June 2, 1936. W. G. PONTIS 2,042,680

ELECTRIC CONNECTER

Filed Feb. 15, 1934 2 Sheets-Sheet 1

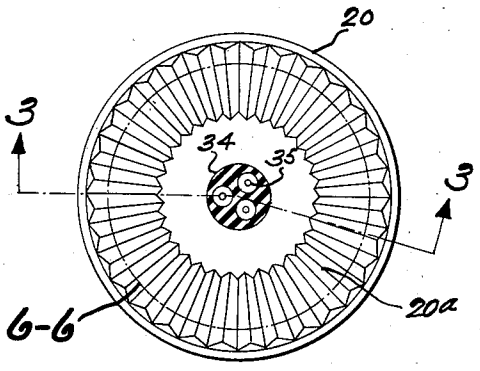


Fig. 1

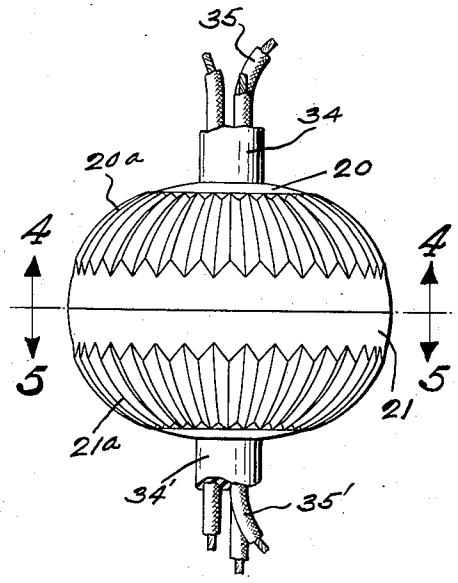


Fig. 2

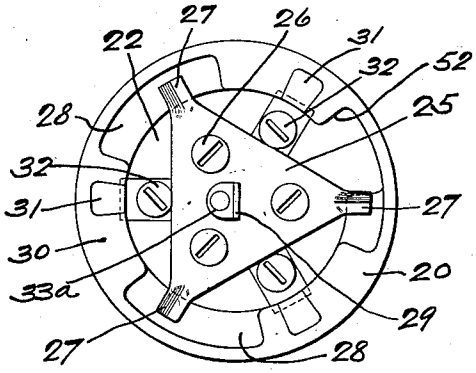


Fig. 4

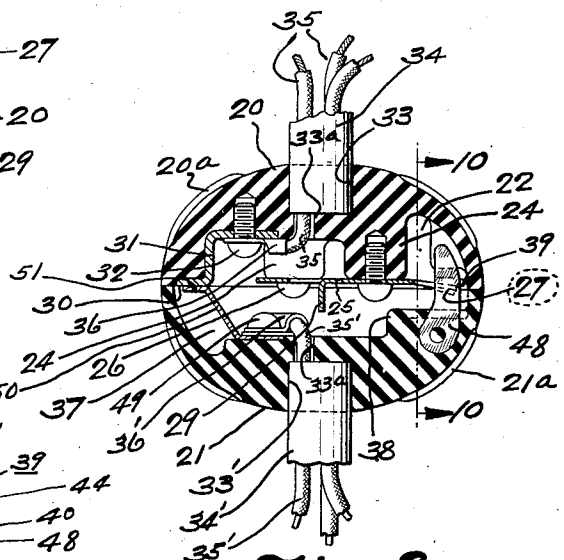


Fig. 3

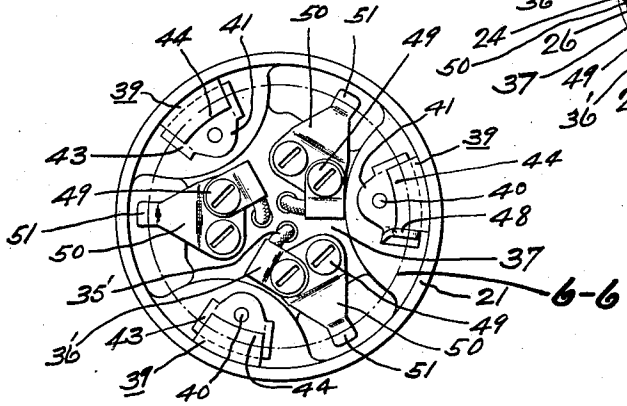


Fig. 5

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ELECTRIC CONNECTER

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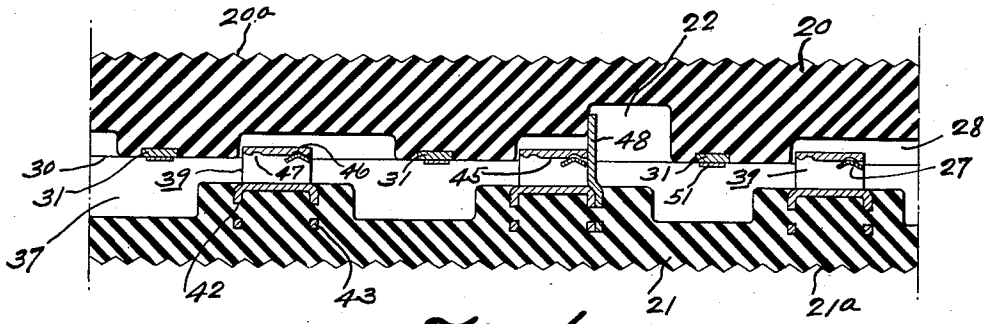


Fig. 6

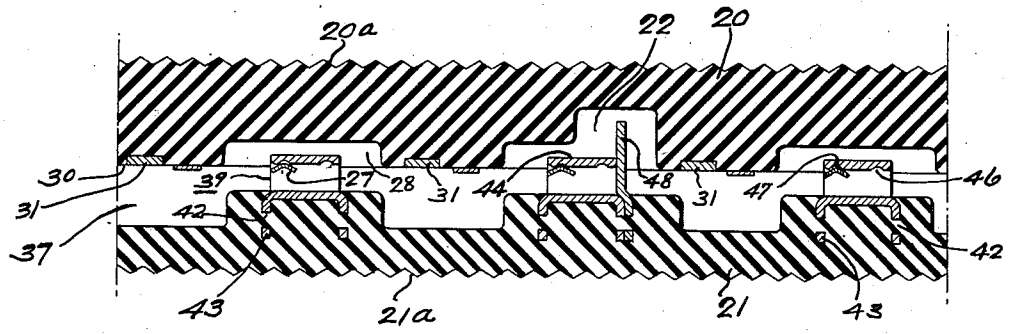


Fig. 7

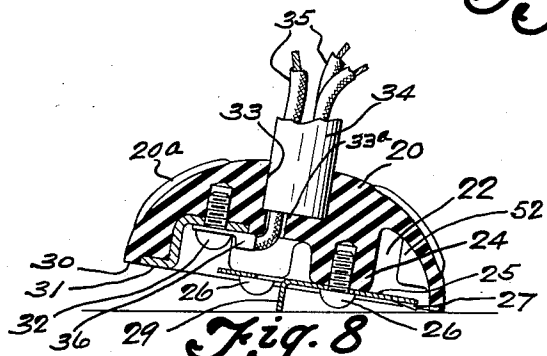


Fig. 8

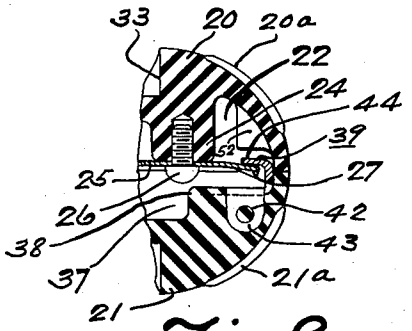


Fig. 9

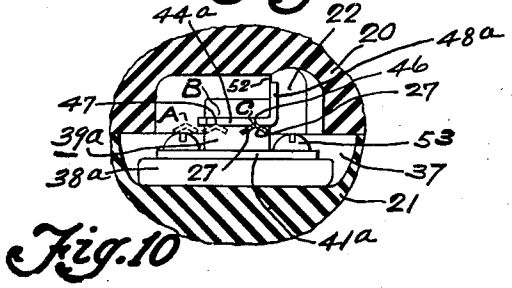


Fig. 10

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UNITED STATES PATENT OFFICE

2,042,680

ELECTRIC CONNECTER

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Application February 15, 1934, Serial No. 711,352

14 Claims. (Cl. 200—51)

This invention relates generally to circuit controlling devices, and is particularly related to electrical coupling devices incorporating means for selectively opening and closing circuits through the coupling device.

One of the objects of the invention is to provide a combined connecter plug and switch device adaptable for insertion in an electrical line to act both as a plug connecter and as a switching mechanism. This has been accomplished by building the electrical coupling device into the form of two sub-assembly units in such a manner that they have cooperating provisions for maintaining the subassemblies together in a plurality of interengaged relations.

A further object of the invention is to provide a coupler device that has a plurality of positions in the coupled relation, at least one of which positions is in circuit closed position, and at least one of the other positions is in a circuit opened position, yet the plurality of positions being optionally selectable without separating the contributing subassemblies. This has been accomplished by forming the coupling device into a plurality of subassemblies that have interfitting rotary connection one with the other, so that a plurality of relatively rotary positions may be assumed with the cooperating parts still maintained in locking position.

Another object of this invention is to provide a coupling switch for an electrical circuit, whose conducting parts are sealed against the effects of acid fumes and drippings that might deteriorate or corrode the conductive parts of the device. This is accomplished by constructing the coupler switch in a form to provide a pair of cooperating housing members, each of which encloses a part of the plug and switch mechanism and which are held together by interengaging locking provisions so that a rim to rim engagement between the housing members may be maintained, though the housing members may be capable of relative rotation for manipulation of the plug and switch parts within. The sealing of the unit against the deteriorating influences is completed by cementing the insulated conductor or conductors to the housing members at their points of entry, so that when the coupler switch is properly connected the chamber within the housing members will be entirely segregated from the conditions of atmosphere surrounding the unit.

A further object of the invention is to provide a coupler switch for use in an electrical circuit that is capable of assembly in only one mating relation, which thereby prevents improper connection of the circuit conductors. This is provided by incorporating interengaging parts, like a projection on one subassembly that projects into and is capable of limited movement within a receiving recess or aperture incorporated in the other subassembly.

A further object of the invention is to provide a coupler switch whose coupling members, or at least one of them, preferably on the energy side of the line, will prevent accidental short circuiting of the electrical leads into which it is connected. This is accomplished by providing a stud or abutment arranged within the group of contacting elements of one of the members and projecting outwardly from the plane of the same such that when the member may be deposited face down over a flat plate, that not more than one of the contacting elements will be possible of engagement with the flat plate at any one time.

A further object of the invention is to provide a coupler device with locking provisions so that the coupler device may be maintained in coupled relation in a plurality of positions. This is accomplished by so forming the cooperating members of the coupler device that a spring tongued ratchet plate supported by one of the housing members engages behind overhanging projections of the other housing member, and in which the interengaging members are of such extent as to permit substantial relative rotation of the housing members while the parts are in interengaged relation.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

The device contemplated by this disclosure is particularly adaptable to what is known as spinner motors in the rayon industry. There are conditions existent in that industry by which acid fumes and drippings are so prevalent as to have a deteriorating effect upon the ordinary types of construction. Under these conditions it is desirable to have perfect control over the individual mechanism driving the spinner devices, and such is usually incorporated in a plug device between the motor and the power line, or in some instances a switch, and in some other instances both a switch and plug. The present invention proposes to take into account all of these conditions and proposed controls, and provide a single unit of structure adaptable to all and to solve the entire list of problems that might arise or are

known to exist. With this in mind the inventor has provided a combined switch and plug unit that comprises two subassemblies, each of which has electrically conductive elements adapted to mate up with those of the other subassembly, and one of the subassemblies provides a lock spring plate adaptable for resilience or yielding engagement with locking lugs carried by the other subassembly, and the two housing members or subassemblies are adapted for rim to rim engagement, the engaging surfaces of which are finished surfaces so as to present a joint, between the members of the sealed type when the subassemblies are maintained together by the interlocking provisions.

In some phases of this art it is desirable that the driving motor be one of the three phase type, by reason of which it is necessary that the conductors leading from the energy source to the motor be properly connectible at their separable parts, and possible of connection only in the proper relation. The instant coupling device automatically takes care of this desire by providing cooperating provisions in the two subassemblies such that they can be coupled together only in one definite relation, and thereby prevent incorrect coupling of the electrical leads between the source and the motor. During those times when it is desired to separate the particular spinner unit or its driving motor from the energy line, carelessness on the part of the operator may manifest in allowing one of the other and particularly the coupling member on the line side of the circuit to come into contact with a plate or other metallic element situated on the bench or supporting structure. Provision is afforded for eliminating this accidental occurrence by which a short circuit across the energy line might take place, by fitting the subassembly on the line side of the unit with an obstruction or raised portion situated within the group of contacting elements, such that it will be impossible to produce a short across the conductive elements by allowing the assembly to be disposed with its entire face against such plate or metallic cover. The structure in detail will be more readily understood by reference to the drawings.

In the drawings:

Fig. 1 is a plan view of a device embodying the principles of my invention.

Fig. 2 is a side elevational view of the device shown in Fig. 1.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a view taken on line 4—4 of Fig. 2.

Fig. 5 is a view taken on line 5—5 of Fig. 2.

Fig. 6 and Fig. 7 are developed views taken substantially on the circular line as indicated at 6—6 of Figs. 1 and 5.

Fig. 8 is a sectional view similar to the upper portion of Fig. 3, and illustrating certain features of the invention.

Fig. 9 is a fragmentary section, further illustrating certain details of the device, with modifications.

Fig. 10 is a fragmentary sectional view taken on line 10—10 of Fig. 3 illustrating a modification of certain other details of the device.

Referring to the drawings, the device consists of a housing made up of two half portions or plugs 20 and 21 of Bakelite or other nonconducting material of substantially semi-spherical formation which, with their assembled parts form the line side and the motor side respectively, of the combined switch and connecter plug.

Referring specifically to Figs. 3 and 4, plug 20 which contains the assembly for the line side of the switch, has a central cored-out portion 22 for the accommodation of switch and plug parts. A plurality of upstanding lugs 24 formed concentric with the cored-out portion 22 and integral with the Bakelite plug 20, support a rigid bayonet or lock plate 25 of triangular formation secured in place by a plurality of screws 26. At each extremity of the bayonet or lock plate 25, there is an indent or ratchet formation 27, the function of which will be described later. These ratchet formations extend into recesses 28 formed adjacent the periphery of the cored-out portion 22. Substantially central of the lock plate 25, is an extension 29 punched out of said plate or otherwise secured as a part thereof.

Molded into the plug 20 and flush with a finished surface 30 are a plurality of contact inserts 31 that are secured to the bottom of the cored-out portion 22 by screws 32. Concentric with the plug 20 there is counterbored a hole 33 to a depth substantially two-thirds the thickness of the Bakelite wall for the reception of a power cable 34. In the bottom wall of the counterbored hole 33 are three holes 33a for the admission of the three cable wires 35 which, with their clips 36 are secured to contact inserts 31 by screws 32.

Referring to Figs. 3 and 5, plug 21, which contains the assembly for the motor side of the switch, has a cored-out portion 37 for the accommodation of the assembly.

A plurality of bosses 38 formed integral with plug 21 and at the periphery of cored-out portions 37 and substantially half its depth, support lock inserts 39 that are rigidly supported by molding the plug material about the inserts, so that the Bakelite or molding compound flows into holes 40, located in extension 41, and holes 42 located in dependent ears 43 of the inserts, thus eliminating the use of anchoring screws. Lock inserts 39 have an overhanging portion 44 lying substantially parallel with and spaced from extension 41, whose under side 45 facing extension 41 is notched at 46 and 47 for receiving the indent or ratchet formation 27 of the line side of the switch. Either formed integral with or secured to one of the lock inserts 39, there is an extension or locator 48 which projects into the cored-out portion 21 of plug 20 for the purpose of properly positioning the two plugs 20 and 21, and to facilitate the correct electrical connection of the various contacts.

Located concentric with the axis of the plug 21 and secured to the bottom wall of the same by screws 49, there are a plurality of flexible spring contacts 50 with extensions 51 for wiping engagement with inserts 31 of plug 20. Concentric with the plug 21 there is a counterbored hole 33' substantially the same as in plug 20 to accommodate cable 34' and holes 33a' for admission of three cable wires 35' which, with their clips 36' are secured to flexible spring contacts 50 by screws 49.

As illustrated in Fig. 8 the extension 29 punched out of lockplate 25 is shown functioning for the purpose of preventing the plug 20 from being accidentally placed flat with its surface 30 upon a metallic surface, whereby a short across the contact inserts 31 might be made.

The extension 48 of plug 21, in addition to acting as a positioning means for plugs 20 and 21 relative to each other, has the additional function as that of extension 29 of plug 20 for preventing plug 21 from being placed flat upon a

metallic surface, whereby short circuits might be made across the contacts 51 if the plug 21 should be attached to the line side of the connection.

To facilitate turning to off and on position, a knurled surface 20a and 21a is put on the outer surface of each of the plugs 20 and 21 respectively.

Referring to Fig. 10, there is shown a modification of the lock insert 39 and extension or locator 48 of the previous form. In the modification, lock member 39a is provided with an extension 41a for the purpose of anchoring the same to a boss 38a by the use of screws 53, instead of being moulded in as was done in the previous case. Extension or locator 48a is formed integral with the overhanging portions 44a and both perform the same function as extension or locator 48 and overhanging portion 44 respectively of the other form.

In operation, where the finished surface 30 of plugs 20 and 21 are placed together as shown in Figs. 2 and 3 and plug 20 is turned clockwise and plug 21 is turned in a counterclockwise direction, insert or ratchet formations 27 engage notches 46 on the underside of portion 44. As indicated in Fig. 6, they are then limited in their movement in this direction by extension 48 coming in engagement with an abutment 52 formed in the body of plug 20. In this position contacts 51 come into engagement with inserts 31, thus closing the circuit. When the direction of rotation is reversed, indent or ratchet formations 27 engage notches 47 as indicated in Fig. 7 and contacts 51 are disengaged from inserts 31 thus breaking the circuit. In this last mentioned position the two plugs are still held firmly together because of the continued engagement of the indent or ratchet formations 27 with the lock inserts 39. Continuing the rotation in the last mentioned direction, the indent or ratchet formations 27 will become disengaged from lock inserts 39, thus permitting the two plugs to be separated.

Referring to Fig. 10 again for more detailed explanation of the cooperation between bayonet or lock plate 25 and extension 44 of lock insert 39, letter A represents the position of ratchet formation 27 where the plugs 20 and 21 are placed together in unlocked and off position. Letter B represents the position of ratchet formation 27 snapped into notch 47 causing plugs 20 and 21 to be locked together in an off position. Letter C represents the position of ratchet formation 27 snapped into notch 46 causing the device to be in the on position by bringing into engagement contacts 31 and 51 previously described, and plugs 20 and 21 still remaining in locked position.

The foregoing disclosure is to be regarded as descriptive and illustrative only, and not as a restriction or limitation of the invention, for obviously, an embodiment constructed to include modifications without departing from the general scope herein indicated and denoted in the appended claims could well be made.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A coupler device for electrical circuits comprising in combination, a pair of plug like members cooperating to provide a housing and adapted to receive electrical leads connected therewith, conductive elements carried by each of the plug like members corresponding in number to the respective leads of each, and the conductive elements of each member being circumferentially disposed thereabout and each adapted to be brought into engagement with those of the other plug like member, locking inserts carried by one of the members and a lock plate carried by the other of said members, said locking inserts being circumferentially disposed about the plug like member and cooperating with the lock plate to yieldingly hold the plug like members together in a plurality of angular positions, one of said positions being that in which the contact inserts of one member are each in engaging relation with a contact member of the other member.

2. A coupler device for electrical circuits comprising in combination, a pair of bodies each of which is cored out and provided with a terminating edge or rim lying substantially within a single plane, contact elements carried by each of the bodies and situated flush with the rim thereof so as to be equiangularly spaced, yieldable means for holding the bodies together in rim to rim engagement under spring pressure so that the bodies are capable of relatively angular movement, means including said yieldable means, carried by one of the bodies and projecting into the cored out portion of the other body for limiting the amount of angular movement, and means for rotating one of the bodies relative to the other so as to bring the respective elements of each body into both circuit opened and circuit closed positions.

3. A coupler device comprising in combination, a pair of chambered bodies adapted for rim to rim engagement, conductive elements carried by each of the bodies and spaced for coincident engagement and disengagement, cooperating means secured within the chambers of the two bodies for limiting the rim to rim engagement within a predetermined angular distance, and flexing means carried by one body for engaging provisions incorporated in the other body for yieldingly maintaining the bodies in rim to rim engagement throughout the greater portion of said angular distance, said maintaining means permitting relative rotation between the bodies while they are in rim to rim engagement so that the conductive elements may be moved into and out of coincidence without permitting separation of the bodies.

4. A coupler device for use under conditions exposed to corrosive elements, said device comprising in combination, a pair of chambered bodies of dielectric material, said bodies each presenting a flanged portion of circular contour and adapted to mate with plane surfaces of the other body, contacting elements carried by each body and situated within the chamber thereof with exposed portions substantially flush with the respective body flange, cooperating locking provisions provided by the two bodies permitting the coupling and uncoupling of the bodies and for holding the bodies together in rim to rim engagement in a plurality of positions, each of the bodies being recessed exteriorly to provide a receptacle for the insulation of a multi-conductor cable and within which the same may be cemented, said bodies when coupled together being capable of relative angular movement for establishing circuit open and circuit closed conditions, and yet presenting a chamber within the unit that is substantially sealed against the fluid content exterior of the unit.

5. A coupler device comprising in combination,

a first subassembly unit providing a peripheral flange about a chambered portion, contact inserts secured within the body of said flange but providing portions flush therewith, means adapted to secure electrical conductors to said inserts, a yielding lock plate secured substantially beneath said flange and having detent provisions situated in notches of the flange and positioned intermediate the contact inserts, a second subassembly unit providing a circular flange surrounding a recessed portion, resilient contact members supported within the recess and having free ends terminating near the flange portion, locking lugs situated intermediate the free ends of the contact members and arranged near the flange, and means adapted for connecting electrical leads to the contact members, said first and second subassemblies fitting together in flange to flange relation, and the lock plate and locking lugs cooperating to retain the assemblies in a plurality of coupled relations.

6. A coupler device comprising in combination, a pair of readily separable bodies of similar contour, each body being chambered and providing a circular plane-surfaced flange each engageable with the other, a plurality of contacting members carried by each body, cooperating locking provisions situated within the chamber of each body and adapted for demountably holding the bodies together in a plurality of angular positions, and means carried by one of the bodies and situated near the flange thereof and projecting into a recess provided by the other body for determining the angular positions of the bodies when assembled, and for limiting the extent of relative angular movement.

7. A coupler device comprising in combination, a pair of separable bodies of similar contour, each body being chambered and providing a circular flange each engageable with the other, a plurality of contacting members carried by each body, cooperating locking provisions situated within the chamber of each body and adapted to hold the bodies together in a plurality of angular positions, the contact members of each body being circumferentially spaced and situated adjacent the respective body flange, and means projecting from one of the bodies beyond the plane of the respective contact members for preventing the body from lying flat on a conducting surface whereby short circuits might be made from one contact to another.

8. A coupler device comprising in combination, a pair of bodies at least one of which is chambered and has a flange terminating in a plane for mating with a flat surface provided by the other body, contact elements provided by both bodies and confined within the chamber and having contacting faces flush with the plane surfaces, cooperating provisions part of which are mounted on each body for demountably holding the bodies together in a plurality of angular relations, and means carried by one of the bodies engageable with a part of the other body for limiting the range of angular relations, said bodies when coupled together forming a compartment enclosing the contacts and cooperating provisions, which compartment is substantially sealed against the influence of fluid content of the air exterior of the coupler device, and the bodies being relatively angularly movable, whereby the contacts may be brought into either circuit-closed or circuit-open relation.

9. A coupler device comprising in combination, a pair of cooperable housing members recessed and mated to provide a substantially sealed chamber, contact inserts carried by one member and spaced near the mating portion, spring contacts carried by the other housing member and terminating in spaced relation near its mating portion, means securing the members together in either circuit-closed or circuit-open condition, said means comprising a spring tongued lock plate carried by one of the members and a plurality of overhanging lock inserts carried by the other member and so disposed as to engage the spring tongue of the lock plate in either one of a plurality of positions.

10. A coupler device comprising in combination, a pair of cored-out bodies of dielectric material, contacting elements contained by each body and located in the bottom wall of the same, upstanding bosses provided by each cored-out portion for supporting cooperating locking means for the two bodies, each of the bodies being recessed to provide a receptacle for the installation of a multi-conductor cable and within which the same may be secured, said bodies when coupled together being capable of relative angular movement for establishing circuit-open and circuit-closed condition and yet presenting a chamber within the unit that is substantially sealed against the fluid content exterior of the unit.

11. A coupler device comprising in combination, a pair of substantially hollow bodies of insulating material, each of said bodies presenting a flat surface close to its periphery for rubbing engagement with the other so as to provide a substantially sealed chamber, conductive elements carried by each body, cooperative locking provisions provided by the two bodies permitting the locking and unlocking of the bodies and for holding the bodies together in a rubbing engagement in a plurality of positions, locating elements formed on the locking means for correctly positioning the bodies relative to each other, each of the bodies being recessed to provide an aperture for the installation of a multi-conductor cable and within which the same may be secured.

12. In a combined electric plug and switch, a pair of cup-like housing members providing a sealed chamber, contact elements provided by each member, cooperating lock means provided by both members, including a plate secured to one member and having resilient arms extending in close proximity to the edge of the cup members, said arms alternating in position with the contact elements of the respective cup member, and peripherally spaced detents on the other cup member and engageable by the resilient arms for holding the contact elements either in registry or out of registry, said cup-like member enclosing the contact element and lock means, and being relatively angularly movable to effect registration and non-registration of the contact elements during a locked relation of the cup-like members, and to an unlocked position in which the cup-like members may be separated.

13. A coupler device comprising in combination, a sub-assembly unit providing a chambered member having a flange terminating in a plane, contact inserts secured within the body of said member and having portions flush with the plane of said flange, a yieldable lock-plate secured substantially beneath the plane of said flange surface, and means projecting from the lock-plate to a point on the opposite side of the said plane surface, whereby short circuits between the con-

tact elements are prevented when the sub-assembly unit is laid face down on a flat surface.

14. A coupler device, comprising in combination, a pair of cooperating chambered housing members adapted to fit together along a plane and provide a substantially sealed enclosure, a set of contact elements provided by each member, and having parts flush with the meeting plane of said members, cooperating lock provisions provided by both members, and adapted to hold the members together in a plurality of positions, cooperating means provided by both members for determining the number of said positions, and means located on each member and projecting through the meeting plane of said member, so that when the members are separated they may not be placed flat upon a plane surface, whereby short circuits across the contact elements of either housing member might obtain.

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