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(71) Applicant: **Ke, Cilong**
Beilun, Ningbo, Zhejiang 315800 (CN)

(72) Inventor: **Ke, Cilong**
Beilun, Ningbo, Zhejiang 315800 (CN)

(74) Representative: **Smith, Norman Ian et al**
fJ CLEVELAND
40-43 Chancery Lane
London WC2A 1JQ (GB)

(54) AN ELECTRICAL CONNECTOR FOR A WIRELESS ELECTRICAL APPARATUS

(57) An electrical connector for a cordless electrical appliance includes a plug and a socket that are interconnectable and relatively rotatable; in the center of the plug's upper face there is a plughole and a number of ring grooves being concentric with the plughole, with power supply terminal lugs inside them respectively. Correspondingly, the plug is provided with receiving center terminal lugs and periphery terminal lugs that are respectively engaged with the power supply terminal lugs inside the center plughole and the ring grooves of the plug. The Socket is **characterized by** that it also includes at least one power supply contact sheet connected with live wire or zero line of power supply and at least one contact switching mechanism, which keeps the contacts between the power supply contact sheet and the corresponding receiving terminal lugs normally open when the plug isn't inserted into the socket, and makes the normally open contact pair close and electrify under the action of the plug when the plug is inserted into the socket. In this invention, because the visible power supply contact sheet of the socket surface is not electrified all the time, the electrical connector is not only ensured safety in use, but also facilitated for connecting on account of the unrestricted width and depth of the grooves.

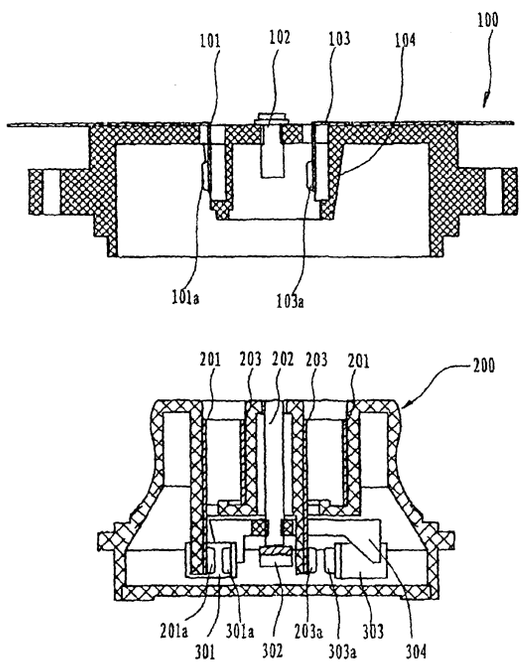

FIG. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention is related to an electrical connector, especially related to a rotatable connector for use with a cordless and detachable electrical appliance, such as electrical heater pot, cordless frying pan, cordless electrical flatiron and so on.

BACKGROUND OF THE INVENTION

[0002] In the present a detachable electrical apparatus, such as cordless electrical pot, cordless frying-pan, cordless electrical flatiron and etc, typically, there is a plug on the bottom of the electrical appliance, and there is a socket on the corresponding power supply pedestal. When the electrical apparatus is placed on the pedestal, the plug and socket are engaged together mutually, so as to supply the power to the electrical appliance. Usually, there is a straightly pillared receiving terminal lug on the plug, because of its structural restriction, the plug and socket respectively lies in the periphery of the electrical appliance and the power supply pedestal, that is, far away from the harycenter of electrical appliance, so not only the appearance but also the effect of connection is influenced. Therefore, "cordless electrical appliance and its junction" (published serial No.CN1135270A) provides a rotatable electrical connector, including an electronegative tie-in(plug)and an electropositive tie-in (socket). The plug includes a center conducting pillar receiving terminal lug and a ring receiving terminal lug being concentric with that terminal lug. In the front of the socket there is an opening for accepting the center pillar receiving terminal lugs and the ring receiving terminal lugs of the plug. And the socket has a separate power supply contact for bonding with the receiving terminal lugs. This design makes the plug in the bottom center of electrical appliance near its harycenter or at the same plumb line with it, and freely rotates relative to power supply pedestal without impeding the electrical connecting effect from the horizontal direction, which makes the electrical appliance setting in the power supply pedestal more firmly and gets better connecting effect. However, because the socket is being power supplied continuously, that is, the contact sheet in the center hole or ring grooves is being electrified continuously. So, for avoiding getting an electric shock accident and assuring the connecting effect, the diameter of the center hole and ring groove's width must be very small, normally, no more than 3mm, which requires the user to align the plug and socket straight carefully when using. Therefore, it makes the user's in convenience; on the other hand, because it limits the size of supply pedestal, when the power supply to the electrical appliance is large and a larger size of connector is needed, it's hard to realize.

SUMMARY OF THE INVENTION

[0003] This invention addresses the limitations in the prior art described above. It provides a new connector for cordless electrical appliance, which keeps the connecting contact sheet of socket connected with plug being power off all the time while the plug is not inserted.

[0004] What technological method this invention adopts for solving above technological problem is as follows: an electrical connector for a cordless electrical appliance includes a plug and a socket that are interconnectable and relatively rotatable; in the center of the plug's upper face there is a plughole and ring grooves being concentric with the plughole, with power supply terminal lugs inside them respectively. Correspondingly, the plug is provided with receiving center terminal lugs and periphery terminal lugs that are respectively engaged with the power supply terminal lugs inside the center plughole and the ring grooves of the plug. It is characterized by that the socket also includes at least one power supply contact sheet connected with live wire or zero line of power supply and at least one contact switching mechanism, which keeps the contacts between the power supply contact sheet and the corresponding receiving terminal lugs normally opened when the plug isn't inserted into the socket, and makes the normally opened contact pair closed and electrified under the action of the plug when the plug is inserted into the socket. In the invention, because the visible power supply contact sheet of the socket surface is not electrified all the time, the electrical connector is not only ensured safety in use, but also facilitated connecting on account of the unrestricted width and depth of the grooves.

[0005] It is possible to have one power supply contact sheet of socket connected with live wire or zero line of power supply. Other two power supply wires are connected with other two power supply terminal lugs of socket. And the contact switching mechanism acts on between the power supply contact sheet and corresponding terminal lugs of the power supply socket.

[0006] It is also possible to have two power supply contact sheets of a socket connected respectively with a live wire and a zero line of a power supply; the ground wire of power supply is connected with the corresponding power supply terminal lugs, and the contact switching mechanism at least acts on between one of two supply contacts and corresponding power supply terminal lugs of the power supply socket.

[0007] It is further possible to have three power supply contacts of a socket connected respectively with a live wire, a zero line and a ground wire, corresponding respectively to three supply terminal lugs of the socket. And the contact switching mechanism at least acts on between one of the supply contact sheets connected with a live wire or a zero line of the power supply and its corresponding the power supply terminal lugs of power supply socket.

[0008] The terminal lugs in a plug and a socket can be either a pillared one or a contact sheet. Typically, the receiving center terminal lugs of a plug are pillared ones, the periphery terminal lugs of the plug are plug pillars or contact sheets, and according to different situation the power supply terminal lugs of the socket are either receiving pillar or contact sheets correspondingly.

[0009] When the power supply contact sheets of socket's center plughole is connected with ground wire of power supply, the contact switching mechanism could be connected with the power supply contact sheet and make it as a drive part. At this time, in the power supply contact sheet inside the socket's concentric ring groove there is at least one normally open contact; it is in order to assure the earliest electrical connecting between the power supply contact and its corresponding socket's center terminal lug when the plug and socket is connected, and to keep the supply contact sheet and its corresponding socket's center terminal lugs disconnecting latest at last to assure safety in electric use.

[0010] Contact switching mechanism can be made up with a horizontal direction isolating pushrod and power supply contact sheet in the same direction underneath it. The central section of isolating pusher is connected with the root of socket's center receiving pillar, in its end there is a underside warp with a slope side, and touches the corresponding parallel slope of power supply contact sheets. There are movable contacts on the power supply contact sheets, corresponding to the immovable contacts which is inside the socket's concentric ring groove and under the side of power supply contact sheet. When the isolating pushrod moving down, that is, under the action of slope, the power supply contact sheet moves towards immovable contacts until movable the contacts touch immovable contacts.

[0011] The contact switching mechanism consists of an insulating sheet whose section is inverted T-type and a vertical movable contact sheet. The isolating sheet's upper face is connected to the root of the socket's central receiving pillar, whose underside is held by a reset spring. On the vertical movable contact sheet there is a movable contact connected to a live wire or a zero line, opposite to the immovable contact under the outside of socket's power supply contact of concentric ring grooves. When inverted T-type insulating sheet moving down, the vertical movable contact sheet inclines outwards from the immovable contact until the movable contact touches the immovable contact.

[0012] The contact switching modernism also includes a horizontal insulating pushrod, whose central section is connected with the root of the socket's center receiving pillar, on its both ends there are movable contacts connected with live wire or zero wire, which is correspondingly set up under the power supply contact inside the socket's concentric ring grooves and banded under the movable contact, which makes the immovable contact on the warp right opposite to the movable contact, when the isolating pushrod moving down, the movable contact moves with it until touches the immovable contact.

[0013] The contact switching mechanism may also consist of an isolating lever and a bacilliform movable contact, one end of which is fixed to the socket's shell, on the other end there is a movable contact, which is correspondingly set up under the socket's power supply contact of concentric ring grooves and warped on the movable contact, which makes the immovable contact on the warp right opposite to the movable contact; and one of the insulating pusher is connected with the root of the socket's center receiving pillar, the other end is under the movable contact end of the movable contact, when the isolating pushrod moving down, the isolating lever turns, raising the contact of the contact sheet until the movable contact touches the immovable contact.

[0014] The contact switching mechanism may also be made up by an isolating slippery sheet and a bacilliform movable contact sheet. One side of the movable contact sheet is fixed to the socket's shell, on the other side there is a movable contact, whose central section is held by a pivot, which is correspondingly set up under the socket's power supply contact of concentric ring grooves and warped on the movable contact, which makes the immovable contact on the warp right opposite to the movable contact; the isolating slippery sheet is set up on the root of the socket's concentric ring grooves and can slip up and down. The underside of the slippery sheet is collided with the part of bacilliform movable contact sheet near the fixed end. When the insulating slippery sheet moving down, it presses and pushes the bacilliform movable contact sheet down, under the action of the lever, raising the movable contact until it touches the immovable contact.

[0015] There may be either one or two concentric ring grooves in the socket.

[0016] When there is only one concentric ring groove in the socket, with in the ring groove a ring power supply contact is set inside and outside it respectively, correspondingly, socket's receiving periphery terminal lug is a contact sheet, and corresponding to the inside receiving contact sheet of the socket's ring groove there is a bulgy contact inside it, and corresponding to the outside receiving contact of the socket's ring groove sheet there is a bulgy contact outside it.

[0017] When there are two concentric ring grooves in the socket, with a power supply contact sheet set outside them respectively. Correspondingly, the receiving periphery terminal lug in the plug is a contact sheet, and on one side of the corresponding ring groove there is a bulgy contact; the power supply contact sheet inside ring grooves also may be on the bottom of ring groove, at this time, the corresponding receiving periphery terminal lug on the plug should be a plug pillar.

[0018] When the socket's center plughole's receiving contact sheet is connected correspondingly to the live wire or the zero line of power supply, it is one of the normally open contacts, and one of the power supply con-

tact sheets inside the ring groove is connected to the earth wire of power supply.

[0019] At this time, the contact switching mechanism also could be made up by a cuneiform isolating sheet and the movable contact base on its slope. The cuneiform isolating sheet's inside is held by a reset spring, which makes it tend to moving outside breadthwise. On the movable contact base there is a contact connected with live wire or zero line of power supply, opposite to the immovable contact inside the socket's bottom of corresponding power supply contact, when the cuneiform isolating sheet moving inward breadthwise; the movable contact base on the slope moves upwards until the movable contact touches the immovable contact.

[0020] To assure the plug is inserted into the socket accurately, in the plug it could be set up a ring bulgy wall which can be inserted into the ring groove of socket.

[0021] Comparing with the prior technology, this invention creatively sets up two pair of mutually corresponding power supply contact sheet teams, and when the plug isn't inserted into the socket, in the power supply contact sheet team at least one of them connected with the live wire or zero line of power supply and its corresponding power supply contact sheet keeps normally open, which makes the visible power supply contact sheet of the socket surface is not electrified all the time, and also not only safety in use, but also facilitative connection on account of the unrestricted width and depth, even inserting incliningly, the effect is the same. At the same time, the present invention will make it possible to design, manufacture and utilize larger power eclectrical connecter, and widen its applied field immensely, support the variegated development of products such as electrical pot and electrical frying pan.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

Fig. 1 is a diagram of the structural sectional view of the first exemplary embodiment of the present invention;

Fig. 2 is a diagram of the structural sectional view of the Fig. 1 when the two parts are engaged as a whole body;

Fig. 3 is a diagram of the structural sectional view of the installation when it is applied for a cordless electrical pot;

Fig. 4 is a diagram of the structural sectional view of the second exemplary embodiment of the present invention;

Fig. 5 is a diagram of the structural sectional view of the Fig. 4 when the two parts are engaged as a whole body;

Fig. 6 is a diagram of the structural sectional view of the third exemplary embodiment of the present invention;

Fig. 7 is a diagram of the structural sectional view of the Fig. 6 when the two parts are engaged as a whole body;

Fig. 8 is a diagram of the structural sectional view of the forth exemplary embodiment of the present invention 4;

Fig. 9 is a diagram of the structural sectional view of the Fig. 8 when the two parts are engaged as a whole body;

Fig. 10 is a diagram of the A-direction part view of Fig. 8;

Fig. 11 is a diagram of the structural sectional view of the fifth exemplary embodiment of the present invention 5;

Fig. 12 is the structural sectional view of the Fig. 11 when the two parts are engaged as a whole body;

Fig. 13 is a diagram of the B-direction part view of Fig. 11;

Fig. 14 is a diagram of the structural sectional view of the sixth exemplary embodiment of the present invention;

Fig. 15 is a diagram of the structural sectional view of the Fig. 14 when the two parts are engaged as a whole body;

Fig. 16 is a diagram of the structural sectional view of the seventh exemplary of the present invention;

Fig. 17 is a diagram of the structural sectional view of the Fig. 16 when the two parts are engaged as a whole body.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] In connection with the drawings above, hereinafter is the further description of invention.

[0024] Example one, as shown in Figs 1,2, it includes a plug 100 and a socket 200 that are interconnectable and relatively ratable.

[0025] In the center of the socket's upper face there is a plughole and a number of ring grooves being concentric with the plughole, inside the plughole is a center power supply receiving pillar 202, inside and outside the ring groove there are power supply contact sheets 201,203, inside the power supply contact's 201 under-

side there is a immovable contact 201a extended out words, and outside the power supply contact 203 there is a immovable contact 203a.

[0026] On the underside of the socket 200 there are three corresponding power supply contacts 301,302,303 all in the form of movable contact sheets, which correspond to the power supply contact sheet 201, the power supply receiving pillar 202 and the power supply contact sheet 203 respectively; the power supply contact sheet 302 is connected with the earth wire of the power supply and pressed against the power supply receiving pillar 202 all the time; the power supply contacts 301,303 are respectively connected with the live wire and the zero line of the power supply, and that, on the one side of the supply contact sheet 301 there is a movable contact 301a, opposite to a immovable contact 201a of the power supply contact 201; on the one side of power supply contact sheet 303 there is a movable contact 303a, opposite to an immovable contact 203a of the power supply contact sheet 203.

[0027] The isolating pushrod 304 is in the horizontal direction, whose central section is connected with the root of socket's center receiving pillar(202), on the both sides of which there is a underside warp, with a slope side, and the half part of its underside touches with power supply contact sheet 301, 303's corresponding parallel slope; which forms the contact switching mechanism.

[0028] On plug 100 there is a ring bulgy wall 104 that can be plugged into socket's 200 ring groove, and in the center of which there is a receiving plug pillar 102, corresponding to socket's power supply pillar 202; on two sides of which there are two receiving contact sheets 101, 103, and in its underside there are contact 101a, 103a, corresponding to socket's power supply contact sheets 201, 203 respectively.

[0029] When the plug 100 and the socket 200 are interconnected, see Fig. 2, the receiving contact sheets 101,103 of the socket respectively through the contacts 101a, 103a touch the power supply contact sheets 201,203 of the socket, the plug's center plug pillar 102 presses the socket's center receiving pillar 202 down, then the isolating pushrod 304 moves down with it, under the action of the slope between the warp and the power supply contact sheets 301,303, causing the power supply contact sheets 301,303 to move towards power supply contact sheet 201,203 respectively until the movable contacts 301a, 303a touch the immovable contacts 201a, 203a respectively.

[0030] When in use, see the example shown in Fig. 3, fix the plug 100 in the center of electrical pot's bottom and fix the socket 200 in the center of power supply socket, the thus, plug 100 and the socket 200 are interconnectable integratively and the electrical pot is heated when the electrical pot is put on the power supply socket.

[0031] In the above example, the isolating pushrod 304 under the action of its two sides acts on two power supply contact sheets 301,303 at the same time, however, in practical application, it can act one of the power supply contact sheets only through one side, and another power supply contact is connected directly with its corresponding line of power supply.

[0032] Example 2, as shown in Figs. 4, 5, in the center of plug's 210 upper face there are one plughole and two ring grooves being concentric with the plughole, in the plughole there is a center power supply receiving pillar 212, outside the external ring groove there is a ring power supply contact sheet 211, at the bottom of the internal ring groove there is a ring power supply contact sheet 213, inside the power supply contact 211's underside there is a immovable contact 211a extended outwards, and outside of the power supply contact 213 there is a immovable contact 213a.

[0033] On the underside of the socket 200 there are three corresponding power supply contacts 311, 312, 313 all in the form of movable contact sheets, which correspond to the power supply contact sheet 211, the power supply receiving pillar 212 and the power supply contact sheet 213 respectively; the power supply contact sheet 312 is connected with the ground wire of the power supply and pressed against power supply receiving pillar 212 all the time; the power supply contacts 311, 313 are in the vertical direction, connected with live wire and zero line of power supply respectively, and that, on one side of the supply contact sheet 311 there is a movable contact 311a, opposite to the immovable contact 211a of the power supply contact 211; on one side of power supply contact sheet 313 there is a movable contact 313a, opposite to the immovable contact 213a of the power supply contact sheet 213.

[0034] The insulating sheet whose section is of inverted T-type and whose underside is held by a reset spring 315 is under the power supply receiving pillar 212. On its both sides there are power supply contact sheets 311, 313. And the upside of the insulating sheet 314 is connected with the root of the socket's center receiving pillar 212.

[0035] On plug 110 there is a ring bulgy wall 114 that can be plugged into socket's 210 ring groove, and in the center of which there is a receiving plug pillar 112, corresponding to socket's power supply pillar 212; on both sides of which there are two receiving contact sheets 111, 113, corresponding to socket's power supply contact sheets 211, 213 respectively and there is contact 111a in the receiving contact sheet 111.

[0036] When the plug 110 and the socket 210 are interconnected, see Fig. 5, the receiving contact sheet 111 of the plug touches the power supply contact sheets 211 of the socket through contact 111a, and the receiving plug pillar 113 touches the power supply contact sheet 213, and the plug's center plug pillar 112 presses the socket's center receiving pillar 212 down, then the isolating sheet 314 moves down with it, causing the vertical power supply contact sheets 311,313 to move towards power supply contact sheets 211, 213 respectively until

movable contacts 311a, 313a respectively touch immovable contacts 211a, 213a.

[0037] In the above example, the isolating sheet 314 under the action of its both sides acts on two power supply contact sheets 311,313 at the same time, however, in practical application, it can act one of the power supply contact sheets only through one side, and another power supply contact is connected directly with its corresponding line of power supply.

[0038] Example 3, as shown in Figs 6, 7, in the center of the socket's 220 upper face there are one a plughole and two ring grooves being concentric with the plughole, inside the plughole is a center power supply receiving pillar 222, at the bottom of the ring groove there are ring power supply contact sheets 221, 223, with a underside extended outwords and a tortuous end where there are immovable contacts 221a, 223a.

[0039] On the underside of the socket 200 there are three corresponding power supply contacts sheets 321, 322, 323 all in be form of movable contact sheets, which correspond to the power supply contact sheet 221, the power supply receiving pillar 222 and power supply contact sheet 223; the power supply contact sheet 322 is connected with the ground wire of the power supply and pressed against the power supply receiving pillar 222 all the time; on the immovable contacts 221a, 223a the power supply contacts 321, 323 are connected with the live wire and the zero line of power supply respectively, and that on, the underside of supply contact sheets 321, 323 there are movable contacts 321a, 323a, corresponding to immovable contacts 221a, 223a respectively.

[0040] The isolating pushrod 324 is in horizontal direction, whose central section is connected with the root of socket's center receiving pillar 222 and whose two sides are connected with the power supply contact sheets 321, 323 respectively.

[0041] On the plug 120, there is a ring bulgy wall 124 that can be pluged into the socket's 220 ring groove, and in the center of which there is a receiving plug pillar 122, corresponding to socket's power supply pillar 222; on both sides of which there are two receiving plug pillars 121, 123, corresponding to socket's power supply contact sheets 221, 223 respectively.

[0042] When plug 120 and socket 220 are interconnected, see Fig. 7, the receiving plug pillar 121,123 of the plug touch the power supply contact sheets 221,223 of the socket respectively. The plug's center plug pillar 122 presses the socket's center receiving pillar 222 down, the isolating pushrod 324 then moves down with it, under the action of vertical power supply contact sheets 321, 323, which causes the vertical power supply contact sheets 321, 323 to move towards power supply immovable contacts 221a, 223a respectively until movable contacts 321a, 323a touch immovable contacts 221a, 223a respectively.

[0043] In the above example, the isolating pushrod 324 under the action of its both sides acts on two power supply contact sheets 321, 323 at the same time, however, in practical application, it can act one of the power supply contact sheets only through one side, and another power supply contact is connected directly with its corresponding line of power supply.

[0044] Example 4, as shown in Figs 8, 9, 10 , in the center of the socket's 230 upper face there is a plughole and a ring grooves being concentric with the plughole, inside the plughole is a center power supply plug pillar 232, on the inside and the outside of the ring groove there are ring power supply contact sheets 231, 233, with an underside extended out words and a tortuous end where there are immovable contacts 231a, 233a.

[0045] On the underside of the socket 230 there are three corresponding power supply contacts sheets 331, 332, 333 all in the form of movable contact sheets, which correspond to the power supply contact sheet 231, the power supply receiving pillar 232 and the power supply contact sheet 233 respectively; the power supply contact sheet 332 is connected with the ground wire of the power supply and pressed against the power supply receiving pillar 232 all the time; the power supply contacts 331, 333 which are in parallel and connected with the live wire and the zero line of power supply respectively, one side of which is fixed on the shell of the socket, on another side there are movable contacts 331a, 333a, which are under the immovable contacts 231a, 233a and opposite to them respectively.

[0046] The isolating lever 334 is of inverted T-type, one side of the vertical rod of which is connected with the root of socket's center receiving pillar 232 and the horizontal rod of which is under the movable contacts 331a, 333a.

[0047] On the plug 130 there is a ring bulgy wall 134 that can be pluged into the socket's 230 ring groove, and in the center of which there is a receiving plug pillar 132, corresponding to socket's power supply pillar 232; on both sides of which there are two receiving plug pillars 131, 133, and on the underside of it there are contacts 131a, 133a, corresponding to socket's power supply contact sheets 231, 233 respectively.

[0048] When the plug 130 and the socket 230 arc interconnected, see Fig. 9, the receiving plug pillar 131,133 of the plug through the power supply contacts 131a, 133a of the plug touch power supply contact sheets 231, 233 of the socket respectively, the plug's center plug pillar 132 presses and pushes the socket's center receiving pillar 232 down, then the isolating lever 334 turns, raising the end of movable contacts 331a, 333a of the movable contact sheets 331, 333 until movable contacts 331a, 333a touch immovable contacts 231a, 233a respectively.

[0049] In the above example, the isolating lever 334 under the action of its both sides acts on two power supply contact sheets 331, 333 at the same time, however, in practical application, it can act one of the power supply contact sheets only through one side, and another power supply contact is connected directly with its cor-

responding line of the power supply.

[0050] Example 5, as shown in Figs 11, 12, 13, in the center of the socket's 240 upper face there are one plughole and one ring grooves being concentric with the plughole, inside the plughole is a center power supply plug pillar 242, on the inside and outside of the ring groove there are ring power supply contact sheets 241, 243, with an underside extended down words and a tortuous end where there are immovable contacts 241a, 243a.

[0051] On the underside of the socket 240 there are three corresponding power supply contacts sheets 341, 342, 343 all in the form of movable contact sheets, which correspond to the power supply contact sheet 241, the power supply receiving pillar 242 and the power supply contact sheet 243 respectively; the power supply contact sheet 342 is connected with the ground wire of the power supply and pressed against the power supply receiving pillar 242 all the time; the power supply contacts 341, 343 which are in parallel are connected with the live wire and the zero line of the power supply respectively, one side of which is fixed on the shell of the socket, on another side there are movable contacts 341 a, 343a, which are under immovable contacts 241a, 243a and opposite to them respectively, and its central section is held by pivot.

[0052] The insulating slippery sheet 344 is lambdoidal, see Fig. 13. Its upside runs thoroughly through the bottom of socket's concentric ring groove and it can slip up and down. On its two undersides there are power supply contacts 341, 343 near their fixed parts above respectively.

[0053] On the plug 140 there is a ring bulgy wall 144 that can be pluged into socket's 240 ring groove, and in the center of which there is a receiving plug pillar 142, conesponding to socket's power supply pillar 242; on two sides of which there are two receiving contact sheets 141, 143, and the underside of it there are contacts 141a, 143a, corresponding to socket's power supply contact sheets 241, 243 respectively.

[0054] When the plug 140 and the socket 240 are interconnected, see Fig. 12, the receiving plug pillars 141, 143 of the plug through power supply contacts 141a, 143a of plug touch the power supply contact sheets 241, 243 of the socket respectively, the plug's center plug pillar 142 touches with the center receiving pillar 242; at this time, the ring bulgy wall 144 of socket 140 inserts into the ring groove of the socket 240, the insulating sheet 344 slips down under the action of the ring groove wall's 144 end, pressing the bacilliform movable contact sheets 341, 343, raising the movable contact under the action of the lever until movable contacts 341a, 343a touch immovable contacts 241a, 243a respectively.

[0055] In the above example, the isolating slippery sheet 344 under the action of its both sides acts on two power supply contact sheets 341, 343 at the same time, however, in practical application, it can act one of the power supply contact sheets only through one side, and another power supply contact is connected directly with its corresponding line of the power supply.

[0056] Example 6, as shown in Figs 14, 15, in the center of the socket's 250 upper face there is a plughole and two ring grooves being concentric with the plughole, inside the plughole is a center power supply contact sheet 252, on the tortuous end underside extended outwards there is a immovable contact 252a; inside the external ring groove there is a power supply contact sheet 251, with an underside down words end; inside the internal ring groove there is a power supply contact sheet 253, and on the underside outstretched and tortuous end there is a immovable contact 253a.

[0057] On the underside of the socket 250 there are one immovable power supply contact sheet 351 and two power supply contact sheets 352, 353 in the movable contact sheet form, which correspond to power supply contact sheet 251, 252, 253 respectively; the power supply contact sheet 351 is connected with the underside outstreched end of the power supply contact sheet 251 all the time and the ground wire of the power supply; the power supply contacts 352, 353 is connected with the live wire and the zero line of electric line respectively, they are set in parallel with one above another, with respective movable contacts 352a, 353a set in their upsides, and opposite to immovable contacts 252a, 253a respectively.

[0058] On the plug 150, there is a ring bulgy wall 154 that can be pluged into the socket's 250 ring groove, and in the center of which there is a receiving plug pillar 152, corresponding to socket's power supply pillar 252; on both sides of which there is a V-type receiving contact sheet 151 and a receiving plug pillar 153, corresponding to socket's power supply contact sheets 251, 253 respectively.

[0059] A cuneiform insulating sheet 354 holds the movable contact end of the power supply contacts 352, 353 on its slope, and its inside is held by a reset spring 355, forming an outward horizontal moving trend.

[0060] When the plug 150 and the socket 250 are interconnected, see Fig. 15, the receiving contact sheet 151 and the receiving plug pillars 152, 153 of the plug touch power the supply contacts 251, 252, 253 of the socket respectively; at this moment, the cuneiform insulating sheet 354 under the action of plug's ring external wall 155 moves down in words laterally and pushes movable contacts 352, 353 on the slope upwards until movable contacts 352a, 353a touch immovable contacts 252a, 253a.

[0061] In the above example, the cuneiform insulating sheet 354 via its slope under the action of its two sides acts on both power supply contact sheets 352, 353 at the same time, however, in practical application, it can act one of the power supply contact sheets only through one side, and another power supply contact is connected directly with its corresponding line of the power supply.

[0062] Example 7, as shown in Figs. 16, 17, it's a var-

iation of the example 6, with one figure different from above example 6, that is, all the grooves on the upper face of the sockets are concentric ring grooves (in this example there are three concentric ring grooves 251, 252, 253 on it), but not a center hole with a concentric ring groove. Its superiority is that it can overcome the restriction on the power and structure that is caused by the center plughole's limited size.

[0063] In practice, for the examples 1 through 6, it also can adopt the variations similar to the example 7, that is, replacing the center plughole of the socket with a concentric ring groove. This can be understood according to the illustrative drawings of exemplary embodiments 1 through 6 in connection with the illustrative draw of the example 7, so the detailed structural diagrams are omitted here, and their literal descriptions are also not given unnecessary details any more.

Claims

1. An electrical connector for a cordless electrical appliance includes a plug and a socket that are interconnectable and relatively rotatable; in the center of the plug's upper face there is a plughole with a number of ring grooves being concentric with the plughole, with power supply terminal lugs inside them respectively, correspondingly, the plug is provided with receiving center terminal lugs and periphery terminal lugs that are engaged with the power supply terminal lugs inside the center plughole and the ring grooves of the plug respectively, it is **characterized by** that the socket further includes at least one power supply contact sheet connected with a live wire or a zero line of a power supply and at least one contact switching mechanism, which keeps the contacts between the power supply contact sheet and the corresponding receiving terminal lugs normally opened when the plug isn't inserted into the socket, and causes the normally opened contact pair to close and to be electrified under the action of the plug when the plug is inserted into the socket.

2. An electrical connector for a wireless electrical appliance of claim 1, wherein there is only one power supply contact sheet connected with a live wire or a zero line of a power supply of the socket; other two power supply wires are connected with other two power supply terminal lugs; and the contact switching mechanism acts on between the power supply contact sheet and its corresponding power supply tenninal lugs of the power supply socket.

3. An electrical connector for a wireless electrical appliance of claim 1, wherein there are two power supply contact sheets of the socket connected with a live wire and a zero line, and a ground wire of the power supply is connected with the corresponding power supply terminal lugs of the socket; and the contact switching mechanism at least acts on between one of the power supply contact sheets and the corresponding power supply terminal lug of the power supply socket.

4. An electrical connector for a cordless electrical appliance of claim 1, wherein there are three power supply contact sheets of the socket connected respectively with a live wire, a zero line and a ground wire and corresponding to three power supply terminal lugs of the socket respectively; and the contact switching mechanism at least acts on between one of the supply contact sheets connected with the live wire or the zero line and its corresponding power supply terminal lugs of the power supply socket.

5. An electrical connector for a cordless electrical appliance of claim 1 or 2 or 3 or 4, wherein the plug's receiving center terminal lug is a plug pillar, its periphery terminal lug is either a plug pillar or a contact sheet, and the power supply terminal lug of socket is a receiving pillar or a contact sheet.

6. An electrical connector for a cordless electrical appliance of claim 5, wherein the socket's power supply terminal lug inside the center plughole is engaged with the ground wire of the power supply, and the contact switching mechanism is connected with the power supply terminal lug and takes it as a drive part; and there is at least one normally open contact in the power supply terminal lug inside the socket's concentric ring groove.

7. An electrical connector for a cordless electrical appliance of claim 6, wherein the contact switching mechanism comprising a horizontal insulating pushrod and under the pushrod a the power supply contact sheet set in the same direction as the pushrod; the center of the isolating pushrod is connected with the root of the socket's center receiving pillar; at the end of it there is a warp with an inclined outside plane connected to the corresponding parallel slope; on the power supply contact sheet there is a movable contact, corresponding to the immovable contact under the outside of socket's power supply contact sheet of the concentric ring grooves, when the isolating pushrod moving down, i.e. under the action of the slope, the power supply contact moves towards the immovable contact until the movable contact touches the immovable contact.

8. An electrical connector for a cordless electrical appliance of claim 6, wherein the contact switching mechanism comprising an insulating sheet, whose cross-section is of an inverted T-type, and a vertical movable contact sheet, the isolating sheet's upper

face is connected with the root of the socket's center receiving pillar, whose underside is propped by a reset spring, on the vertical movable contact sheet there is a movable contact connected with a live wire or a zero line; corresponding to the immovable contact under the outside of socket's power supply contact sheet of the concentric ring grooves, when the inverted T-type insulating sheet moving down, the vertical movable contact inclines outside towards the immovable contact until the movable contact touches the immovable contact.

9. An electrical connector for a cordless electrical appliance of claim 6, wherein the contact switching mechanism comprising a horizontal insulating pushrod, whose central section is connected with the root of the socket's center receiving pillar, with the both sides of the insulating pushrod connected with a live wire or a zero wire respectively, which are correspondingly set up under the power supply contact sheet inside the socket's concentric ring grooves and bended under the movable contact, causing the immovable contact on the warp right opposite to the movable contact; when the isolating pushrod moving down, the movable contact moves with it until touches the immovable contact.

10. An electrical connector for a cordless electrical appliance of claim 6, wherein the contact switching mechanism comprising an isolating lever and a bacilliform movable contact sheet, one of its both sides is fixed to the socket's shell, on another side there is a movable contact, which is correspondingly set up under the socket's power supply contact sheet of the concentric ring grooves and bended on the movable contact, causing the immovable contact on the warp right opposite to the movable contact; and one of the insulating pushers is connected with the root of the socket's center receiving pillar, another side is under the movable contact end of the movable contact, when the isolating pushrod moving down, the isolating lever turns, raising the movable contact of the movable contact sheet until the movable contact touches the immovable contact.

11. An electrical connector for a cordless electrical appliance of claim 5, wherein the contact switching mechanism comprising an isolating slippery sheet and a bacilliform movable contact, one side of the movable contact is fixed to the socket's shell, on another side there is a movable contact,whose central section is held by a pivot, which is correspondingly set up under the socket's power supply contact sheet of the concentric ring grooves and warped on the movable contact, causing the immovable contact on the warp right opposite to the movable contact; the isolating slippery sheet is set up on the root of the socket's concentric ring grooves and could slip up and down, the underside of the slippery sheet is pressed against the part of bacilliform movable contact sheet near the fixed end, when the insulating slippery sheet moving down, it presses the bacilliform movable contact sheet down under the action of the lever, raising the movable contact until it touches the immovable contact.

12. An electrical connector for a cordless electrical appliance of claim 1 or 2 or 3 or 4, wherein there is only one concentric ring groove in the socket, with a ring power supply contact inside and outside it respectively; correspondingly, the socket's receiving periphery terminal lug is also a contact sheet, and corresponding to the socket's ring groove's inside receiving contact sheet there is a bulgy contact inside it, and corresponding to the socket's ring groove's outside receiving contact sheet there is a bulgy contact.

13. An electrical connector for a cordless electrical appliance of claim 1 or 2 or 3 or 4, wherein the socket comprising two concentric ring grooves therein, with a power supply contact sheet outside them respectively; correspondingly, the receiving periphery terminal lug in the plug is a contact sheet, and on one side of the corresponding ring groove there is a bulgy contact.

14. An electrical connector for a cordless electrical appliance of claim 1 or 2 or 3 or 4, wherein the socket comprising two concentric ring grooves therein, with a power supply contact sheet on the bottom of each ring groove respectively; correspondingly, the receiving periphery terminal lug on the plug is a plug pillar.

15. An electrical connector for a cordless electrical appliance of claim 1 or 2 or 3 or 4, wherein the socket's center plughole's power supply contact sheet corresponding to the live wire or zero line of power supply; and the power supply contact sheet one of the normally open contacts, and one of the power supply contact sheet inside the ring groove is connected with the ground wire of the power supply.

16. An electrical connector for a cordless electrical appliance of claim 15, wherein the contact switching mechanism comprising a cuneiform isolating sheet and a movable contact base on its slope; the cuneiform isolating sheet's inside is held by a reset spring, causing it to tend to move outside breadthwise; on the movable contact base there is a contact connected with a live wire or a zero line of the power supply, corresponding to immovable contact inside the socket's bottom of power supply contact; when the cuneiform isolating sheet moving inward breadthwise, the movable contact base on the

slope moves upwards until the movable contact touches the immovable contact.

17. An electrical connector for a cordless electrical appliance of claim 1 or 2 or 3 or 4, wherein in the plug there is a ring bulgy wall which can be inserted into the ring groove of the socket.

18. An electrical connector for a cordless electrical appliance comprising a plug and a socket that are interconnectable and relatively rotatable; in the center of the plug's upper face there are one plughole and a number of ring grooves being concentric with the plughole, with power supply terminal lugs inside them respectively; correspondingly, the plug is provided with receiving center terminal lugs and periphery terminal lugs that are respectively engaged with the power supply terminal lugs inside the center plughole and the ring grooves of the plug; and wherein the socket further comprising at least one power supply contact sheet connected with a live wire or a zero line of a power supply and at least one contact switching mechanism, which keeps the contacts between the power supply contact sheet and the corresponding receiving terminal lugs normally open when the plug isn't inserted into the socket, and causing the normally open contact pair closed and electrified under the action of the plug when the plug is inserted into the socket; in this invention, because the visible power supply contact sheet of the socket surface is not electried all the time, the electrical connector is ensured not only safety in use, but also facilitates the connection on account of the restricted width and depth.

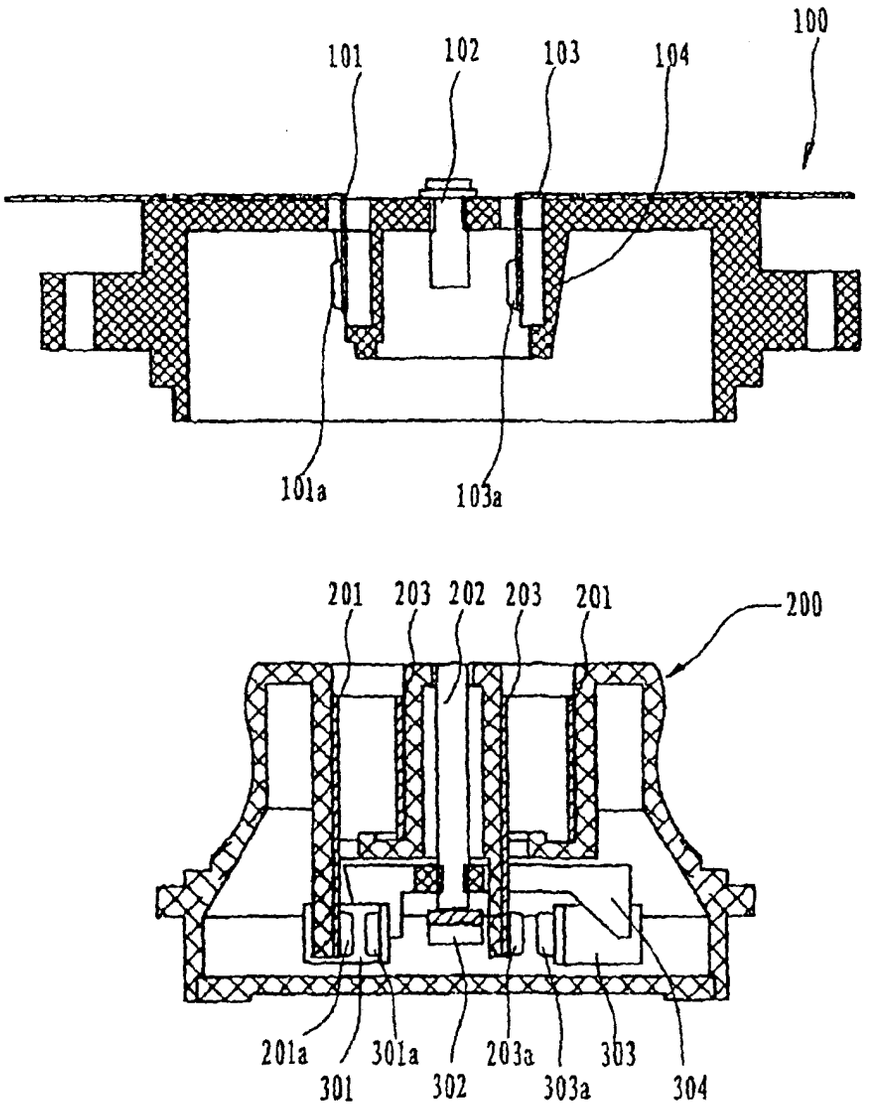
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FIG. 1

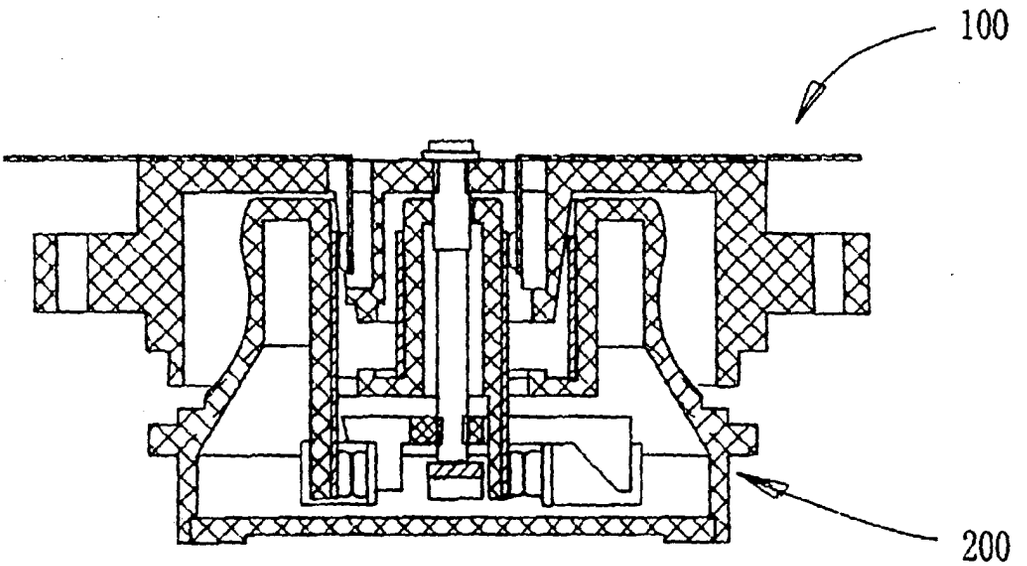

FIG. 2

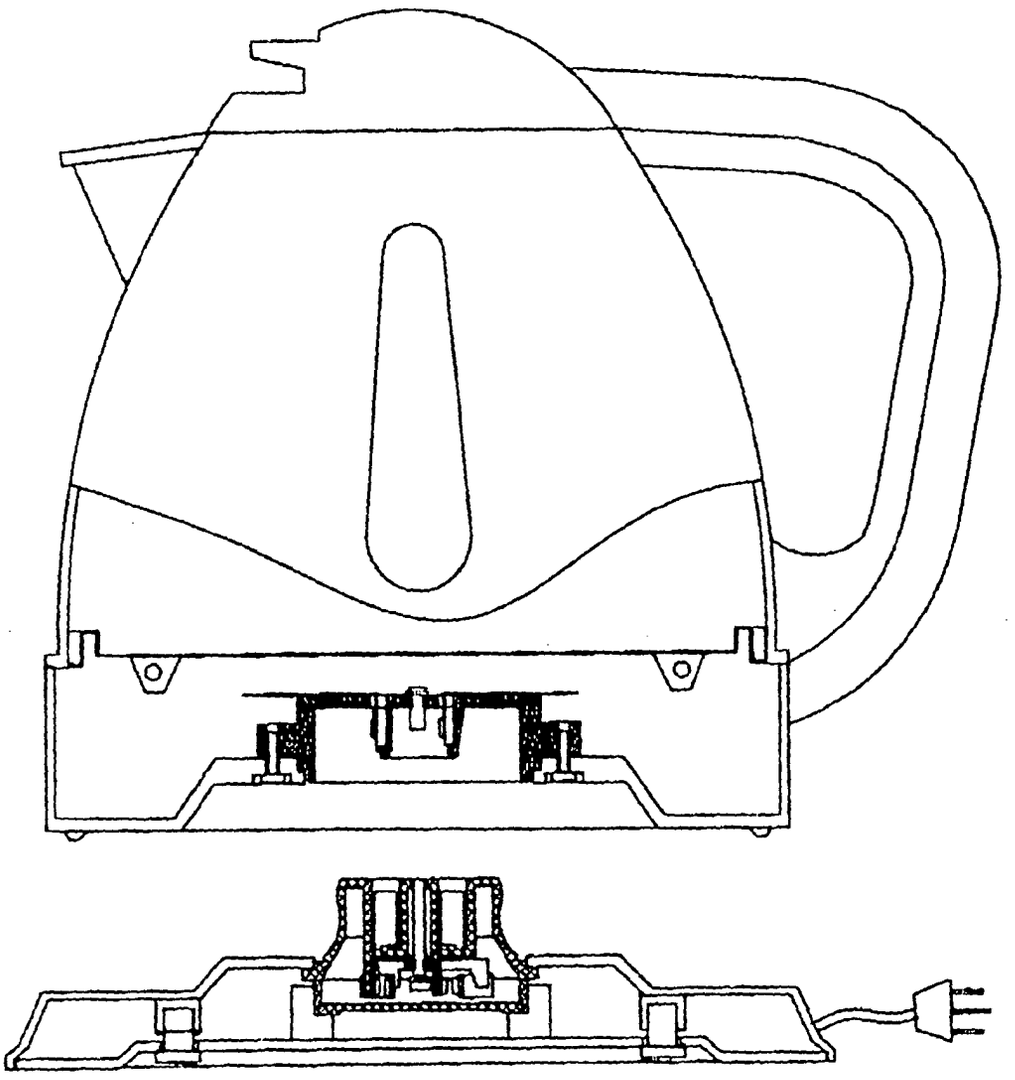

FIG. 3

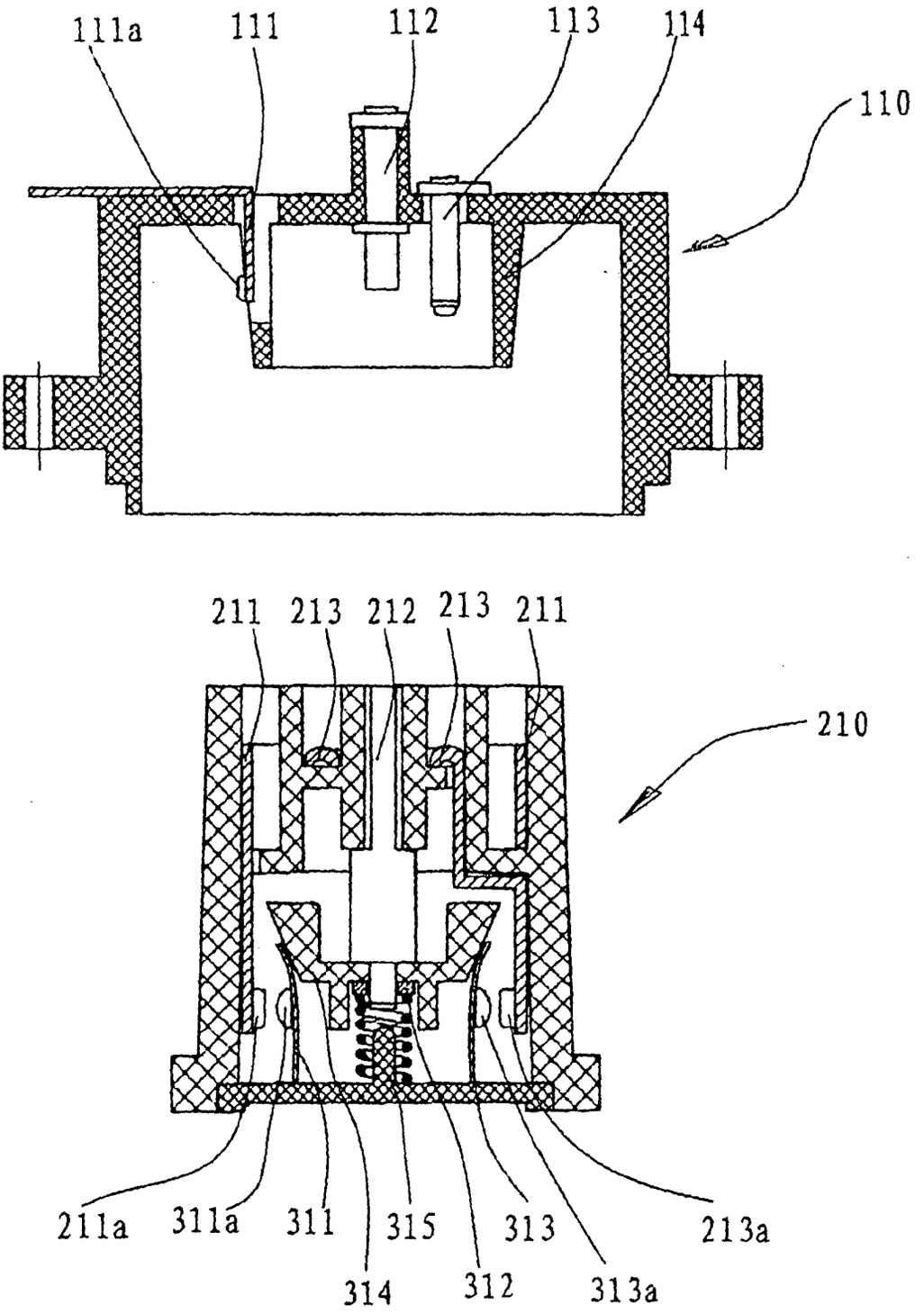
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FIG. 4

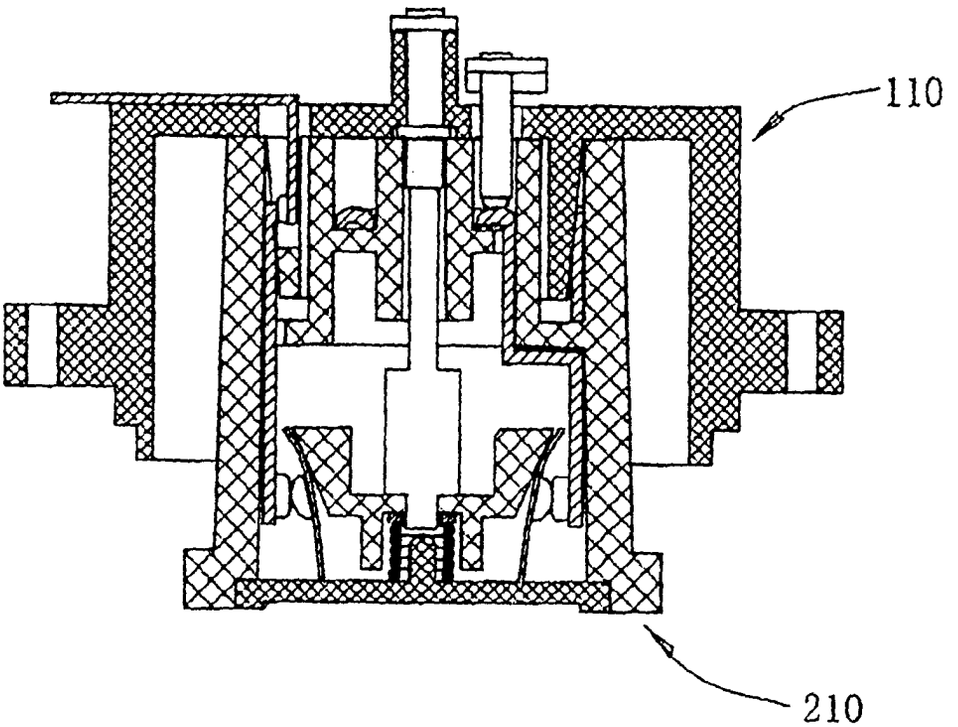

FIG. 5

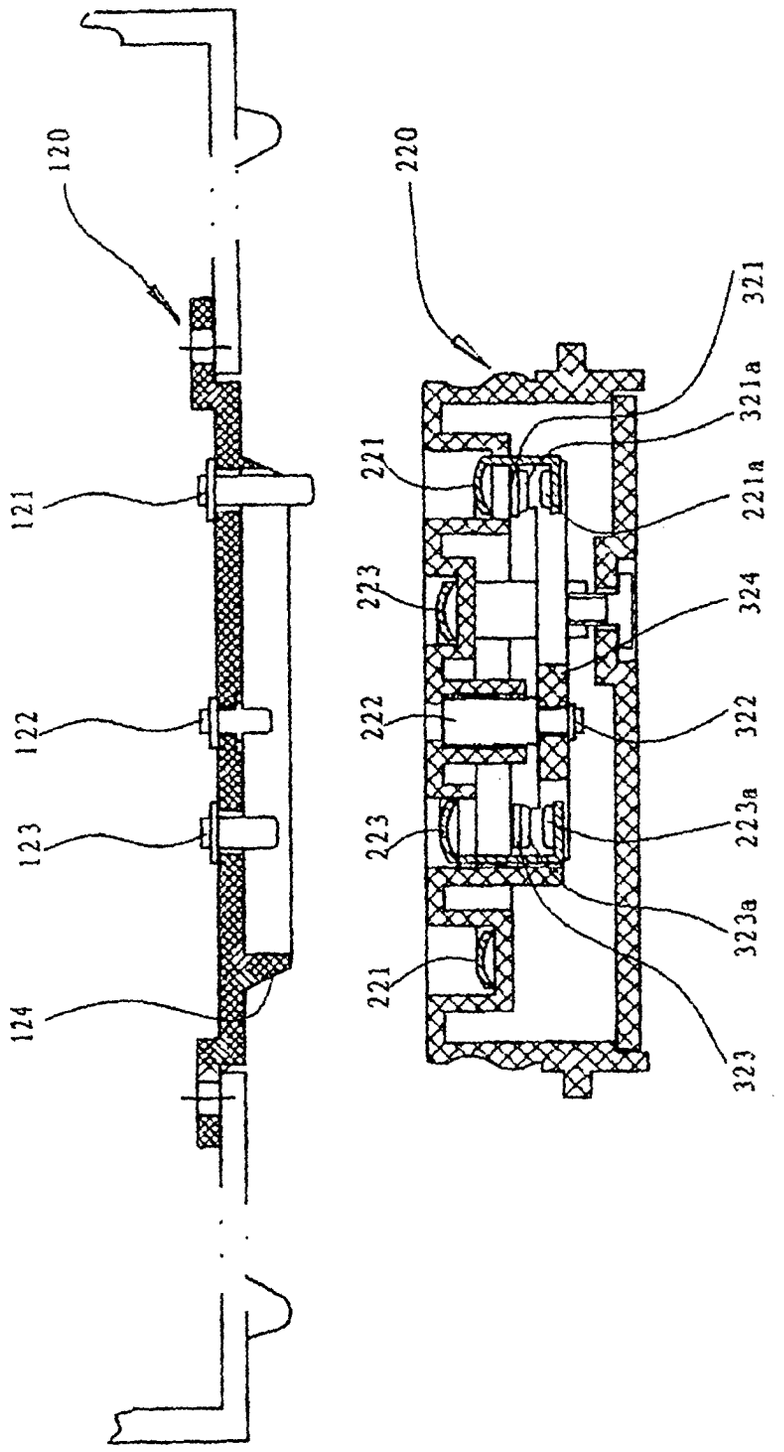
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FIG. 6

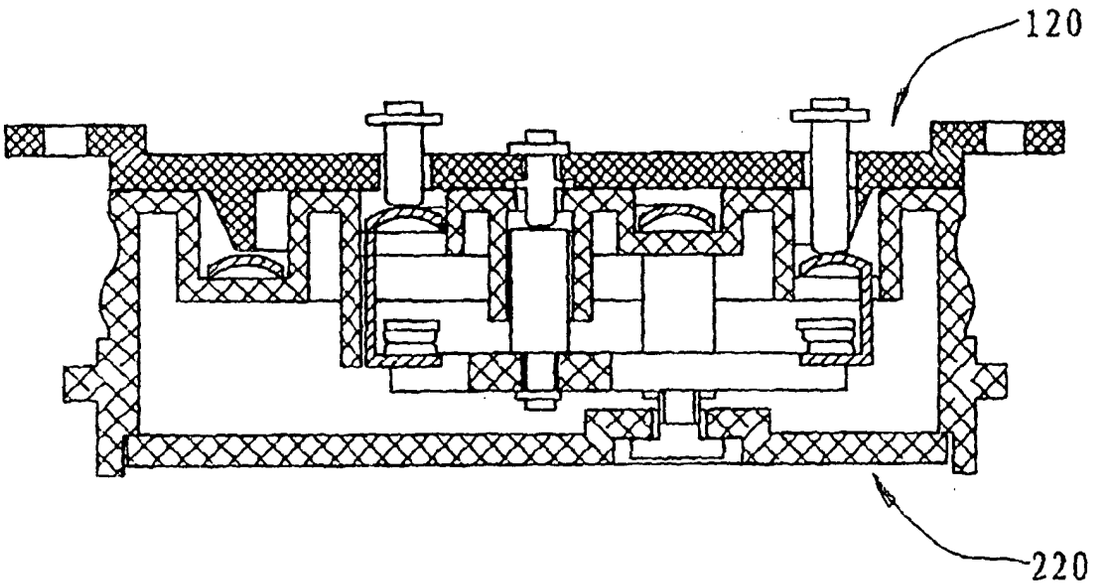

FIG. 7

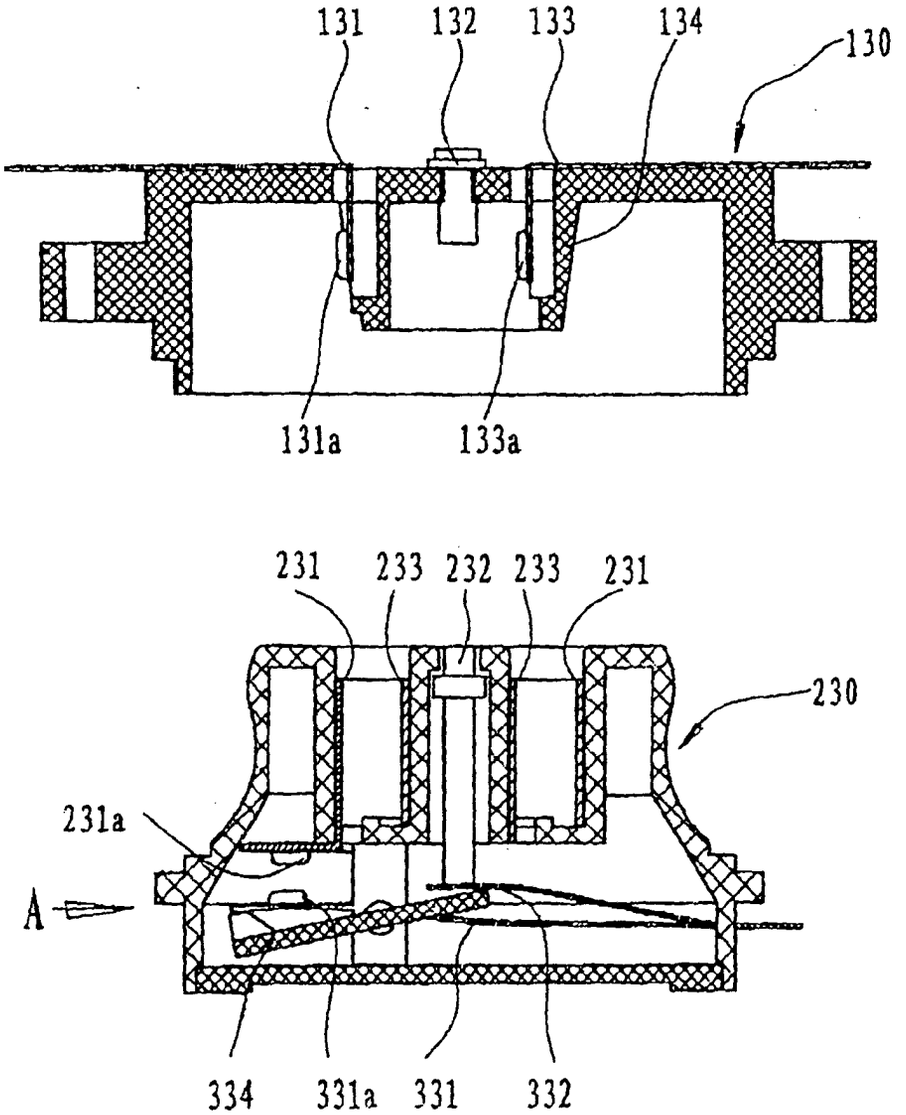
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FIG. 8

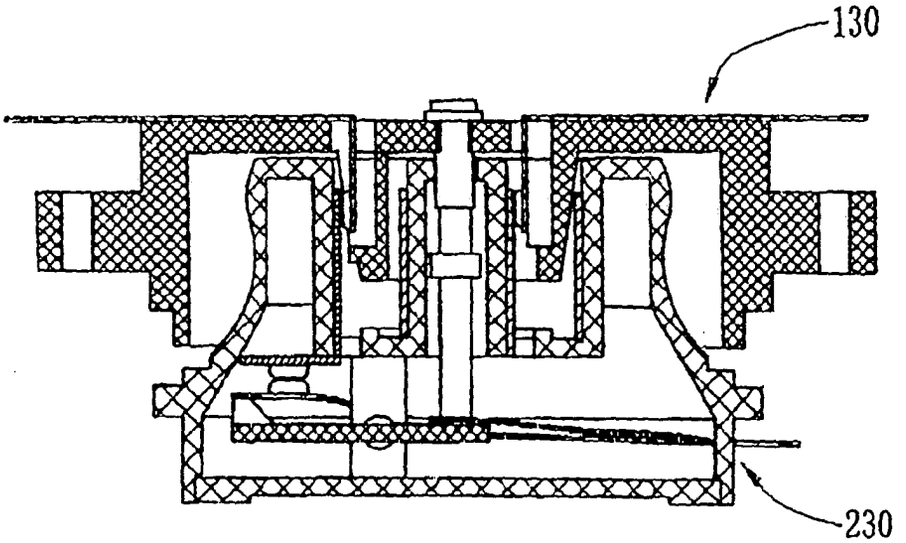
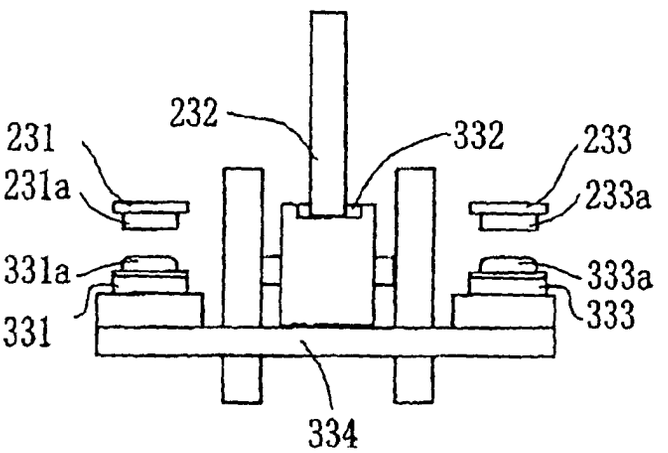


FIG. 9



Directiion A

FIG. 10

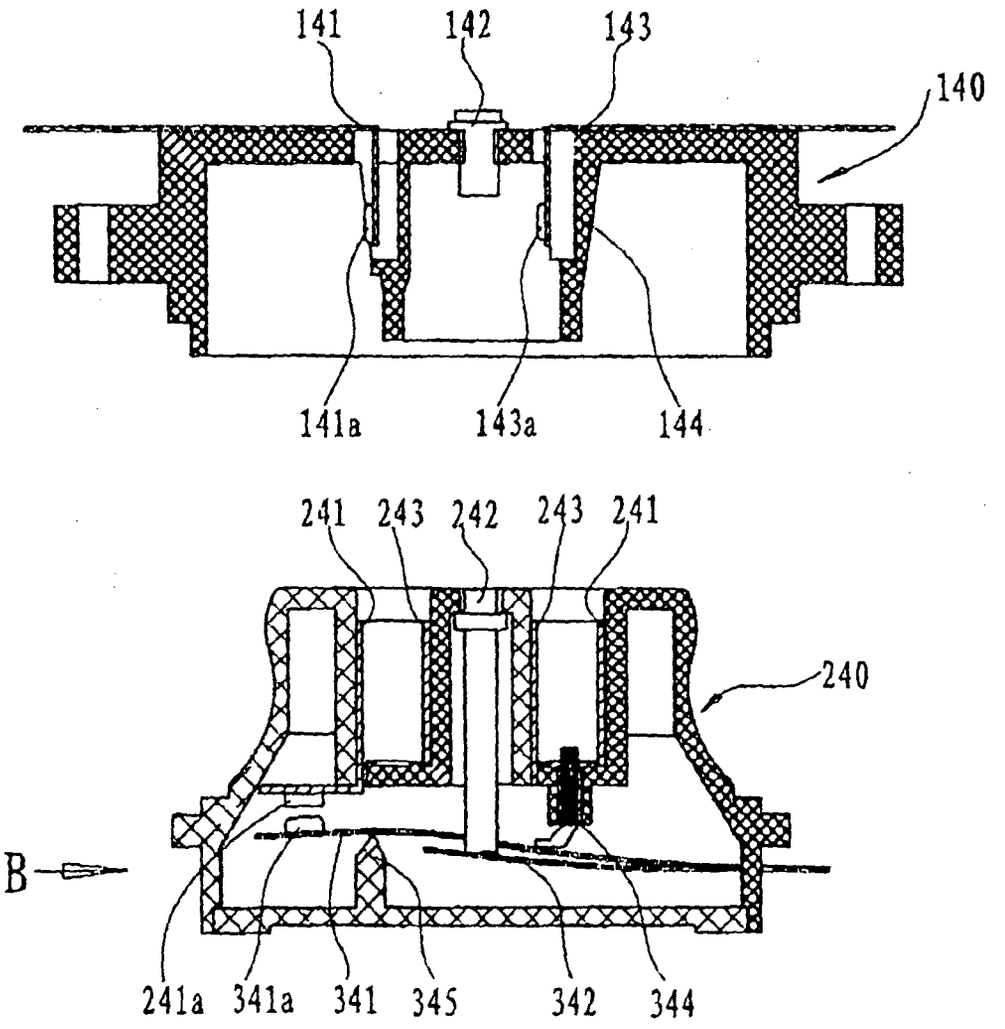

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FIG. 11

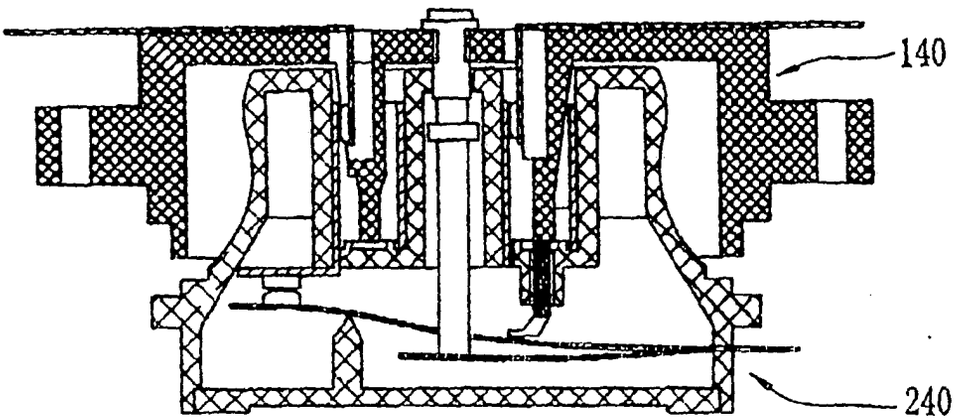

FIG. 12

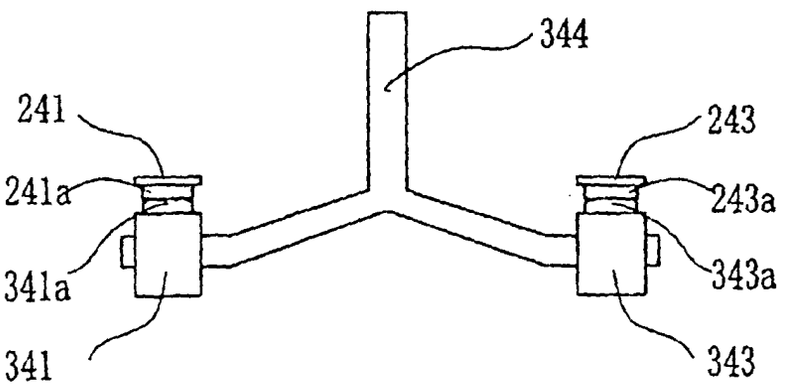

FIG. 13

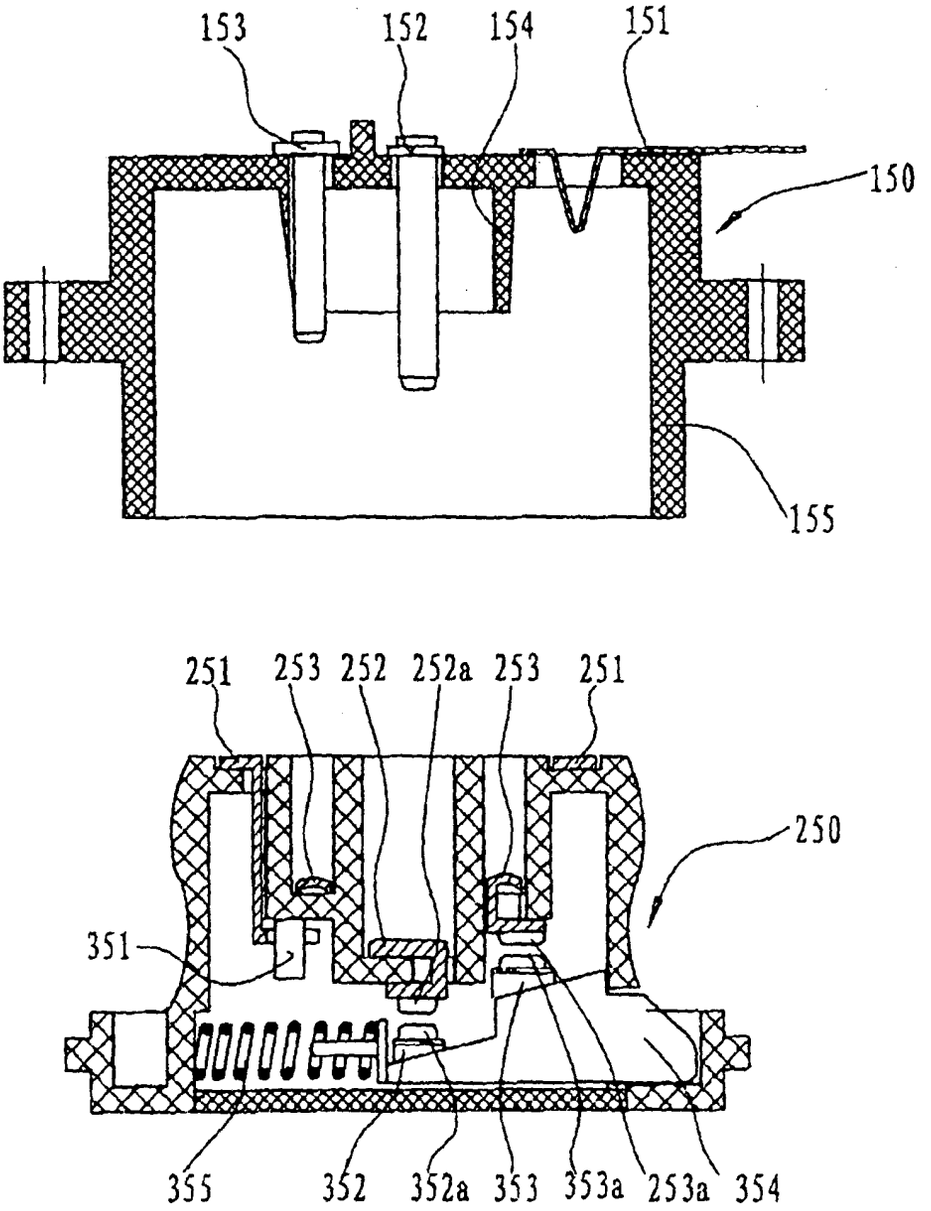
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FIG. 14

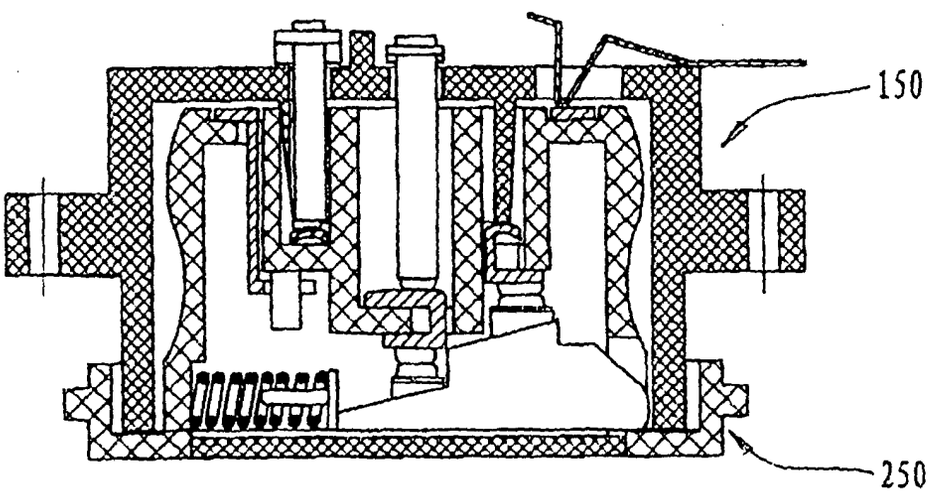

FIG. 15

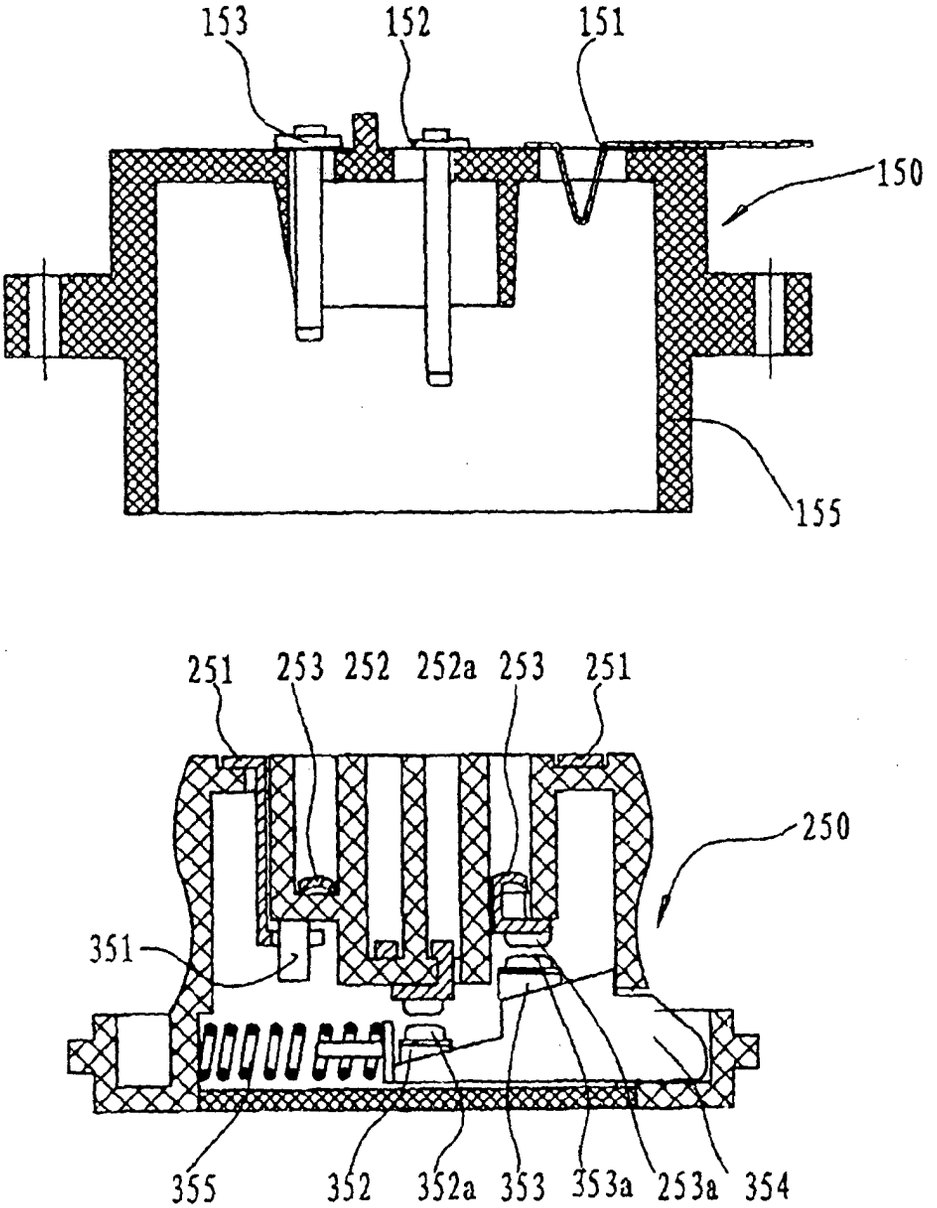
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FIG. 16

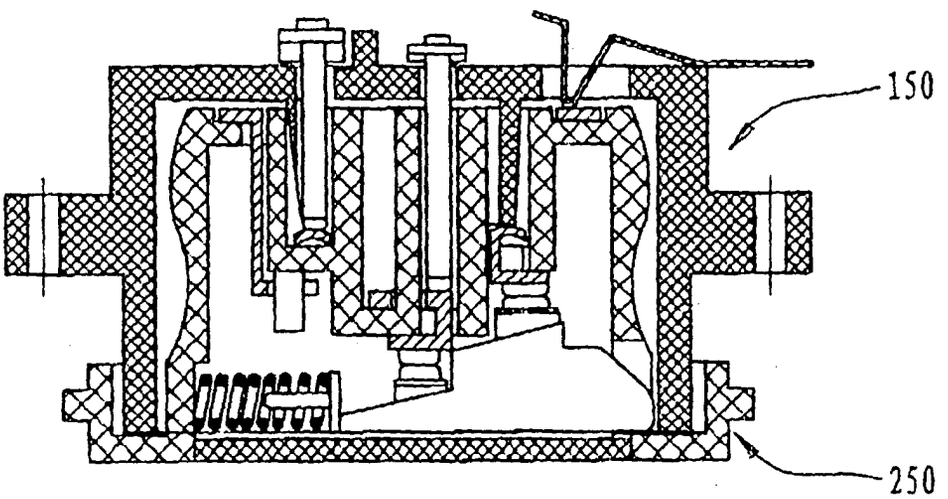

FIG. 17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN03/00601

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H01R24/00

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)

IPC7 H01R24/00 H01R35/00 H01R33/20
IPC3 H01R13/71 H01R13/703

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

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

WPI, EPODOC, PAJ, CNPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN,Y,2371698(SHAO,Zhicheng) 29.March 2000, see the whole document, figure 1-4	1-6,8,10,13,15,17,18
Y	CN,U,87213184(XU,Yixiong) 14.September 1988, see the whole document, figure 1	1-6,8,10,13,15,17,18
Y	CN,Y,2175473(ZHONG,Qianlin) 24.August 1994, see the whole document, figure 1,2	8
Y	CN,U,87209125(XU,Zhongyi) 22.June 1988, see the whole document, figure 2	10
A	CN,Y,2422757(YANG,Ning'en) 7.March 2001, see the whole document, figure 1.2	1-18

☐ 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

"P" document published prior to the international filing date but later than the priority date claimed

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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25. October 2003	06 NOV 2003 (06.11.03)
Name and mailing address of the ISA/CN 6 Xitucheng Rd., Jimen Bridge, Haidian District, 100088 Beijing, China Facsimile No. 86-10-62019451	Authorized officer LU,Shuiru Telephone No: 86-10-62084964

Form PCT/ISA /210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN03/00601

Patent document Cited in search report	Publication date	Patent family member(s)	Publication date
CN2371698Y	29.03.00	NONE	
CN87213184U	14.09.88	NONE	
CN2175473Y	24.08.94	NONE	
CN87209125U	22.06.88	NONE	
CN2422757Y	07.03.01	NONE	

Form PCT/ISA /210 (patent family annex) (July 1998)