitedly in any way by the descriptions of these embodiments.

## Claims

1. A plug connector assembly (P) comprising
a housing (100) having a body (110) being provided therein with the first receiving chambers (111) for receiving the connecting part sides of electric terminals (300), a central plug part (120) extending from the body (110) towards the fitting side in the height direction and being provided therein with the second receiving chambers (121) being communicatively connected to said first receiving chambers (111), opening on the fitting side and being to receive the contacting parts (310) of said electric terminals (300), and a plurality of leg parts (130) extending from a plurality of points of annular parts surrounding said central plug part (120) , when seen in the height

direction of said body (110), towards the fitting side in the height direction, respectively; and
a control member (200) having a plate-like operating member (210) of which non-fitting-side face serving as the pressing face (211) and fitting-side face contacting the body (110) of said housing (100), and a plurality of guiding members (220) extending from the fitting-side face of the operating member (210) substantially in parallel to each other towards the fitting side and slidably fitting in a plurality of through holes (112) penetrating in the height direction between said central plug part (120) and said plurality of leg parts (130) of said body (110);
each of said leg parts (130) being provided, on its fitting-side end, on the farther side from said central plug part (120), with a hooking part (131) protruding towards the father side from said central plug part (120);
each of said guiding members (220) being provided, on its fitting-side end, on the farther side from said central plug part (120) and in a position opposing to the fitting-side end of each of said leg parts (130), with a concaved part (221) concaving towards said central plug part (120), the fitting-side face of the faces constituting each of the concaved parts (221) substantially opposing to the top-end inner-side part (133) being on the fitting-side top end of each of said leg parts (130) and in a position on the closer side to said central plug part (120), and being formed into a guiding face (221a) so tilted to approach towards the non-fitting side when approaching towards said central plug part (120);
each of said leg parts (130) being provided, on the non-fitting side of the hooking part (131) and on the closer side to said central plug part (120), with a sheltering part (132) concaving towards the farther side from said central plug part (120) to hold the fitting-side end of each of said guiding members (220) when said guiding member (220) being sled towards the non-fitting side; and
said plug connector assembly (P) being so structured that when said hooking parts (131) are pressed towards said central plug part (120), each of said top-end inner-side parts (133) is guided by each of said guiding faces (221a) and displaced to bring each hooking part (131) closer to said central plug part (120), and when each of said hooking parts (131) is pulled towards the fitting side, each of said top-end inner-side parts (133) is held by each of said guiding faces (221a) to restrain the displacement of each hooking part (131) towards said central plug part (120).

**2.** A plug connector assembly (P) according to claim 1, wherein the numbers of said leg parts (130) and said guiding members (220) are two, respectively, said two guiding members (220) are provided, when seen in the height direction, in positions substantially opposing to each other with the second receiving chambers (121) of said central plug part (120) in between, and said two leg parts (130) are provided, when seen in the height direction, in farther positions from said central plug part (120) than said two guiding members (220) and in positions substantially opposing to each other with the second receiving chambers (121) of said central plug part (120) in between.

**3.** A plug connector assembly (P) according to claim 1 or claim 2,
wherein the top-end inner-side part (133) of each of said leg parts (130) is formed into a sloped face which slopes towards the non-fitting side when approaching towards said central plug part (120).

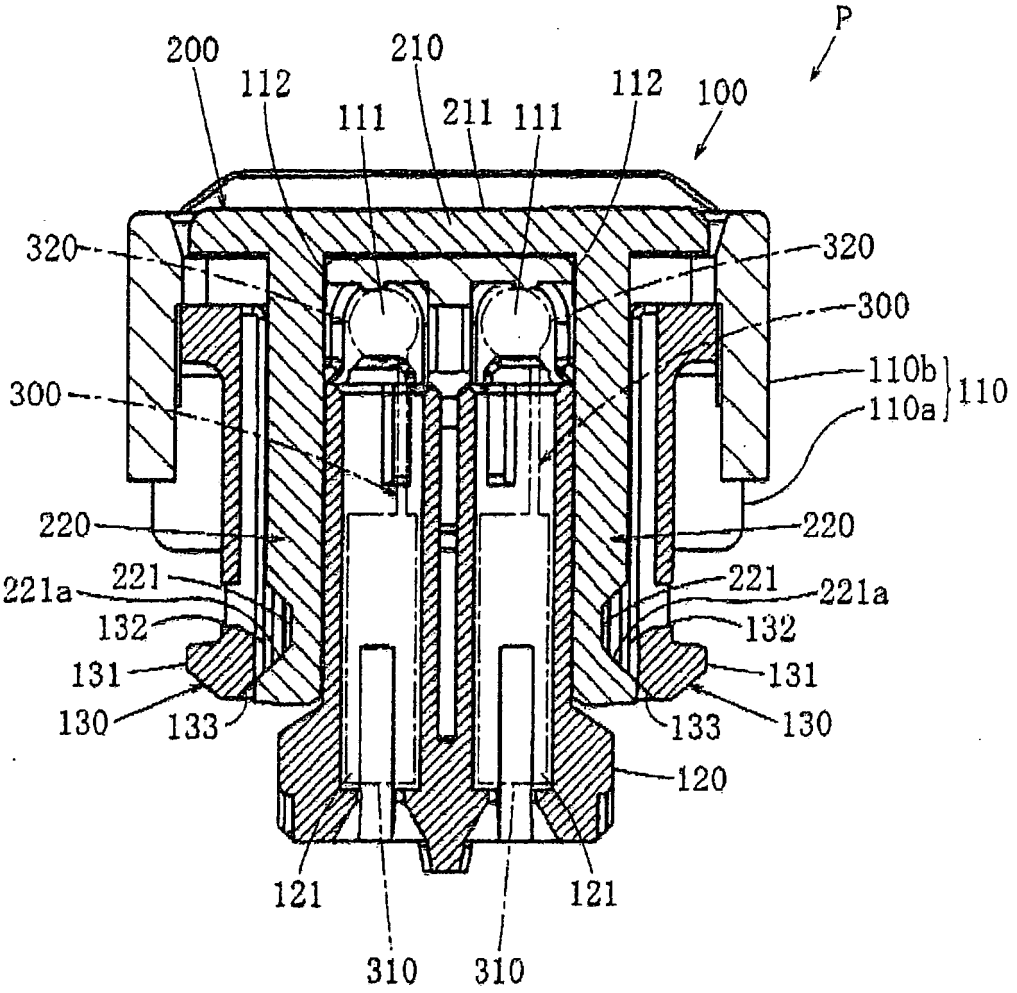
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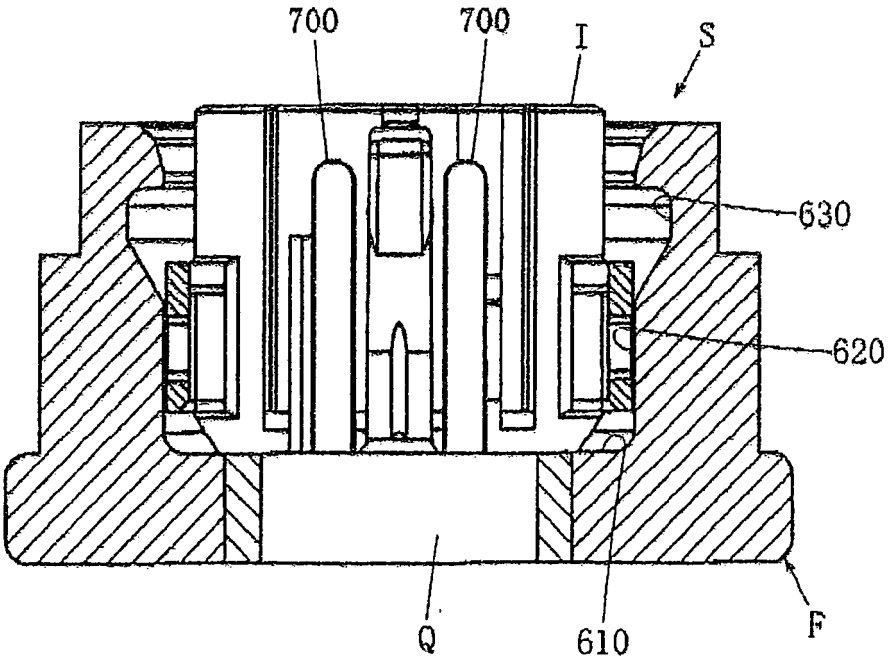
Fig. 1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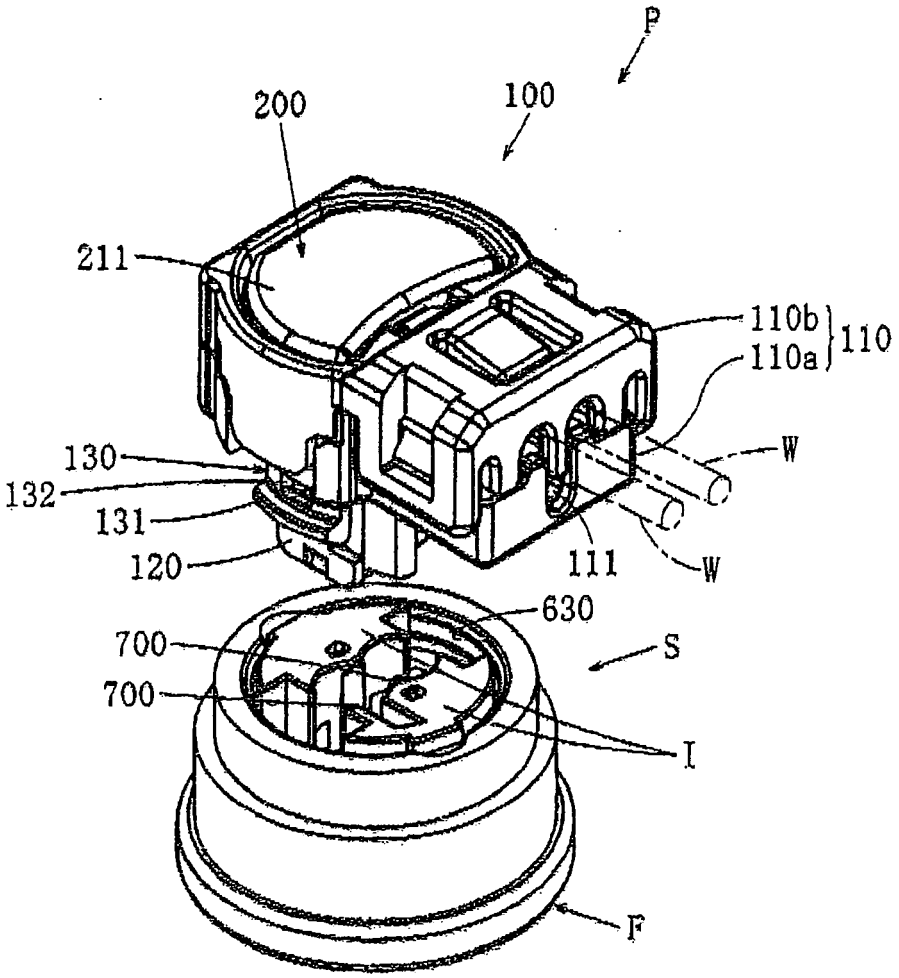
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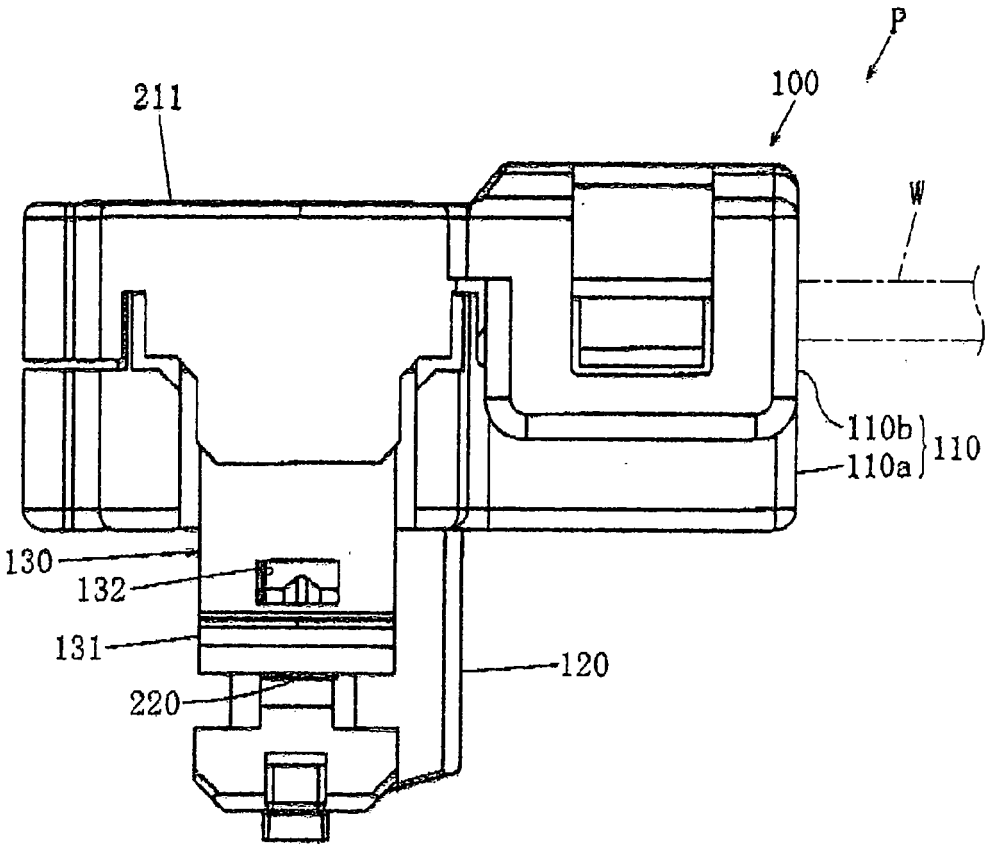
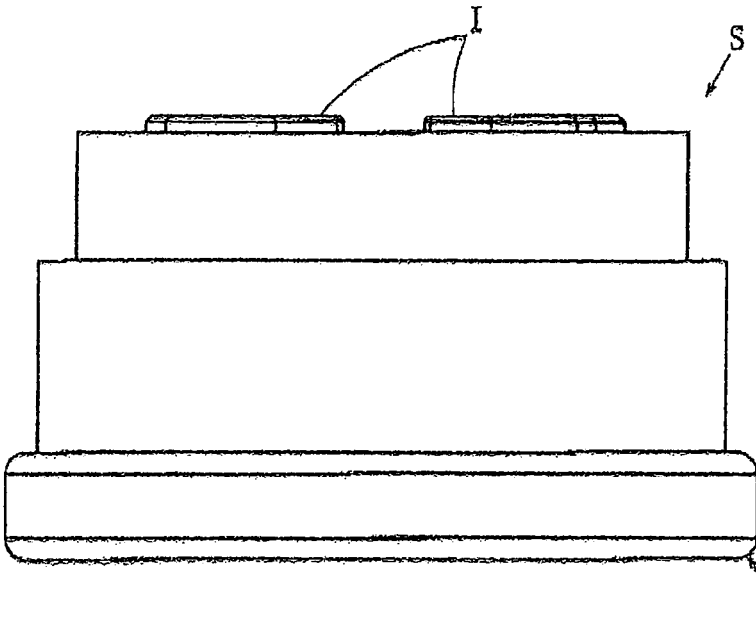
Fig. 2

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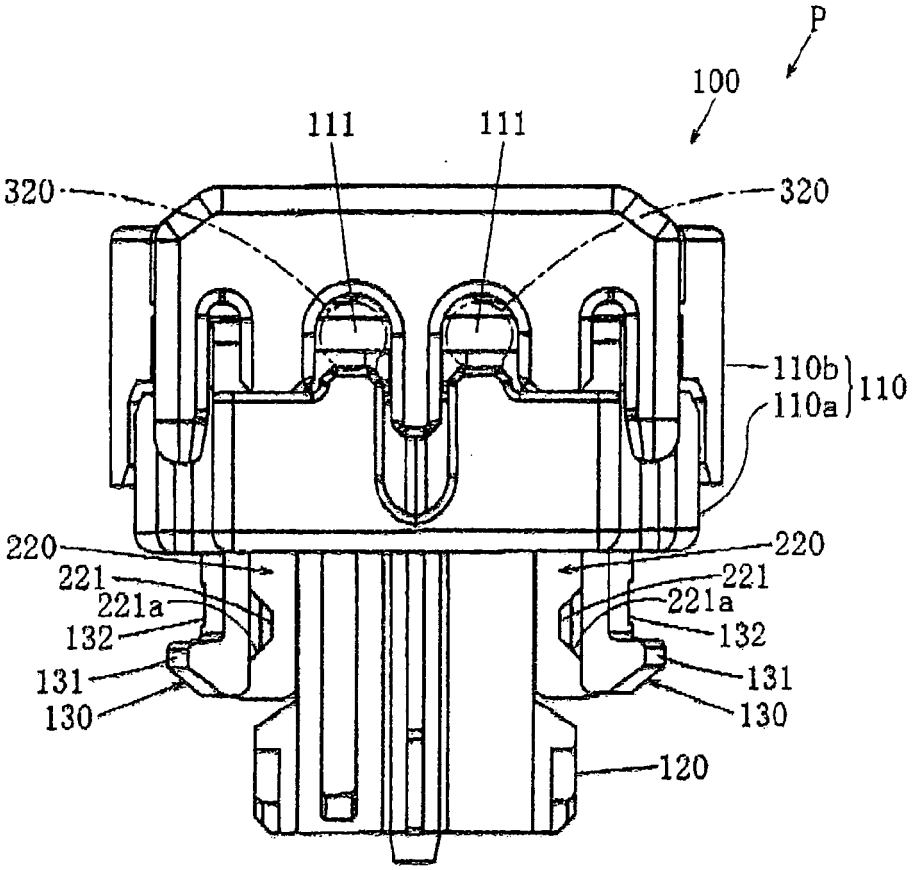
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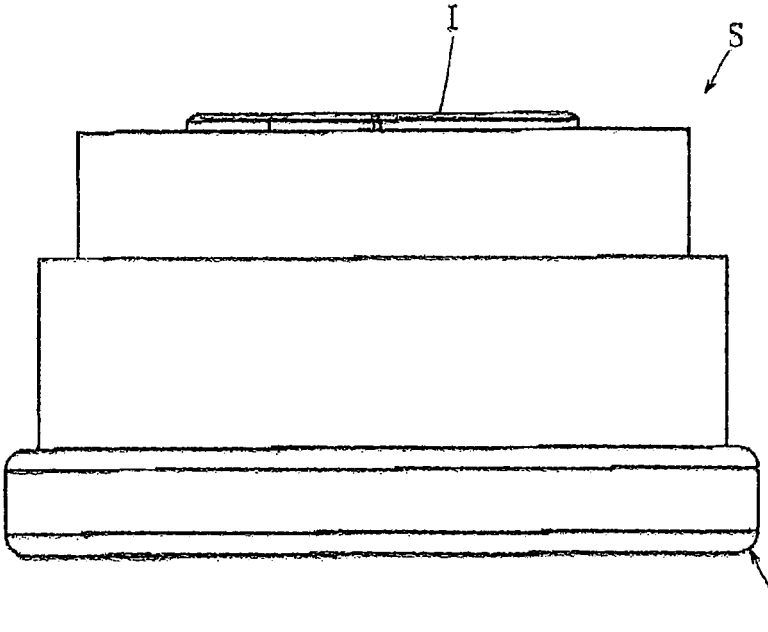
Fig. 4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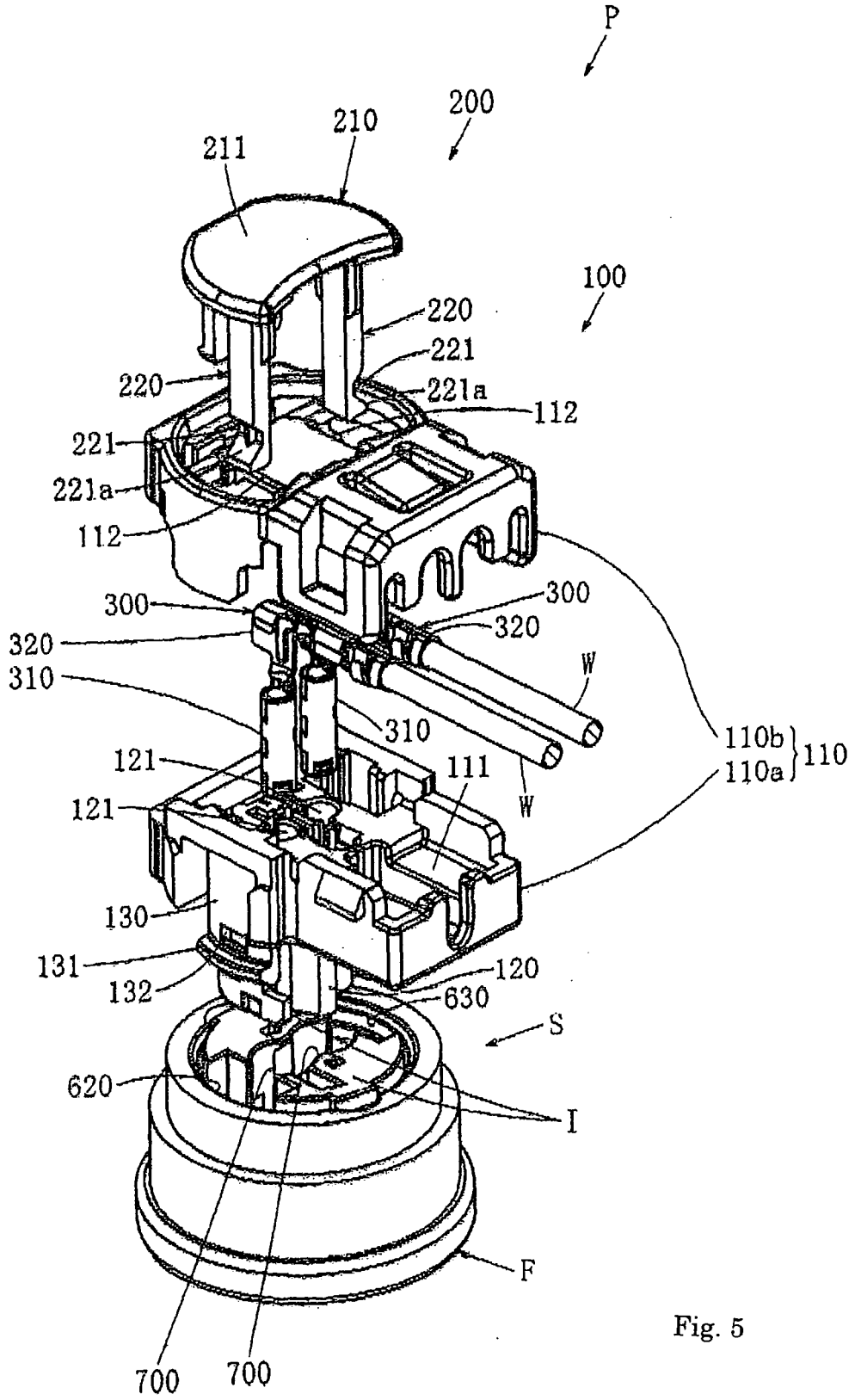
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Fig. 5

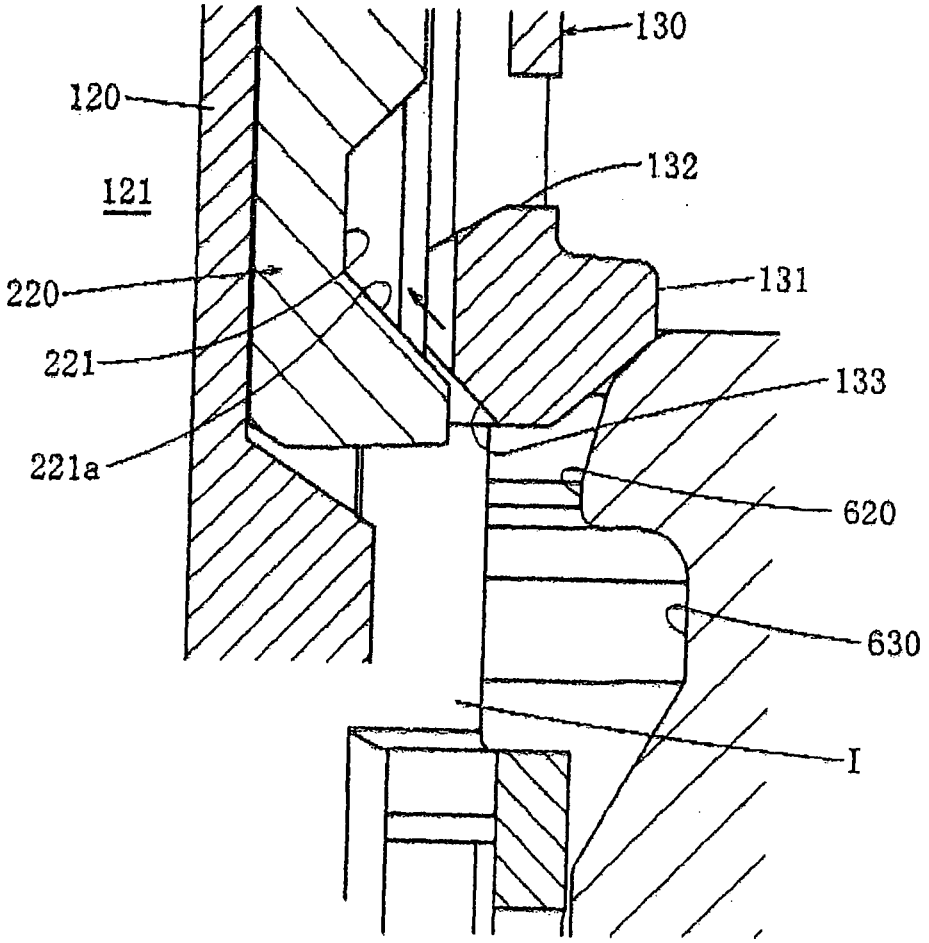


Fig. 6

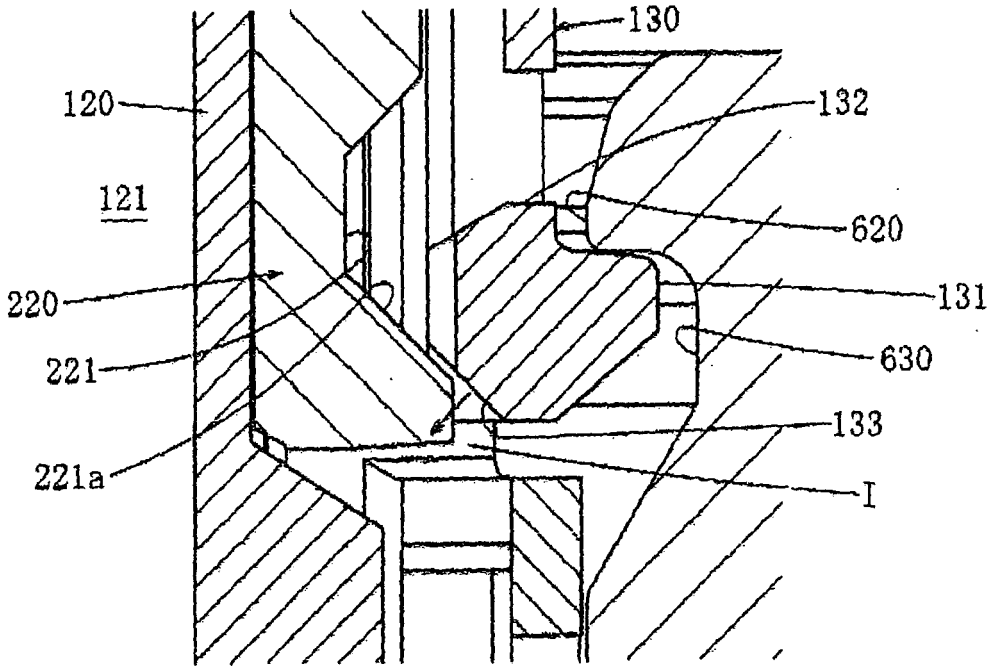


Fig. 7

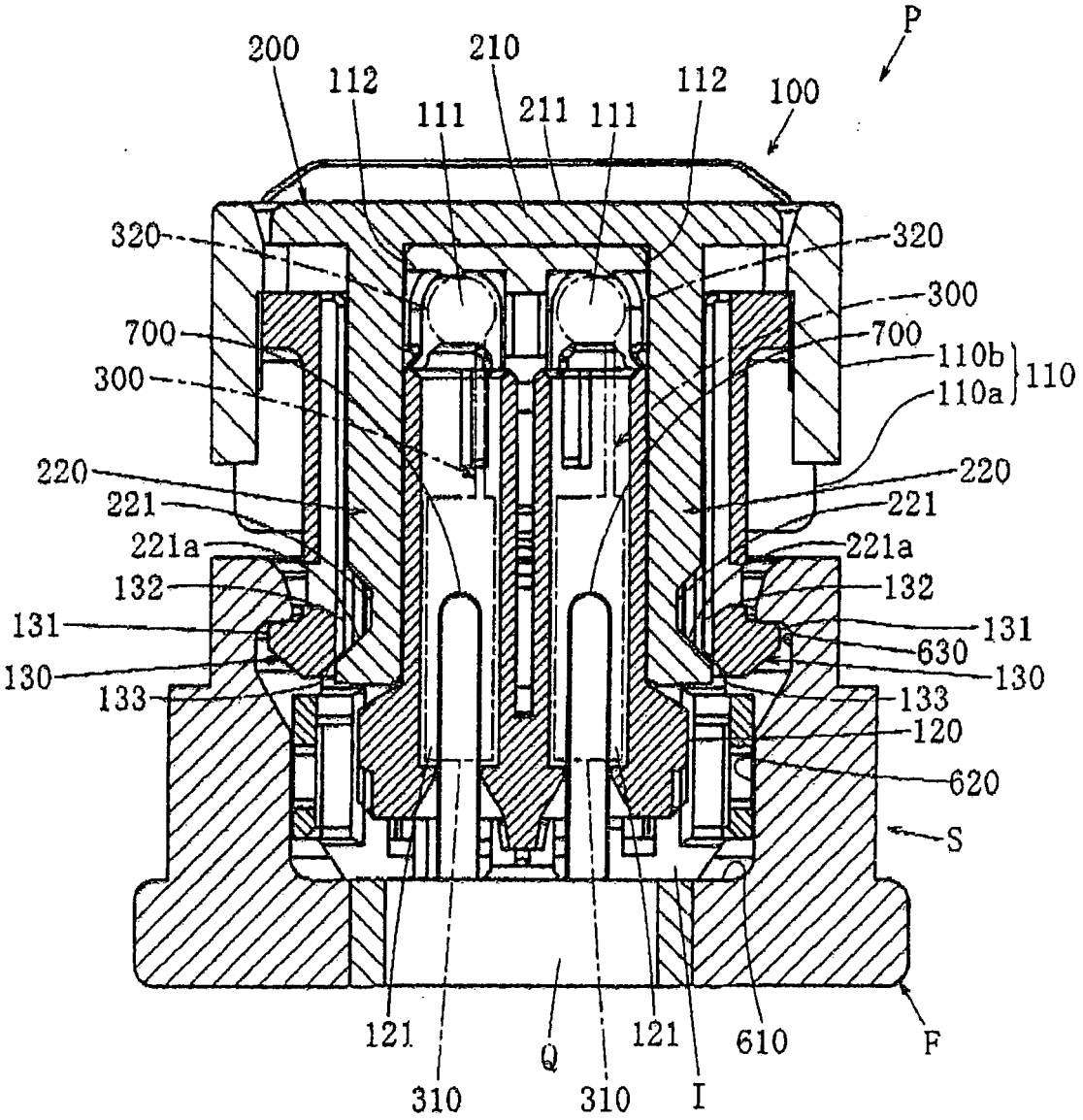
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Fig. 8

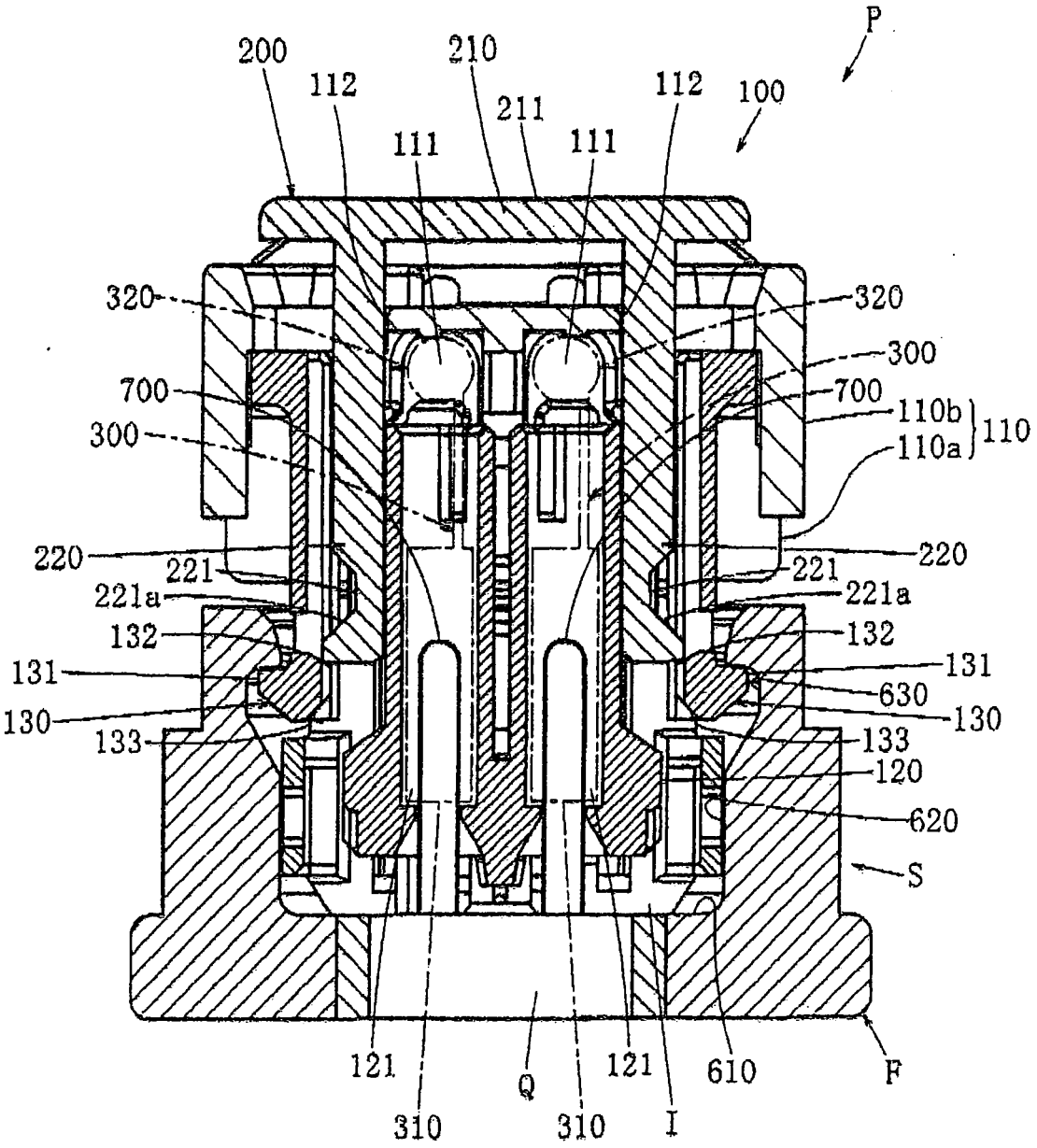
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Fig. 9

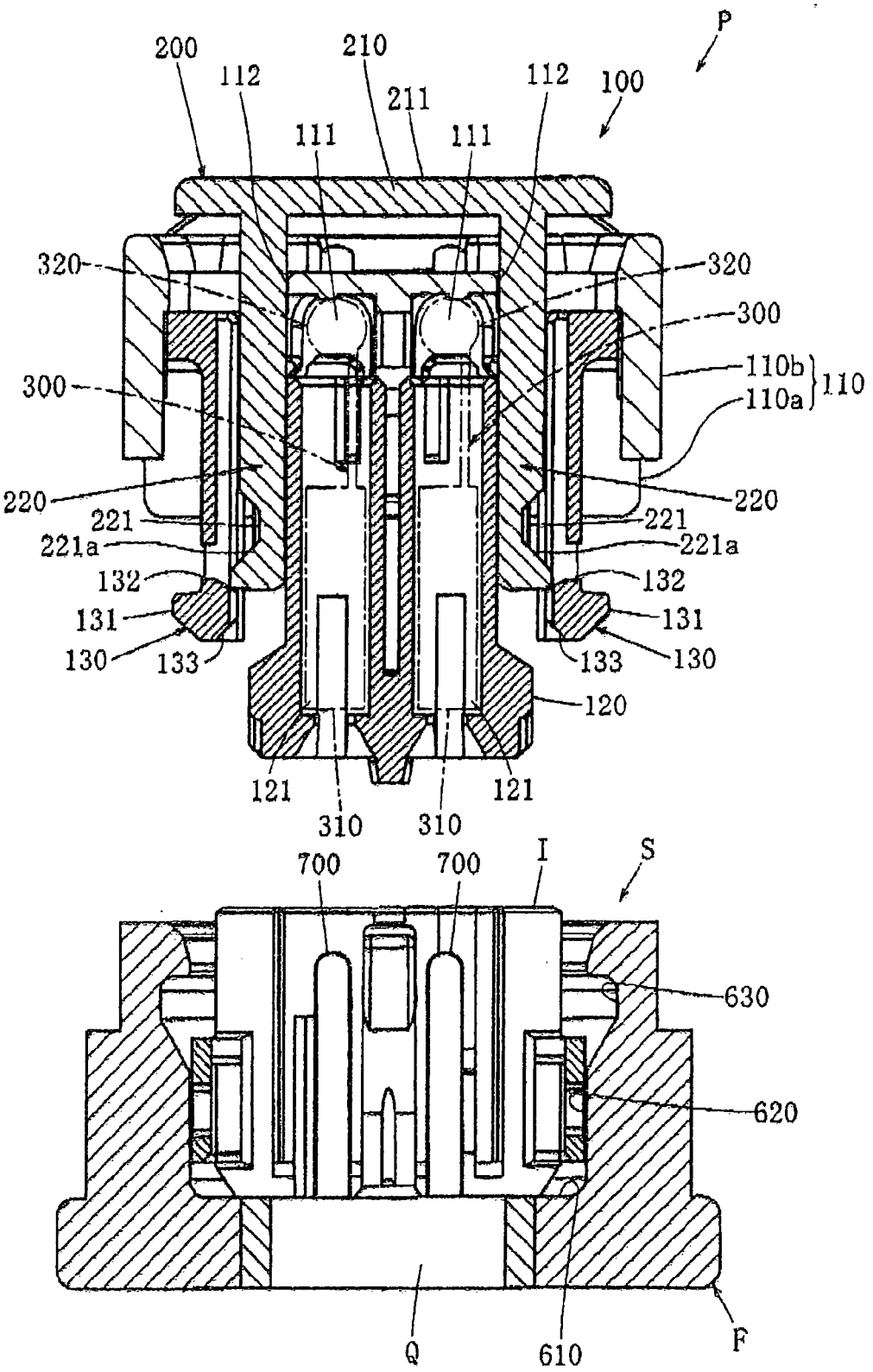
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Fig. 10

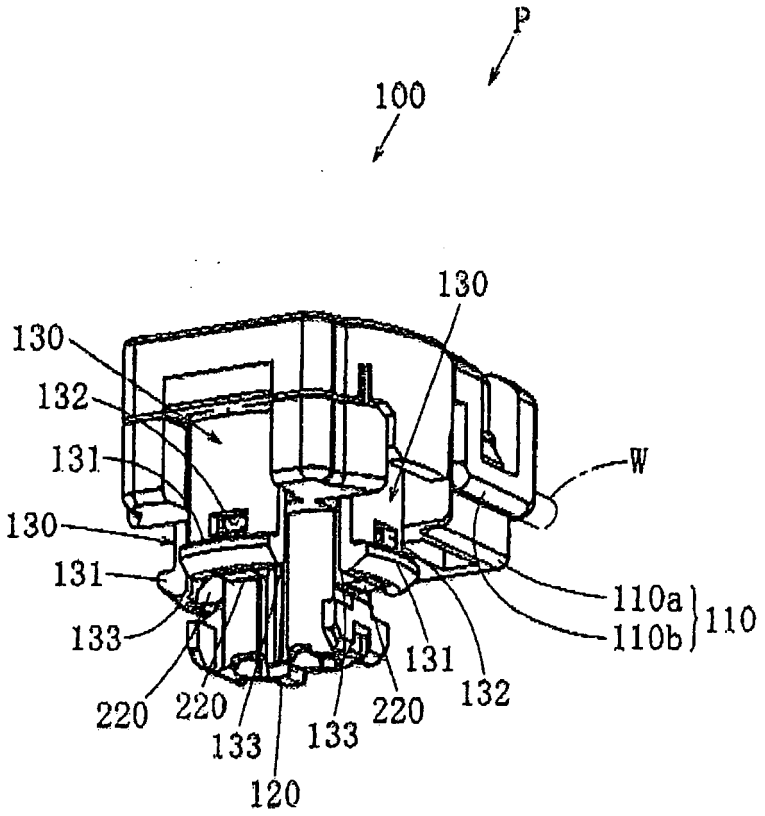
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Fig. 11

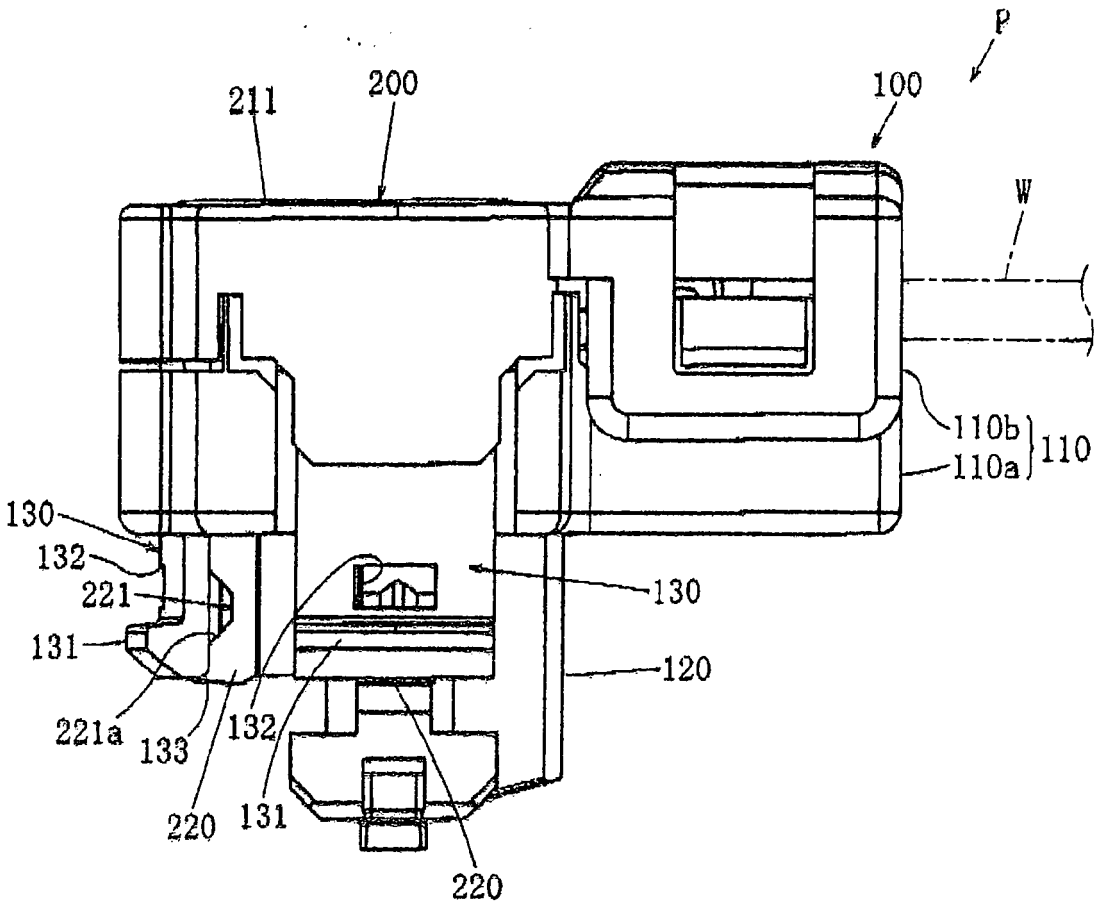
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Fig. 12

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- JP 2006019297 A **[0002] [0003]**