Aug. 21, 1945. D. CONLAN 2,383,109

ELECTRICAL APPARATUS

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Fig. 1.

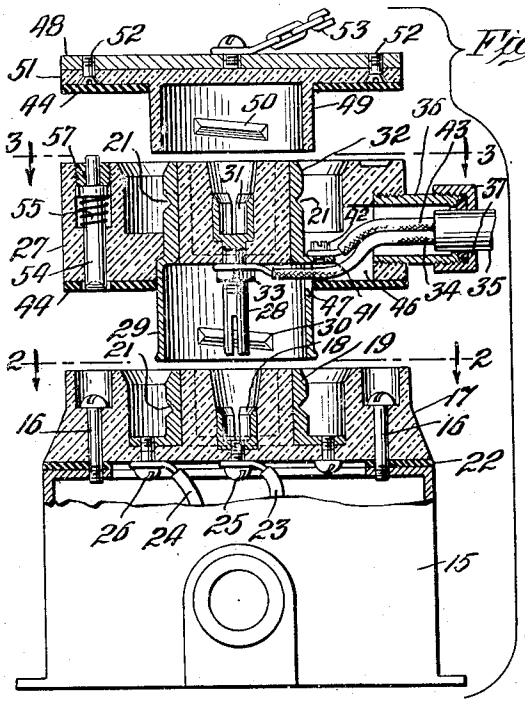


Fig. 2.

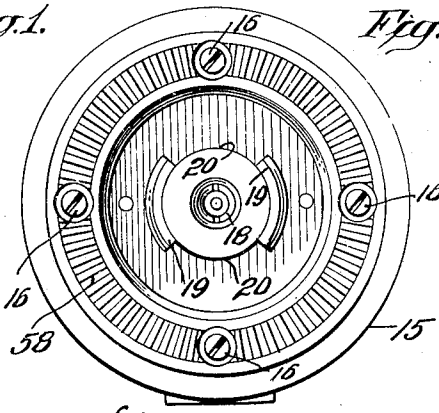


Fig. 3.

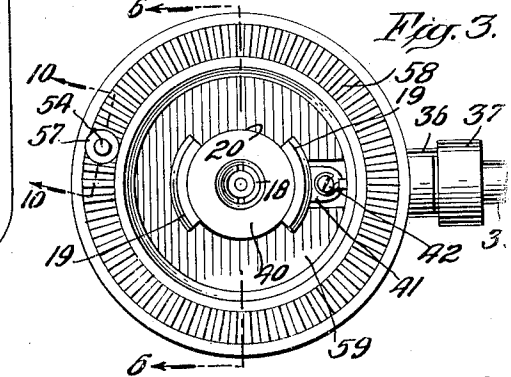


Fig. 6.

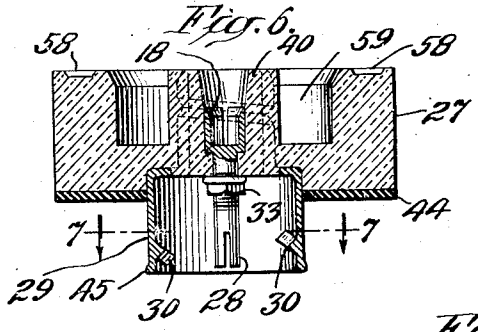


Fig. 4.

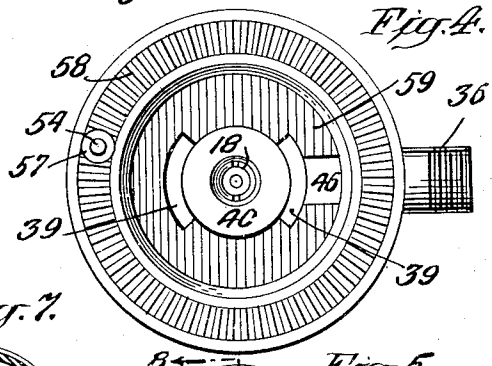


Fig. 7.

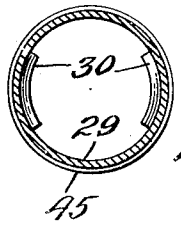


Fig. 8.

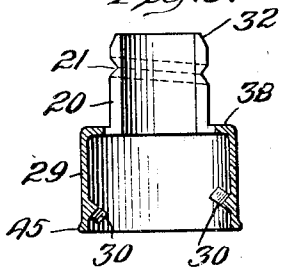
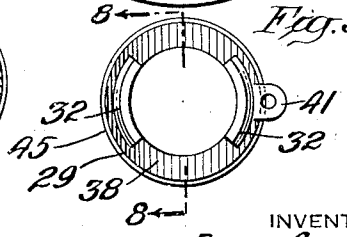


Fig. 5.



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Fig. 10.

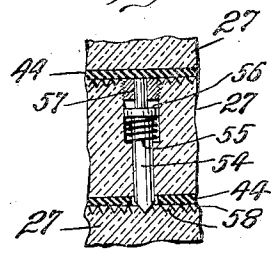


Fig. 9.

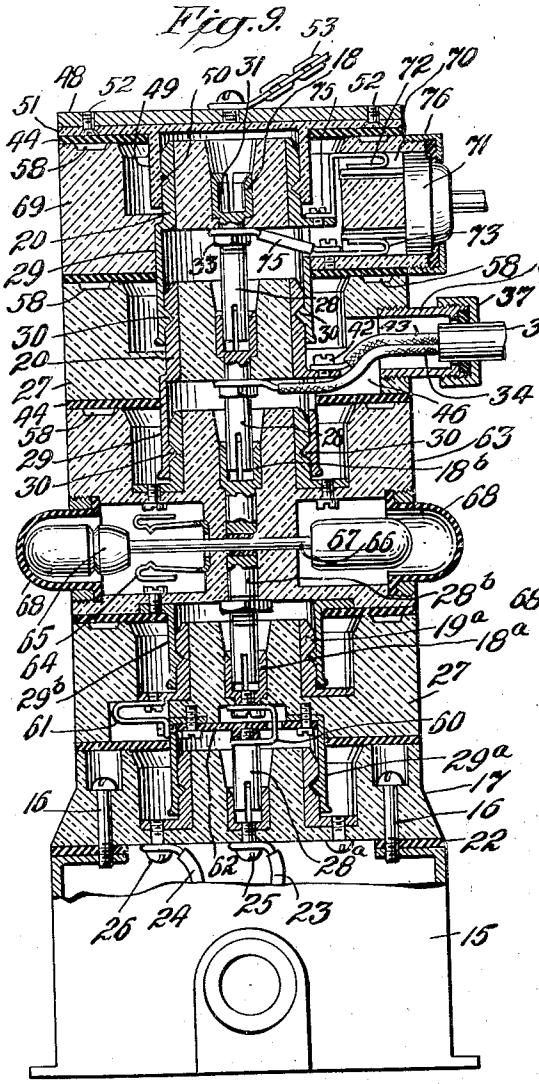


Fig. 11.

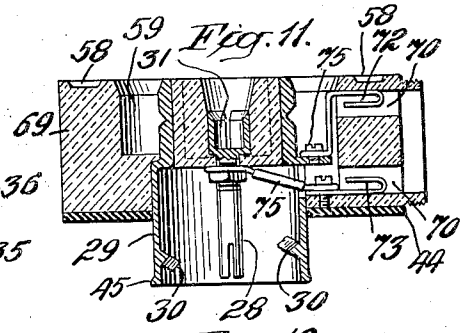


Fig. 12.

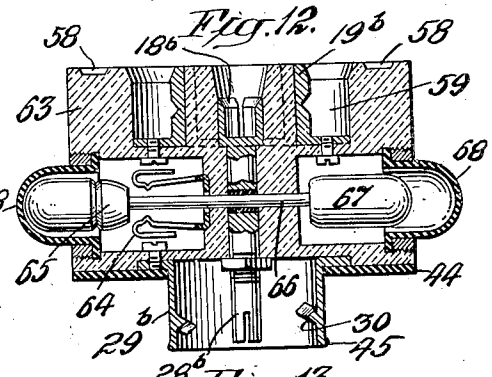
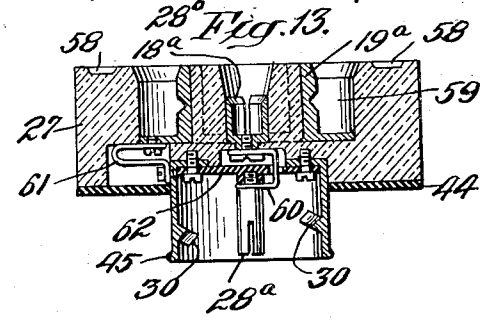


Fig. 13.



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2,383,109

ELECTRICAL APPARATUS

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Application December 5, 1942, Serial No. 468,176

5 Claims. (Cl. 173—334)

The invention here disclosed relates to circuit extension apparatus of the type disclosed in the earlier Conlan Patent 1,400,803 of December 20, 1921.

Objects of the present invention are to provide a watertight and gas tight extension outlet combination for marine use or the like, which will be of simple construction, consist of but few parts, be light in weight and small in size, as compared to previous proposed designs and in which the various units making up the combination, can be quickly and securely coupled together or be easily disconnected, and in which the various parts and the units themselves will be rugged and strong, capable of standing the hard usage to which marine fixtures may be subjected.

Other desirable objects and the novel features by which the purposes of the invention are attained are set forth or will appear in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate certain present practical embodiments of the invention. The structure however may be modified and changed as regards this disclosure, all within the true intent and broad scope of the invention as hereinafter defined and claimed.

Fig. 1 is a broken sectional view illustrating three of the complementary units in separated relation and comprising the outlet service box unit, a cord circuit extension unit and a cap or cover unit.

Fig. 2 is a plan view of the outlet or base unit, as on substantially the plane of line 2—2 of Fig. 1.

Fig. 3 is a similar view of the extension cord unit as on line 3—3 of Fig. 1.

Fig. 4 is a plan view of the same unit but with the center double-ended sleeve contact removed and Fig. 5 is a plan of the last mentioned element.

Fig. 6 is a sectional view showing details of the plug structure as on substantially the plane of line 6—6 of Fig. 3.

Fig. 7 is a sectional detail of the lower contact sleeve as on line 7—7 of Fig. 6.

Fig. 8 is a longitudinal sectional view of the complete double-ended sleeve contact as on line 8—8 of Fig. 5.

Fig. 9 is a broken longitudinal sectional view illustrating various plug units as combined in watertight coupled relation on the outlet box.

Fig. 10 is a fragmentary sectional detail of one of the locking pins as on substantially the line 10—10 of Fig. 3.

Fig. 11 is a cross-sectional view of the attachment plug receiving unit shown at the top in Fig. 9.

Fig. 12 is a similar view of the push button switch unit shown in Fig. 9 and Fig. 13 is a like view of the fuse unit appearing at the bottom in Fig. 9.

Fig. 1 shows how the invention may be applied to an ordinary service or outlet box, such as represented at 15, simply by securing over the open end of the latter, as by screws 16, an insulating base 17, carrying an inner or center contact socket 18, and an outer or side contact 19, of tubular formation, but open or interrupted at opposite sides as at 20, and having interrupted screw thread grooves 21, 21, to receive companion screw thread elements on the plug or cover units which may be applied thereto.

The insulating base 17, may be relatively shallow and is shown as of lesser diameter than the outlet box. A watertight joint is provided between the box and the applied base by an interposed gasket 22. Service wires 23, 24, are shown connected with the center contact socket and the side contact sleeve by means of terminal screws 25, 26, at the back of the base.

The attachable plug unit shown directly above the outlet box unit in Fig. 1, comprises a flat insulating base 27, carrying at the underside a projecting center contact pin 28, for cooperative engagement in the center contact socket 18 and a concentric projecting sleeve contact 29, telescopically engageable over the tubular contact 19, and having internal opposed screw thread segments 30, to pass down through the openings 20, 20, and into the screw thread groove segments 21, 21.

At the top, this plug unit carries a center contact socket 31, electrically connected with the center pin contact 28, and a tubular outer contact 32, interrupted or open at opposite sides at 20, 20, Fig. 3 and having screw thread groove segments 21, 21.

The center contacts, that is, the projecting pin 28, at one end and the socket 31, at the opposite end of the plug unit are shown as integrally formed and the pin portion as having a nut 33, threaded thereon for clamping one of the wires 34, of an extension cord 35, brought out through a nipple 36, in the side of the base, carrying a watertight cord connection or packing at 37.

Similarly, the outer or side contacts 29, 32, at the opposite ends of the plug are shown as integrally connected, Figs. 5 to 8, in particular showing these contacts as the opposite end portions of a one-piece sleeve, the external diameter of the

tubular segmental portion 31, at one end being approximately equal to or slightly less in diameter than the internal size of the opposite end portion 29. The larger and smaller end portions are shown connected mid-length by a shoulder or flange portion 38, which may be utilized for anchoring or securing this compound or double-ended tubular contact in the insulating base 27. This base material may be molded about the contacts, or the base may be preformed and the contacts afterwards applied thereto, after the manner indicated in Fig. 4, where the base is shown formed with oppositely disposed segmental slots 39, therethrough, to pass the tubular contact segments 32, which will then stand at opposite sides of the central tubular post 40, providing the seat or socket for mounting the central socket contact 31. If assembled in this manner, the outer double-ended tubular contact may be permanently fastened in place as by pinning it to the insulation at one or more points. This double-ended contact is shown as having a terminal lug 41, struck out of one side of the same, carrying a terminal screw 42, for securing the other wire 43, of the extension cord.

To provide firm mechanical and electrical connection, either one or the other, or both the center pin and socket contacts 28, 18, may be of split spring construction, as illustrated. This type of over-sliding telescopic spring engagement enables connection by a straight line movement and permits rotary movement through the angle necessary to engage and fully tighten the segmental screw thread elements on the outer contact members.

To provide a fully watertight connection between the base and attached plug unit, a washer or annular packing member 44, is shown covering the under or inner face of the plug base 27, about the projecting tubular contact 29. The latter is shown as having an external bead 45, about the end of the same, which in addition to stiffening this shell-like structure, may serve as a stop to prevent the gasket from slipping off over the end of the contact. This reinforced end of the outer contact is shown as projecting beyond the end of the center pin contact to serve as a guard or protector for the latter. The gasket 44 also, as shown in Fig. 1, covers the opening 46, in the inner or back face of the insulating base through which the wires are taken out and in this same view, it will be noted that the opening 47, in the side of the outer shell contact 29, where the wiring lug 41, is bent out provides a way for the extension of the wire 34, to the center contact.

From the foregoing, it will be clear that positioned as indicated in Fig. 1, the plug will go down over the service outlet with a straight push, until the thread segments 30, on the inner wall of the shell contact 29, register with the entrances to the thread groove segments 21, and that then a slight rotative movement of the plug, through this screw thread connection, will draw the plug down tightly and firmly on the stationary base, the gasket 44, being compressed in this action to seal the parts together.

To close the open, outer or top side of the plug base and to protect the exposed contacts there, a cover unit is provided such as illustrated at the top in Fig. 1 and comprising a flat disc 48, carrying a projecting sleeve 49, of insulating material and having internal screw thread segments 50, to match and engage the segmental screw thread grooves 21, on the plug. This insulating sleeve thus serves as a coupling member, equivalent in that mechanical respect to the combined coupling and contact sleeve of the plug unit.

The insulating coupling sleeve 49, is shown as carried by and forming a part of the insulating disc 51, secured by screws 52, to the underside of disc 48.

The cover unit carries a gasket 44, about the coupling sleeve 49, to make a water and gas tight joint with the plug unit or, if no plug unit is engaged with the box unit, directly with the face of the latter unit. Thus this cover may be used to close the service outlet unit or any attachment or extension unit mounted on the box unit. A chain 53, may be provided for holding the cover captive to the box or other stationary support.

The screw thread segments 50, may be formed as integral portions of the sleeve 49. The cover, though mechanically connected directly with the side or sleeve contact, is always electrically insulated, because of the fact that the sleeve or collar used to effect the coupling is of insulating material.

To prevent accidental or unintentional release or disconnection of any unit which has been coupled in place, securing means may be provided, such as illustrated, particularly in Figs. 1 and 10, and comprising in each instance, a pin 54, mounted to slide through the base of the unit and of slightly greater length than the overall thickness of the base, so as to project at one side or the other. A spring is shown at 55, acting against a flange or shoulder 56, on the pin, thus to retract the lower end of the pin and project the upper end substantially as indicated in Fig. 1. A screw plug 57, through which the upper end of the pin is guided serves to limit the extent of such retracting movement. The lower end of the pin is shown as sharpened or pointed to engage teeth 58, in the outer face of the preceding unit.

The locking or securing pin being normally retracted, does not interfere with or prevent free turning movement in applying or removing the unit, but as soon as the cover or a succeeding unit is applied, this pin will be projected by engagement of the next applied unit against the protruding upper end of the pin, thus to automatically lock the unit in place, substantially as indicated in Fig. 10. The applied unit will then be securely held in place, until the cover or the next applied unit is loosened or removed and when that occurs, the pin is automatically retracted and permits the unit to be turned either for uncoupling or if required, for tightening it in the coupling direction.

The insulating post or column 40, which forms a seat for the center contact sockets 18, 31, and a support or internal brace for the tubular contact segments 19, 32, also serves as a guide and centering device for the sleeve elements, such as 29 and 49, of the applied units, making it easy for these units to be engaged and quickly coupled in place. Similarly, the bevel edged deep annular channel or groove 59, in the base about the central post provides a guide for assisting in quickly positioning and engaging the attachable plug or cover structure.

The attached plug unit may be designed to serve various purposes, such as for extending cord circuits as first described, or for interposing fuses, switches, or outlets for attachment plugs, or the like.

Fig. 9 shows a fuse unit first connected to the outlet box unit, then a switch unit, a cord extension unit, such as previously described, ap-

plied to the switch unit and then a unit for providing an attachment plug outlet. These units all embody the same elements of construction previously described and in particular, the utilization of the side or sleeve contacts for effecting a screw coupling of the units together.

In the fuse unit, shown at the bottom in Fig. 9, and in detached relation in Fig. 13, the associated contacts at the opposite sides of the plug base, instead of being integrally or directly connected, are electrically connected by interposed fuse links **60** and **61**. To accomplish this relation, the center pin contact **28***a*, *is* made separate from the center socket contact **18***a*, and is carried by an insulating disc **62**, which also carries the lower sleeve contact **29***a*, in this case, a separate entity from the tubular post contact segments **19***a*.

In the push button switch unit illustrated, the insulating base **63**, is lengthened for sufficient separation of the tubular post and sleeve contacts **19***b*, and **29***b*, to enable interposition of a U-shaped spring contact **64**, which can be spread by an insulating switch button **65**, to connect said contacts at will.

In Fig. 12, the center contacts **18***b*, **28***b*, at opposite sides of the base are shown as integrally connected and the shank **66**, of the oppositely acting push buttons **65**, **67**, as passing in insulated relation through the connecting portions of these contacts. The switch buttons are shown covered by gas and water tight flexible diaphragms or covers **68**.

The attachment plug receptacle unit appearing at the top in Fig. 9 and in detached relation in Fig. 11, differs from the extension cord unit previously described, particularly in the provision in one side of the insulating base **69**, of slots **70**, **70**, for the blades of an attachment plug **71**, and the location in these slots of attachment blade contacts **72**, **73**, directly or indirectly connected as at **74**, **75**, with the side and center contacts respectively. In Fig. 9, a screw flange **76**, is shown for connecting the attachment plug **71**, in watertight relation and when this outlet is not in service, it may be covered by a plain screw cap.

While several different forms of attachable plug units have been illustrated, it will be realized that the principle of the invention may be carried out further to provide other different forms of current controlling or circuit extension devices, all incorporating the same advantageous features disclosed. The provision of the mating, interrupted screw elements in oppositely disposed relation on the larger, outer, or side contacts, assures firm, positive screw coupling of the units together, but the invention contemplates as well the provision of the interrupted screw coupling means on the inner or center set of contacts. The combined telescopic and rotative engagement of the two sets of contacts assures good electrical conductivity in all cases. If found desirable, more than one locking pin **54**, may be provided on each unit and if desired, a solid shoulder may be provided on the under or inner face of each base for projecting the locking pin or pins of the preceding units. By locating the ribs or ridges forming the screw segments on the inside of the projecting tubular contacts, said screw elements are protected against injury or undue wear.

What is claimed is:

1. An attachment plug unit, comprising an insulating plug base, a set of sleeve contacts on opposite ends of said base, one having an internal diameter approximating the external diameter of the other, a set of pin and socket center contacts on the opposite ends of said base, companion screw elements on the contacts of one of said sets of contacts, the contacts of said sets of sleeve and center contacts being electrically connected together and provided with wiring terminals, the wiring terminal for said sleeve contacts comprising a terminal lug struck out of the sleeve structure and providing an opening in the side of said sleeve structure for a wire to be extended to the wiring terminal for said center contacts and the plug base having an opening in the side of the same open to said wiring terminals.

2. An extensible attachment plug combination comprising a plurality of substantially flat, disc-like plug bases of insulating material, sleeve contacts extending through said insulating bases, each having one end portion of smaller diameter than the other end portion, said smaller diameter end portion being embedded and supported in the material of the insulating base, and the end portion of larger diameter projecting from the opposite end of the base, center contacts supported in the insulating material of the base within the outlines of said double ended sleeve contact, companion screw elements on the outside of the smaller diameter end portion and on the inside of the larger diameter end portion of the sleeve contacts and whereby the several plug members may be connected together, and compressible packing washers on the ends of the bases closely engaged on and about said projecting portions of the sleeve contacts and thereby located outside the mating contacts in position to be compressed between opposing faces of said plug bases.

3. An extensible attachment plug combination comprising plug bases engageable in end-to-end relation, sleeve contacts extending through said plug bases and having integrally connected opposite end portions of different diameter, said sleeve contacts of the several bases being telescopically engageable and having on their engaging faces companion interrupted screw thread elements enabling connection of the plug bases in different angular relations about a common central axis, companion pin and socket center contacts on the opposite ends of said plug bases telescopically and rotatably engageable in all the various angularly adjustable connected relations of the plug bases and electric extension outlets in the sides of said plug bases electrically connected with said sleeve and center contacts and whereby said plug bases may be mechanically and electrically connected by said sleeve contacts with said side outlets disposed in different angular relations.

4. An extensible attachment plug combination comprising plug bases engageable in end-to-end relation, sleeve contacts extending through said plug bases and having integrally connected opposite end portions of different diameter, said sleeve contacts of the several bases being telescopically engageable and having on their engaging faces companion interrupted screw thread elements enabling connection of the plug bases in different angular relations about a common central axis, companion pin and socket center contacts on the opposite ends of said plug bases telescopically and rotatably engageable in all the various angularly adjustable connected relations of the plug bases and electric extension

outlets in the sides of said plug bases electrically connected with said sleeve and center contacts and whereby said plug bases may be mechanically and electrically connected by said sleeve contacts with said side outlets disposed in different angular relations and means for locking said plug bases in their angularly related mechanically and electrically connected engagement.

5. An extensible attachment plug combination comprising plug bases engageable in end-to-end relation, sleeve contacts extending through said plug bases and having integrally connected opposite end portions of different diameter, said sleeve contacts of the several bases being telescopically engageable and having on their engaging faces companion interrupted screw thread elements enabling connection of the plug bases in different angular relations about a common central axis, companion pin and socket center contacts on the opposite ends of said plug bases telescopically and rotatably engageable in all the various angularly adjustable connected relations of the plug bases, electric extension outlets in the sides of said plug bases electrically connected with said sleeve and center contacts and whereby said plug bases may be mehanically and electrically connected by said sleeve contacts with said side outlets disposed in different angular relations and means for locking said plug bases in their angularly related mechanically and electrically connected engagement, including a locking bolt mounted in one plug base extensible to interlock with the structure in advance of the same and positioned to be automatically extended by engagement of a succeeding plug unit on said plug base.

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