H. A. DOUGLAS.

CIRCUIT EXTENDING PLUG.

APPLICATION FILED JULY 23, 1917.

1,377,410. **Patented May 10, 1921.**

Fig. 1.

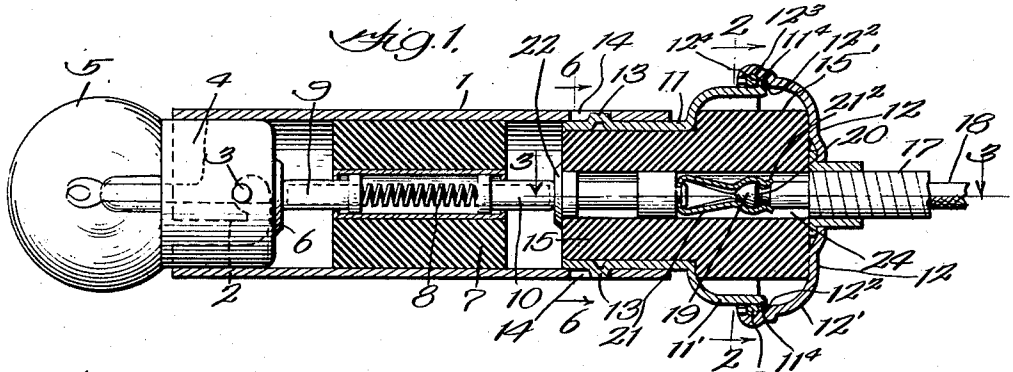


Fig. 2.

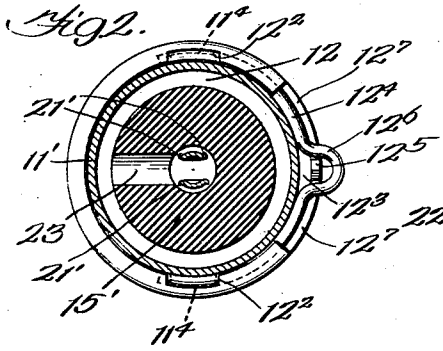


Fig. 3.

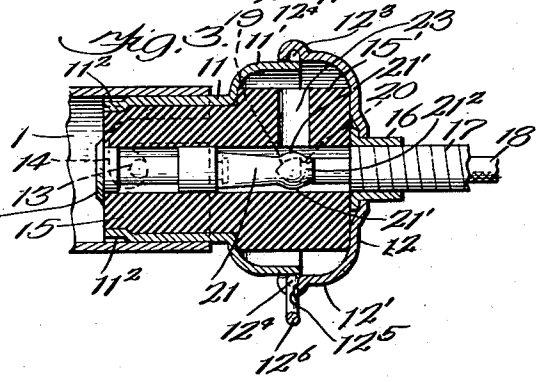


Fig. 4.

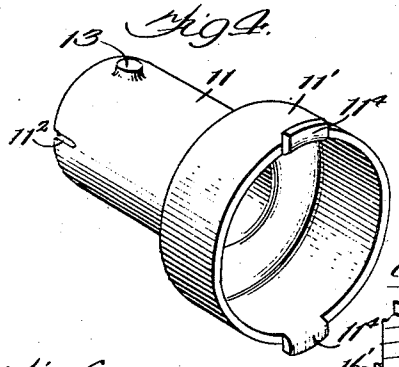


Fig. 5.

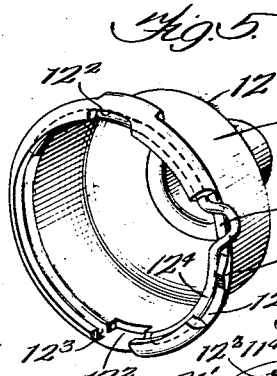


Fig. 6.

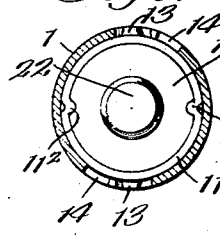


Fig. 7.

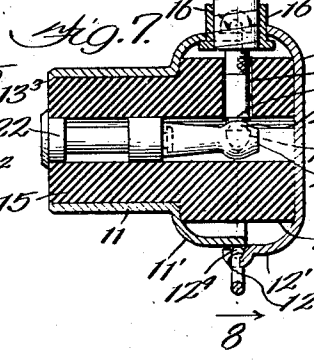
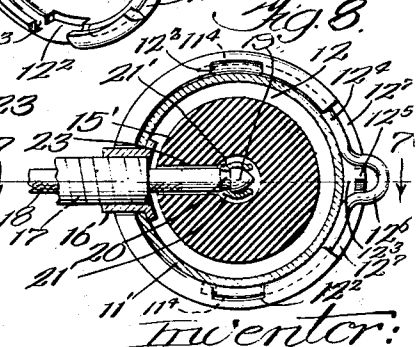


Fig. 8.



Inventor:
Harry A. Douglas.
By L. L. Cragg Atty

UNITED STATES PATENT OFFICE.

HARRY A. DOUGLAS, OF BRONSON, MICHIGAN, ASSIGNOR TO DOUGLAS & RUDD MFG. CO., OF BRONSON, MICHIGAN, A CORPORATION OF MICHIGAN.

CIRCUIT-EXTENDING PLUG.

1,377,410. Specification of Letters Patent. Patented May 10, 1921.

Application filed July 23, 1917. Serial No. 182,197.

To all whom it may concern:

Be it known that I, HARRY A. DOUGLAS, citizen of the United States, residing at Bronson, in the county of Branch and State of Michigan, have invented a certain new and useful Improvement in Circuit-Extending Plugs, of which the following is a full, clear, concise, and exact description.

My invention relates to circuit connectors and has a number of objects and advantages in view.

The connector of my invention is inclusive of a contact carrier or core and a jacket therefor which is formed in body and cap portions, the body portion being so connected with the cap portion as to be immovable with respect thereto preferably in all directions and particularly in rotary directions. The cap is provided with means whereby it may be coupled with the body portion so as to be immovable with respect thereto preferably both rotatably and longitudinally.

The connector of my invention includes a spring jack portion for connecting a circuit extending conductor therewith. This spring jack is constructed to receive the terminal plug of a conductor. The arrangement is desirably such that the spring jack will receive the terminal plug when inserted endwise of the plug or when inserted laterally of the plug, the jack spring or springs having side and end portions that may direct the plug into engagement therewith when inserted longitudinally or transversely of the plug.

The invention, in all of its aspects, will be fully set forth in the following description of the preferred forms of the invention shown in the accompanying drawing and in which drawing Figure 1 is a longitudinal sectional elevation of the plug of my invention in conjunction with a circuit coupler into the shell of which the plug is inserted; Fig. 2 is a view on line 2—2 of Fig. 1; Fig. 3 is a longitudinal sectional view of the plug and the contiguous portion of the shell receiving the same taken at right angles to the direction in which the plug shown in Fig. 1 is taken; Fig. 4 is a perspective view of the body portion of the jacket; Fig. 5 is a perspective of the cap portion of the jacket; Fig. 6 is a view on line 6—6 of Fig. 1; Fig. 7 is a view illustrating a modification, this figure being taken on line 7—7 of Fig. 8; and Fig. 8 is a view on line 8—8 of Fig. 7.

Like parts are indicated by similar characters of reference throughout the different figures.

The circuit extending plug of my invention may be employed in conjunction with any suitable device whereby the plug is instrumental in connecting a translating device with a circuit that is to supply the translating device with current. Such a device is shown in Fig. 1 and partially in Fig. 3, the device shown being inclusive of a cylindrical metallic current conducting shell 1 which has bayonet slots 2 at one end for receiving the metallic bayonet pins 3 that project from the metallic sheath 4 provided about the base of the lamp 5 and adapted for electrical contact with the shell 1. This sheath constitutes one terminal of the lamp as the structure illustrated is a single pole connector. This lamp base also carries a centrally disposed contact 6 which is insulated from the sheath 4 and which contact 6 constitutes the remaining terminal of the lamp 5. The shell 1 incloses a contact carrier 7 of insulating material. A spring 8 presses the contacts 9 and 10, that are carried by the carrier 7, outwardly, this spring forcing the engagement of the contact 9 with the contact 6. The shell 1 is grounded or otherwise connected with one terminal of a source of current. The contacts 9 and 10 are connected with the other terminal of the source of current by a circuit extending plug of my invention.

The circuit extending plug of the invention is inclusive of a metallic jacket that has a cylindrical metallic body portion 11 and a circular metallic cap portion 12 having a cylindrical skirt 12^1. The body portion 11 of this jacket and the metallic shell 1 are provided with interengaging coupling formations that are preferably in the nature of bayonet pins or lugs 13 upon the jacket body 11 and complemental bayonet slots 14 in the shell 1. The jacket body 11 is assembled with the contact carrying cylindrical

core 15 in a manner to prevent relative rotary and longitudinal movements between the jacket body and core. This assembly is desirably a permanent one and is due to the engagement of the core head or enlargement 15^1 with the jacket at the junction of the jacket body enlargement 11^1 with the balance of the jacket body and also to the jacket projections or lugs 11^2 that extend into the substance of the core (Figs. 3 and 4). In Fig. 7 I have illustrated a jacket rim formation 11^3 that performs the function of the jacket lugs 11^2. By this method of assembly of the jacket and the contact carrier or core 15 relative rotary and relative longitudinal movements between the jacket body and core are prevented.

I provide a jacket cap 12 which is coupled with the contact carrier or core 15 through the intermediation of the jacket body, the structure being such (as will appear) that the jacket cap may be slipped upon the body by longitudinal movement of the jacket cap upon the jacket body, there being means whereby the jacket cap and body may have their separation prevented after the cap has been placed. To this end the enlargement 11^1 of the jacket body desirably terminates in the rim formation shown most clearly in Fig. 4 while the contiguous end of the cap 12 desirably has the formation shown most clearly in Fig. 5. The jacket enlargement 11^1, as shown in Fig. 4, has two diametrically opposite outwardly extending wings or parts 11^4 that are receivable in two diametrically opposite recesses 12^2 in the adjacent end of the cap 12. These recesses 12^2 extend longitudinally of the jacket and their continuity is interrupted by an annular recess 12^3 which passes through or intersects the recesses 12^2 midway thereof. A segmental retaining member 12^4 operates in the groove 13^3, being concentric with said groove and movable along the same. In assembling the cap and jacket body the wings 11^4 are bottomed in the recesses 12^2 and when they are bottomed in these recesses these wings are upon one side of the annular recess 12^3 which is angular to and communicates with the recesses 12^2. The segmental retaining member 12^4 serves to maintain the wings 11^4 in the bottoms of the recesses 12^2. According to the construction illustrated a wing 11^4 is placed in one recess 12^2 beyond which the retaining member 12^4 has been withdrawn whereafter this retaining member is placed over such wing and is moved far enough to have its other end removed from the other recess 12^2 whereupon the remaining wing 11^4 is bottomed in this other recess 12^2. The retaining member 12^4 is now drawn to a central position in which both ends thereof overlie the wing 11^4. The cap 12 carries a triangular lug 12^5 located midway between the recesses 12^2 while the segmental retaining member 12^4 has a middle kinked portion 12^6 operable in arcual gaps 12^7 in the cap 12. When the kink is upon one side of the lug 12^5 one of the recesses 12^2 is cleared of the retaining member 12^4 and when the kink is upon the other side of the lug 12^5 the other recess 12^2 is cleared of the retaining member 12^4. When the lug 12^5 is received in the kink 12^6 the ends of the retaining member pass through both recesses 12^2 to hold the wings 11^4 in the bottoms of such recesses. When the wings are thus held in position by the retaining member 12^4 the cap 12 is prevented from having rotary and longitudinal movement with respect to the jacket body 11 and the contact carrier.

The jacket enlargement 11^1 is preferably of a size sufficient to afford an annular space between it and the core enlargement 15^1 and into which space the flanged end of the short sleeve 16 projects when the construction illustrated in Figs. 7 and 8 is employed. The short flanged sleeve 16 constituting, as stated, an enlargement of the conductor covering, serves, in all forms of the invention illustrated, to hold said conductor covering and the conductor therein in fixed relation with the body 11 and the cap 12 so that the plug terminal of the conductor may not be accidently withdrawn after the cap has been assembled with said body as set forth. This sleeve closely engages the serving or other covering 17 for the conductor 18. This conductor terminates in a plug having a tip 19 which is provided with a groove 20 that is adapted to receive the tips of the springs 21 of a spring jack that is in electrical connection with the central contact 22 provided upon the contact carrier. The contact 22 is engageable by the spring pressed contact 10 to include the lamp 5 in circuit. In the form of the invention shown in Figs. 7 and 8 the conductor 18 is transversely disposed with respect to the terminal 22 and the jack springs 21, said conductor passing through an opening 23 formed transversely in the contact carrier and laterally of the bore or longitudinal opening 24 in the carrier, while the jack springs are disposed in the longitudinal opening 24 that is co-axial with the contact carrier and in which bore the contact 22 is also received. The jack springs 21 are integrally constructed to form a U-shaped spring structure whose base is connected with the contact 22 in the bore 24. This is the preferred way of mechanically coupling the spring jack with the contact carrying core 15. The passages 23 and 24 communicate within the carrier in the region of the front end of the jack that is thus engageable by the plug when inserted through either opening. The jack springs have plug engageable formations 21′ upon their sides that direct the plug tip 19 into engagement therewith when the plug is inserted laterally

through the carrier, these guiding formations 21^1 being formed to be received in the groove 20 of the plug.

Where the conductor 18 is alined with the contact 22 and the jack springs 21 the flange enlargement of the sleeve 16 is disposed between the end 15^1 and the central portion of the cap 12 (Figs. 1 and 3). The plug end of the conductor is then disposed longitudinally of the bore 24 and the spring jack. The tips of the jack springs 21 terminate in guiding formations 21^2 upon their front ends that direct the plug tip 19 into engagement therewith, these guiding formations 21^2 being formed to be received in the groove 20 of the plug when it is inserted longitudinally of the carrier. Each contact carrier desirably has both passages 23, 24 in order that it may be adapted to either construction of plug.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. A circuit extending plug including a contact carrier; a jacket for the same, the jacket being formed in body and skirted cap portions, one of these portions of the jacket having wings and the other having recesses for receiving the wings, there being an additional recess in the jacket portion having the aforesaid recesses and which additional recess intersects the other recesses; and a retaining member operable in the additional recess and disposable above the bottoms of the other recesses to retain the wings in such other recesses.

2. A circuit extending plug including a contact carrier; a jacket for the same, the jacket being formed in body and skirted cap portions, one of these portions of the jacket having wings and the other having recesses for receiving the wings, there being an additional recess in the jacket portion having the aforesaid recesses and which additional recess intersects the other recesses; and a retaining member operable in the additional recess and disposable above the bottoms of the other recesses to retain the wings in such other recesses, said retaining member being shiftable to clear first one and then the other of such other recesses.

3. A circuit extending plug including a contact carrier; a jacket for the same, the jacket being formed in body and skirted cap portions, one of these portions of the jacket having wings and the other having recesses for receiving the wings, there being an additional recess in the jacket portion having the aforesaid recesses and which additional recess intersects the other recesses; a retaining member operable in the additional recess and disposable above the bottoms of the other recesses to retain the wings in such other recesses, said retaining member being shiftable to clear first one and then the other of such other recesses; and means for holding the retaining member in a central position over the bottoms of such other recesses.

4. A circuit extending plug including a contact carrier; a jacket for the same, the jacket being formed in body and skirted cap portions, one of these portions of the jacket having wings and the other having recesses for receiving the wings, there being an additional recess in the jacket portion having the aforesaid recesses and which additional recess intersects the other recesses; a retaining member operable in the additional recess and disposable above the bottoms of the other recesses to retain the wings in such other recesses, said retaining member being shiftable to clear first one and then the other of such other recesses; and means for holding the retaining member in a central position over the bottoms of such other recesses, said means comprising a kinked portion in the retaining member and a lug carried by the corresponding portion of the jacket, this lug being receivable within the kink of the kinked portion.

5. A circuit continuing device including a plug; a contact carrier having a bore and a plug receiving opening disposed laterally and communicating with said bore which is also open at its forward end to receive the plug; and a spring jack upon the carrier and positioned to be engageable by the plug when inserted into said bore longitudinally or laterally thereof, said spring jack including a spring having formations upon its side and at its ends, one of these formations being adapted to direct the conducting plug into engagement with the jack when such plug is inserted transversely of the carrier and the other of these formations being adapted to direct the conducting plug into engagement with the jack when such plug is inserted into the carrier longitudinally of the bore.

6. A circuit continuing device including a plug; a contact carrier having a bore and a plug receiving opening disposed laterally of and communicating with said bore which is also open at its forward end to receive the plug; and a spring jack upon the carrier and alined with both of said openings to be engageable by the plug when inserted into said bore longitudinally or laterally thereof.

7. A circuit extending plug including a contact carrier; a jacket for the contact carrier having a body portion and a skirted cap portion, one of these portions of the jacket having a recess and the other portion of the jacket having a part receivable in said recess, there being an additional recess in the jacket portion having the aforesaid recess

and angular to and communicating with the aforesaid recess; and a retaining member operable in the additional recess and disposable above the bottom of the other recess to receive the aforesaid part of one of the jacket portions between the retaining member and said recess bottom whereby the retaining member serves to hold such part in assembly with the jacket portion having the recess.

In witness whereof, I hereunto subscribe my name this 19th day of July, A. D. 1917.

HARRY A. DOUGLAS.