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3,521,216

MAGNETIC PLUG AND SOCKET ASSEMBLY

Filed June 19, 1968

2 Sheets-Sheet 1

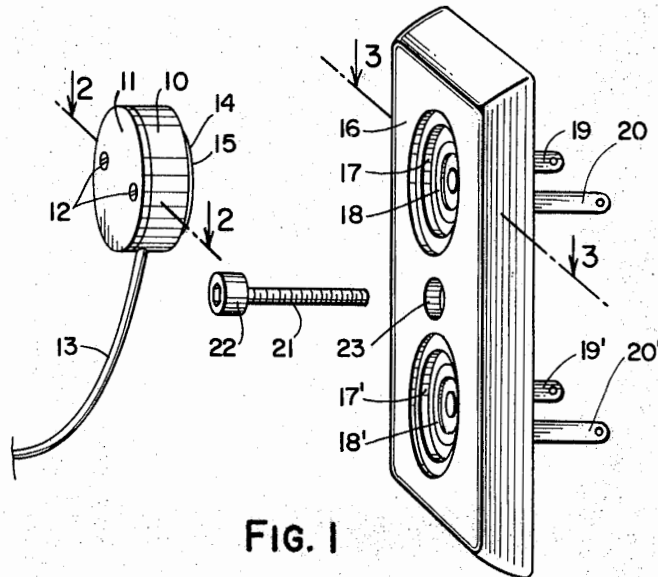


FIG. 1

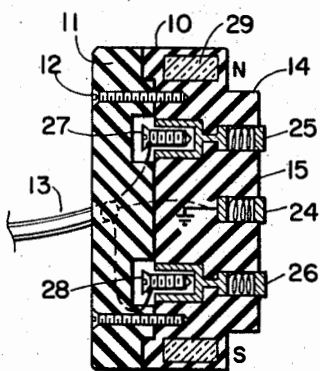


FIG. 2

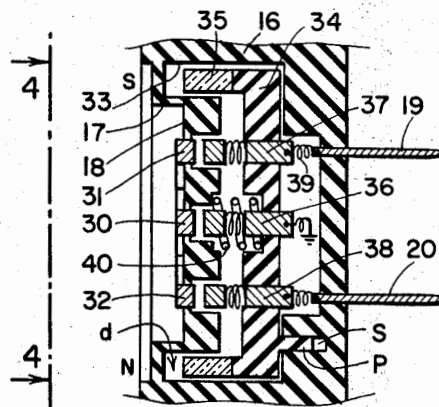


FIG. 3

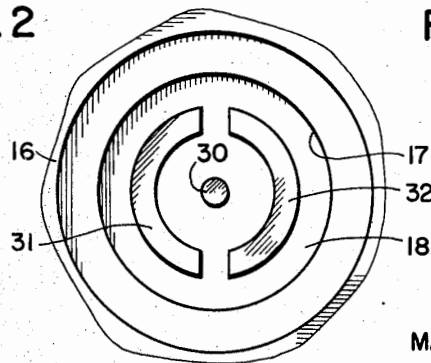


FIG. 4

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2 Sheets-Sheet 2

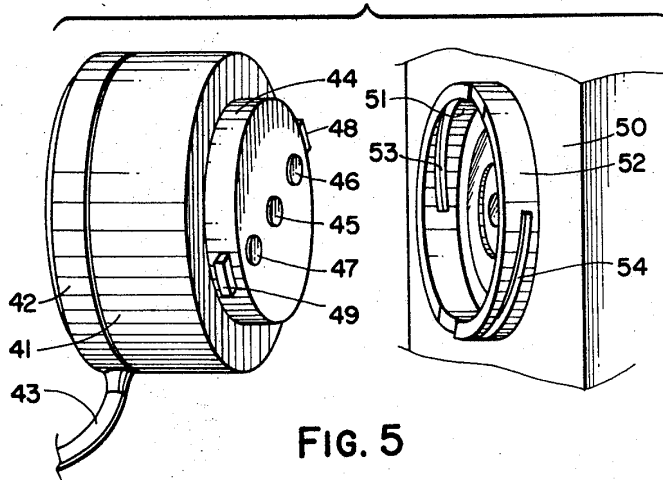


FIG. 5

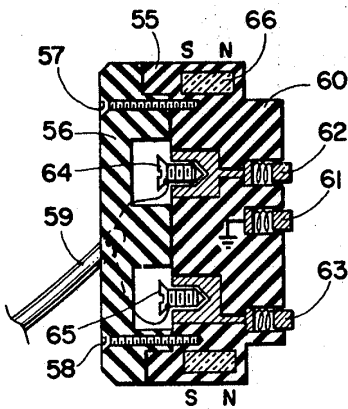


FIG. 6

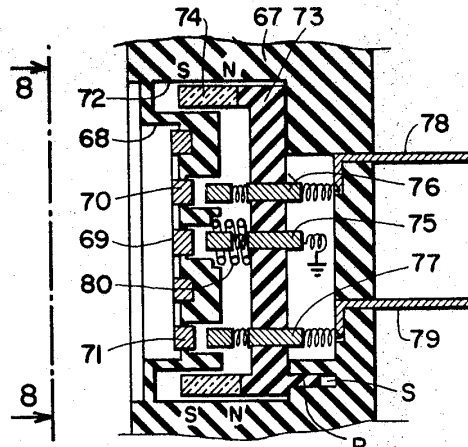


FIG. 7

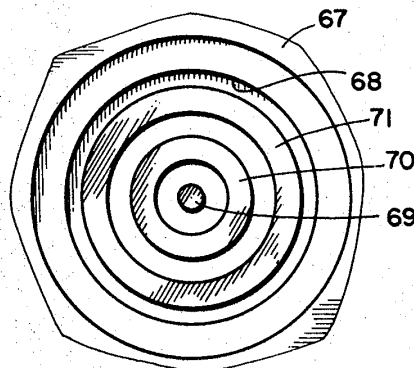


FIG. 8

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MAGNETIC PLUG AND SOCKET ASSEMBLY

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7 Claims

ABSTRACT OF THE DISCLOSURE

A plug and socket assembly is provided with magnets in both the plug and socket polarized such as to attract the plug into the socket and effect electrical contact with a source of electrical energy. The socket has a circular recess for receiving a cylindrical forwardly projecting portion on the plug. The floor or bottom of the recess includes arcuately shaped contact surfaces which are normally disconnected from the source of electrical energy. Within the socket body there are provided movable contacts connected to the source of electrical energy, the arrangement being such that when the plug is received in the recess, the magnetic attraction of the plug causes the movable contacts to engage the arcuately shaped contacts on the recess and thus effect the desired electrical connection. By this arrangement there are no "hot" contacts exposed in the socket. The magnets are polarized with their north and south poles in such positions as to assure that only certain contacts will be electrically engaged so that a consistent polarity is assured. The arcuate shapes are such that contact is maintained for several rotative positions. In addition, the arrangement of the circular recess cooperating with a cylindrical forward portion permits relative rotation of the plug in the socket so that by so rotating the plug, like poles of the magnets can be brought in to juxtaposition to repel the plug from the recess to facilitate disconnection. Because the movable contacts engage the arcuately shaped contacts wholly within the plug body as a consequence of magnetic movement, there is no exposed arcing.

This invention relates generally to plug and socket assemblies and more particularly, to an improved plug and socket assembly incorporating magnetic means for attracting and holding a plug in a socket.

BACKGROUND OF THE INVENTION

In my U.S. Pat. 3,144,527, issued Aug. 11, 1964, there is described a magnetic electrical coupling in the form of a plug and socket structure incorporating magnets to attract the plug into the socket. The socket itself includes stationary contacts on an exposed surface within a recess. In addition, there is provided an internal plunger carrying movable contacts. The magnet of the socket is also carried on this plunger so that when the plug is inserted into the socket the plunger is moved in a direction to cause the movable contacts to engage the rear inside surfaces of the exposed contacts of the recess and thus effect an electrical connection to corresponding contacts on the plug.

With the foregoing arrangement, there are never exposed any "live" contacts in the socket since the plunger within the socket body is biased to hold the movable contacts carried by the plunger out of engagement with the exposed socket contacts. The socket contacts become "live" or energized only when the plug engages the exposed contacts on the receptacle; that is when the plug is in a position to magnetically attract the plunger and effect engagement between the internal movable contacts with the exposed socket contacts. A plug and socket connector is thus provided which is not only extremely safe, but in which connection and disconnection can readily be effected without the attendant difficulties with conventional plug and

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sockets wherein prongs must be fitted within specific openings.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

The present invention constitutes an improved plug and socket assembly incorporating many of the important features of my heretofore mentioned U.S. patent but in addition providing further novel advantages and features.

More particularly, the present invention contemplates a plug body including a cylindrical forwardly extending portion terminating in a flat end face carrying plug contact means. This plug is arranged to cooperate with a socket body having a circular recess terminating in a flat bottom carrying arcuately extending socket contact means. Interior of the socket body there is provided a movable plunger carrying movable contact means for connection to a source of electrical energy. These movable contact means may be connected by flexible "pigtail" type wires to rearwardly extending prongs receivable in a conventional electrical outlet receptacle so that the socket body serves as an adapter.

The plunger within the socket carries a magnetic material for cooperation with a magnetic material in the plug body when the forwardly projecting portion is received in the circular recess. The arrangement is such that the magnetic materials attract each other to cause the plunger to move in a direction to place the movable contacts into electrical engagement with the rear portions of the arcuately extending contacts in the flat bottom surface of the recess.

In one embodiment, the arcuate contacts extend over at least 120° and are arranged on diametrically opposite sides of the center portion of the recess for cooperation with two plug contacts arranged diametrically on opposite sides of the center of the flat end surface of the plug. The magnetic material in turn constitutes permanent magnets polarized such that the two plug contacts will consistently effect engagement with the same two arcuate socket contacts. In other words, any rotative position of the plug in which improper contact might be made will result in positioning of the poles of the magnets in such positions as to repel the plug from the socket. Consistent circuit polarity is thus assured.

In a second embodiment of the invention, the arcuate socket contacts extend over 360° to define ring contacts of different radii. In this arrangement, the magnets are designed to attract regardless of the rotative position of the plug so that there is assured an electrical connection regardless of the manner in which the plug is inserted into the socket.

In all embodiments of the invention, there may be provided central contacts in both the plug and socket constituting proper grounding contacts. Also, there may be provided, if desired, small laterally extending ears on the plug structure for cooperation with helical slots formed in the recess wall of the socket to essentially lock the plug to the socket against direct outward pulling. These helical slots also assure positive prevention of arcing or flash of the exposed contacts during connection or disconnection of the plug by guiding rotation of the plug to effect internal connection or disconnection while the plug is still in the socket.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the preferred embodiments of this improved plug and socket assembly will be had by now referring to the accompanying drawings, in which: FIG. 1 is an exploded perspective view of the plug and socket assembly of this invention showing the plug disconnected from the socket;

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FIG. 2 is a cross section of the plug taken in the direction of the arrows 2—2 of FIG. 1;

FIG. 3 is a cross section of the socket taken in the direction of the arrows 3—3 of FIG. 1;

FIG. 4 is a fragmentary front plan view of the socket taken in the direction of the arrows 4—4 of FIG. 3;

FIG. 5 is a fragmentary perspective view of the plug and socket assembly of FIG. 1 incorporating modified features;

FIG. 6 is a cross section of a plug illustrating a second embodiment of the invention;

FIG. 7 is a cross section of a socket illustrating the second embodiment for cooperation with the plug of FIG. 6; and

FIG. 8 is a fragmentary front plan view of the socket of the second embodiment taken in the direction of the arrows 8—8 of FIG. 7.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1 there is shown a plug body 10 provided with a rear cover 11 held to the body as by screws 12. An electrical wire 13 extends from the body as shown. The front of the body includes a cylindrical forwardly projecting portion 14 terminating in a flat end face 15.

The plug as described in FIG. 1 is arranged to cooperate with a socket body 16 having a circular recess 17 dimensioned to receive the forwardly projecting portion 14 of the plug. The circular recess 17 terminates in a flat bottom surface 18. In the embodiment disclosed, the socket body 16 includes rearwardly extending prongs 19 and 20 for reception in a conventional electrical outlet and thus the socket body 16 is in the form of an adapter. This adapter may include one or more additional recesses and prong assemblies similarly dimensioned to the first mentioned recess such as indicated at 17', 18', 19', and 20' for use with conventional double outlet receptacle. In securing the adapter 16 to the conventional receptacle, the conventional screw for the cover plate is removed and a modified screw 21 with a socket type head 22 is received through a central opening 23 in the socket body. The modified socket head 22 is arranged for cooperation with an Allen wrench and thus the adapter, once affixed, can not readily be removed by children and the like.

Referring now to both FIGS. 2 and 3, further details of the plug and socket bodies respectively will be described. In FIG. 2, it will be noted that the flat front end 15 of the cylindrical projecting portion 14 includes plug contact means 24, 25, and 26. These contacts are essentially flush with the flat end surface 15. The contact 24 constitutes a center contact and may be grounded as shown. The contacts 25 and 26 constitute first and second contacts diametrically spaced on opposite sides of the center. These latter two contacts may connect internally of the plug to connecting screws 27 and 28 respectively which in turn clamp the wires in the lead 13. Thus a conventional plug may be removed and the novel plug of FIG. 2 readily connected by simply removing the rear cover 11 and effecting a screw connection of the leads in the usual manner.

The plug assembly is completed by provision of a magnetic material preferably in the form of a permanent ring type magnet 29 embedded in the plug body 10. This magnet may be of the ceramic type and is polarized such that its upper portion constitutes a north pole and its lower ring portion constitutes a south pole. The north pole is adjacent to the first contact 25 and the south pole adjacent to the second contact 26; that is, these poles are in radial alignment with these contacts when viewed from the front.

In FIG. 3, it will be noted that the flat bottom surface 18 includes socket contact means in the form of contacts 30, 31 and 32. The contact 30 constitutes a central contact for purposes of grounding. The contacts 31 and 32 in turn constitute arcuately extending contact surfaces diametrically arranged on opposite sides of the central portion of the flat bottom 18. An interior portion of

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the socket body 16 is hollowed out as shown at 33 for accommodating a plunger 34 movable towards and away from the rear of the flat bottom surface 18. This plunger carries magnetic material in the form of an annular ring type magnet 35 having its upper and lower halves polarized to define south and north poles respectively. As in the case of the plug magnet, the socket magnet 35 may be of the ceramic type.

The plunger 34 also carries movable contacts 36, 37, and 38. These contacts are positioned to electrically engage, respectively, the rear surfaces of the contacts 30, 31, and 32 when the plunger 34 moves towards the flat bottom surface 18 and to be electrically disengaged from these contacts when moved away from this flat bottom surface. In the embodiment illustrated, the various movable contacts are connected by "pigtail" type leads to ground and the prongs 19 and 20 respectively. One of these leads is indicated at 39 between the movable contact 37 and the prong 19. These leads will accommodate movement of the contacts while maintaining electrical continuity between the movable contacts and the stationary ground connection and prongs. The plunger 34 is keyed against rotation by projecting portion P received in the bore S.

The socket body assembly is completed by a biasing means in the form of a compression spring 40 exerting a biasing force on the plunger 34 to hold it away from the rear wall 18 so that the movable contacts are normally electrically disengaged from the arcuately extending contacts as illustrated in FIG. 3.

FIG. 4 illustrates the actual configuration of the arcuately extending socket contacts 31 and 32. In this particular embodiment, it will be noted that each of these contacts extends over an arc of at least 120°. The magnetic poles S and N for the magnet 35 of FIG. 3 are positioned adjacent to the mid areas of the arcuate contacts 31 and 32; that is, these poles are in radial alignment with radii drawn from the center contact 30 passing through the mid portions of the arcuate contacts 31 and 32.

From the foregoing description, it will be evident that when the forwardly projecting portion 14 of the plug 10 in FIG. 2 is received into the circular recess 17 of the socket 16 of FIG. 3, the unlike poles N and S of the respective magnets will attract and if these poles are not initially juxtaposed each other, the cylindrical forwardly projecting portion will rotate in the circular recess 17 until these poles are juxtaposed. The attraction between the magnets will move the plunger to the left as viewed in FIG. 3 thereby causing the movable contacts to engage the arcuate contacts and thus effect a connection between the plug contacts 25 and 26 and the prongs 19 and 20. Because of the arcuate extent of the socket contacts, exact alignment or juxtaposition of the poles of the magnets is not essential to complete the electrical connection. On the other hand, if the plug is rotated to a position greater than 90° from the proper position in which the poles are juxtaposed, then like poles will become closer to each other and there will be a repulsion thereby urging the plug away from the socket and effectively retracting the plunger 34 to the right. It will be clear, accordingly, that electrical connection can only be properly effected between the plug contact 25 and the socket contact 31, and, plug contact 26 and socket contact 32. Consistent circuit polarity is thus maintained. In all positions the ground contacts 24 and 30 will be engaged.

FIG. 5 illustrates a modification of the plug and socket structures described in FIGS. 2 and 3. In FIG. 5, the plug body is illustrated at 41 provided with a cover 42 for providing access to suitable screws for connecting the lead 43 as in the case of the plug 10 of FIG. 1. The plug body includes a cylindrical forwardly projecting portion 44 terminating in a flat end face carrying contacts 45, 46, and 47. The structure described thus far is identical to the plug of FIG. 1. The modification illustrated in

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FIG. 5 constitutes the provision of laterally extending ears 48 and 49 on the forwardly projecting portion 44.

The socket structure of FIG. 5 includes a socket body 50 having a circular recessed area 51 defined by an annular wall 52. This wall includes helical slots 53 and 54 extending at least 90° positioned to receive the ears 48 and 49 when the forwardly projecting portion 44 of the plug is received in the recess 51. The arrangement is such that when the plug body 41 is rotated to position the ears 48 and 49 at the outer ends of the slots 53 and 54 for initial reception in the slots, the internal magnets in the plug and socket will have their like poles closer so that the plunger will be retracted and no internal connection results until after the plug is rotated along the slots to position the ears at the inner ends of the slots. In this latter position, unlike poles of the magnets are juxtaposed and internal contact will take place to complete the connecting to contacts 46 and 47. Except for the modified recess structure defined by the annular wall 52, the socket contacts and internal portion of the socket is identical to the socket of FIG. 3.

The embodiment of FIG. 5 is useful wherein it is desired to lock the plug into the socket against direct outward pulling and also positively prevent arcing at the exposed contacts. Thus, it will be evident that in removing the plug from the socket, it is rotated clockwise to cause the ears 48 and 49 to ride up the helical slots 53 and 54. The mechanical action effected by the inclined slots will thus aid in breaking the magnetic attraction and, of course, as the rotation increases, the like poles are brought closer together to assure retraction of the internal plunger to break the internal contacts before the ears reach the outer exit openings of the slots. Thus, any arcing necessarily takes place internally.

FIGS. 6, 7, and 8 relate to a second embodiment of the invention wherein desired contact between the plug and socket is effected for any rotative position of the plug. Referring first to the plug of FIG. 6, the structure includes a plug body 55 having a cover 56 and securing screws 57 and 58 for providing access to connect lead wires from a lead 59. The plug includes a cylindrical forwardly projecting portion 60 terminating in a flat end face carrying ground contact 61 and first and second contacts 62 and 63 at different radial spacings from the center of the end face. The first and second contacts 62 and 63 connect to suitable connecting screws 64 and 65 in the plug body as shown. An annular magnet 66 of the ceramic type is embedded in the plug body 55. This magnet is polarized so that the front annular portion of the magnet constitutes a north pole and the rear annular portion constitutes a south pole as indicated by the letters N and S.

The socket of the second embodiment is illustrated in FIG. 7 and includes a socket body 67 having a circular recess 68 dimensioned to receive the forwardly projecting portion 60 of the plug. This recess has a flat bottom carrying socket contacts in the form of a center ground contact 69 and first and second arcuately extending contacts 70 and 71. These arcuate contacts extend over 360° and thus define first and second ring type contacts at radial spacing corresponding to the radii for the plug contacts 62 and 63 respectively. The interior of the socket body is hollowed out as indicated at 72 to accommodate a plunger 73 carrying an annular ceramic magnet 74. The magnet 74 is similar to the magnet 66 in the plug. In the magnet 74, however, the front or left peripheral portion of the annular configuration is polarized as a south pole and the rear annular portion is polarized as a north pole. As in the case of the other embodiment, the plunger 73 carries movable contacts 75, 76, and 77 arranged to engage rear portions of the contacts 69, 70, and 71. The movable contacts 76 and 77 for the first and second ring contacts 70 and 71 connect through "pigtales" to the prongs 78 and 79 respectively. A compression spring 80 serves to bias the plunger 73 away from the flat bottom of the recess

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68 so as to normally hold the movable contacts out of engagement with the arcuate contacts.

FIG. 8 shows in plan view the first and second ring contacts 70 and 71 and, as mentioned, the radial spacing is such as to effect electrical engagement with the first and second plug contacts 62 and 63 regardless of the relative rotative position of the plug in the socket.

Because of the polarization of the magnets 66 and 74, respectively, it will be clear that regardless of the rotative position of the plug, the plug will always be attracted into the socket by the magnets in question. Therefore, once the forwardly projecting portion 60 is received in the circular recess 68, the attraction of the magnets will result in the plunger 73 moving to the left as viewed in FIG. 7 to effect the desired contacts.

OPERATION

With reference first to the embodiment described in FIGS. 1 through 4, when the socket body is provided with a prong and special screw as illustrated in FIG. 1, it may readily be inserted into double outlet type home receptacles without any modification of the receptacle itself. The special Allen head for the screw 21 will inhibit tampering of the socket by children once the same has been secured to the conventional outlet.

In the absence of any plug received in the various circular recesses, it will be evident that the exposed arcuate contacts as described in FIG. 3 are "dead"; that is, the movable contacts such as 37 and 38 connected to the prongs 19 and 20 and thus energized are out of engagement with the exposed contacts 31 and 32 as a consequence of the biasing spring 40 holding the plunger 34 to its extreme right-hand position. As a consequence, there is no danger of children inadvertently shocking themselves even if they should insert their fingers in the circular recesses. Moreover, by hermetically sealing the entire socket body 16, the interior contacts are wholly protected and can be kept in a clean and operable condition.

The plug body 10 may also be purchased as an adapter and simply substituted for conventional household plugs having prongs. This is accomplished, as described, by removing the cover plate 11 and simply connecting the wires of any electrical lead extending to any appliance to the plug screws.

After the adapters have been positioned, it is a simple matter to effect any desired electrical connection. Whenever the forwardly projecting portion 14 is simply placed manually into the circular recess such as recess 17, full attraction of the projecting portion into the recess will be effected by the magnets 29 and 35 this same attraction also serving to move the plunger 34 to the left as viewed in FIG. 3 thereby effecting contact between movable contacts and the arcuate exposed contacts. It will be clear that the exposed contacts of the socket will not be energized until after they have been covered by the plug and only at that time when the magnets are in juxtaposed relationship will an electrical connection be effected. Thus there is no time at which live contacts are exposed.

The magnetic attraction will assure that the proper contacts on the plug engage the corresponding proper contacts on the socket. The ceramic type magnets may be economically made and are desirable since they are electrically nonconducting. The holding force is adequate and in most instances is greater than that afforded by the mechanical insertion of prongs in conventional receptacles. By making all contacts of the spring loaded type as shown in the drawings, reliable connections are assured.

With the plug connection effected, the desired appliance will be energized in the usual manner. Should any person trip over the plug wire or inadvertently pull the plug from the socket, no damage will result since this action will simply break the magnetic field. On the other hand, in certain instances where it is desired to lock the plug against removal by a pulling force, the annular wall with

slots cooperating with suitable laterally extending ears on the plugs may be incorporated as described in FIG. 5.

Removal of the plug is very simply effected by simply rotating the plug in the socket to thereby readily separate the opposed poles of the magnets and bring like poles closer to each other. This action as described will result in a repulsion of the plug from the socket and it will also be evident that this action will retract or move the plunger 34 to the right as viewed in FIG. 3 thereby breaking the electrical connection prior to the time that the plug ears are free from the slots so that no external arcing can occur. Again it will also be evident that there is at no time "live" contacts exposed.

With respect to the embodiment described in FIGS. 6, 7 and 8, the socket adapter and plugs may be installed as described for the embodiment of FIGS. 1 to 4. When the plug of FIG. 6 is inserted in the recess in the socket of FIG. 7, immediate contact will be effected between the desired contacts regardless of the rotative position of the plug in the socket. This is a consequence, as described heretofore, of the polarity of the annular magnets 65 and 74 wherein they are positioned so that an attractive force always exists.

The second embodiment of FIGS. 6, 7, and 8 has the advantage that a very rapid connection can be effected it not being necessary to orient the plug in a certain rotative position before attraction will take place. Moreover, with the embodiment of FIGS. 6, 7 and 8 more than two contacts may be simultaneously effected without worry as to orientation of the plug. For example, there may be provided additional annular ring type contacts on the recess flat bottom of the socket all concentrically arranged but at different radial distances from the center and corresponding additional plug contacts at proper radial spacing, thereby providing a multiple contact plug and socket.

In all of the embodiments, a center ground contact may be provided as described to assure proper grounding.

The embodiment of FIG. 5 is particularly useful in environments which may contain explosive gases since any arcing upon making or breaking of the contacts takes place wholly within the socket body. This is a consequence of the fact that the plug contacts must be rotated on the arcuately extending socket contacts when inserting or removing the plug such that a repulsion of the plunger takes place before the plug is actually inserted or removed from the socket as a consequence of like poles approaching each other. In the embodiment of FIGS. 6, 7, and 8, it is possible that some slight arcing might occur at the exposed contacts since separation of the plug and socket exposed contacts must take place before the spring 80 can retract the plunger 73. This is a consequence of the polarity arrangement of the various magnets. Thus in explosive environments it is preferable to use the plug and socket assembly described in FIG. 5.

Both embodiments of the invention lend themselves well to use in outdoor installations wherein the contacts are subject to exposure by the elements or even in underwater applications wherein the exposure of live contacts in the absence of a connecting plug could cause short circuits. From the foregoing description, it will be evident that the present invention has provided a greatly improved plug and socket assembly wherein the various unique advantages discussed have all been fully realized.

What is claimed is:

1. A magnetic plug and socket assembly comprising, in combination:

- (a) a plug body having a cylindrical forwardly projecting portion terminating in a flat end face;
- (b) plug contact means on said face in substantially flush relationship therewith;
- (c) magnetic material in said plug body;
- (d) a socket body having a circular recess terminating in a flat bottom surface, said recess being dimensioned to receive said cylindrical forwardly projecting portion;

(e) socket contact means on said flat bottom surface extending over circumferential arcs of at least 120° radially positioned to be engaged by said plug contact means, said cylindrical forwardly projecting portion being rotatable in said circular recess, said socket body having a hollow interior portion behind said flat bottom;

(f) a plunger member in said interior portion movable towards and away from the rear of said flat bottom;

(g) magnetic material carried by said plunger;

(h) biasing means urging said plunger away from said flat bottom; and

(i) movable contact means for connection to a source of electrical energy, said movable contact means being carried by said plunger in a position to electrically engage rear portions of said arcuately extending socket contact means when said plunger is moved towards said flat bottom and to electrically disengage said rear portions when said plunger is moved away from said flat bottom, said magnetic material in said plug body and said magnetic material in said plunger attracting each other to move said plunger towards said flat bottom against the bias of said bias means when said forwardly projecting portion of said plug is received in said recess whereby electrical connection is effected between said plug contact means and said movable contact means through the medium of said arcuately extending socket contact means.

2. An assembly according to claim 1, in which said plug contact means includes at least two contacts spaced at different radial distances from the center of said flat end face, and in which said socket contact means includes at least two contact surfaces extending over 360° to define two ring contacts of radii corresponding to the radial distances of said two contacts in said plug, whereby electrical connection is effected between said two contacts of said plug and said two ring contacts for any rotative position of said forwardly extending portion in said circular recess.

3. An assembly according to claim 1, in which said socket body includes rearwardly extending prongs connected to said movable contact means, said prongs being receivable in a conventional electrical outlet receptacle whereby said socket body defines an adapter for enabling energy to be passed to said plug contact means from said outlet receptacle without modifying said receptacle.

4. An assembly according to claim 3, in which said socket body includes an additional socket recess with arcuately extending contact means dimensioned identically to said first mentioned recess, said plunger including additional movable contact means and said socket body including additional rearwardly extending prongs connected to said additional movable contact means to provide a double outlet adapter, said socket body having a central opening for receiving a screw to permanently mount said socket body over a conventional double receptacle outlet.

5. An assembly according to claim 1, in which said plug contacts include first and second contacts radially spaced on diametrically opposite positions relative to the center of said flat end face, said socket contact means comprising first and second contact surfaces insulated from each other and radially spaced from the center of said flat bottom surface in positions to be engaged by said first and second plug contacts respectively; and in which said magnetic material in said plug comprises a first magnet having a north pole adjacent to said first plug contact and a south pole adjacent to said second plug contact, said magnetic material carried by said plunger comprising a second magnet having a south pole adjacent to the mid area of said first arcuately shaped contact surface and a north pole adjacent to the mid area

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of said second arcuately shaped contact surface whereby said first and second plug contacts are attracted respectively to said first and second arcuately shaped contacts and whereby rotation of said forwardly projecting portion in said circular recess beyond 90° positions like poles closer to each other thereby exerting a repelling force on said forwardly projecting portion to facilitate removal thereof from said circular recess and assure consistent circuit polarity.

6. An assembly according to claim 5, in which said forwardly projecting portion includes circumferentially spaced laterally extending ears and in which said circular recess is defined by an annular wall having circumferentially spaced helical slots with entrance portions receiving said ears when said plug is oriented so that said magnets repel, attraction of said first and second magnets occurring when said ears are circumferentially positioned at the inner ends of said slots, whereby said plug is held in said recess against direct outward pulling force and whereby internal connections can only be made or broken while said forwardly projecting portion is in said recess to prevent external arcing.

7. An assembly according to claim 5, in which said plug contact means includes a central contact between

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said first and second contacts defining a ground and in which said flat bottom surface of said recess includes a central contact surface between said first and second arcuately shaped contact surfaces defining a ground for said socket and engaging said central contact of said plug when said forwardly projecting portion is received in said circular recess.

References Cited

UNITED STATES PATENTS

1,684,915	9/1928	Giles et al.	339—155
2,234,982	3/1941	Ross	200—83
2,565,075	8/1951	Harcharek	339—156
3,144,527	8/1964	Tolegian	200—51.09

FOREIGN PATENTS

622,402	2/1927	France.
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U.S. Cl. X.R.

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