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L. A. BATTERMANN

2,356,199

CONNECTION PLUG

Filed May 27, 1942

Fig. 2.

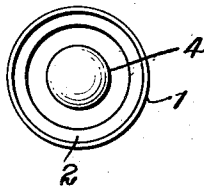


Fig. 4.

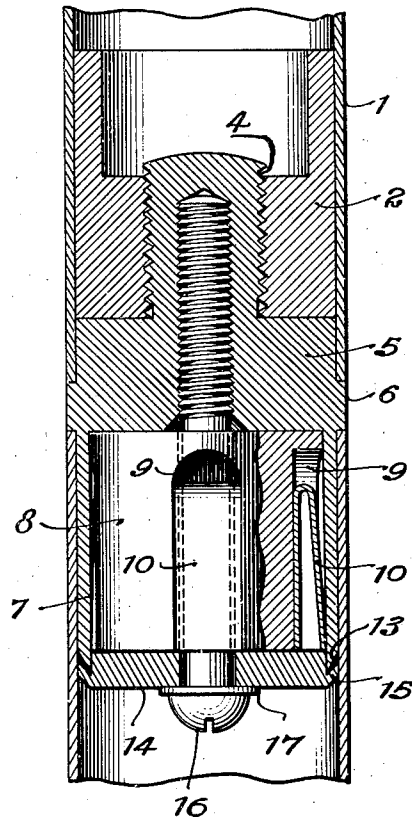


Fig. 1.

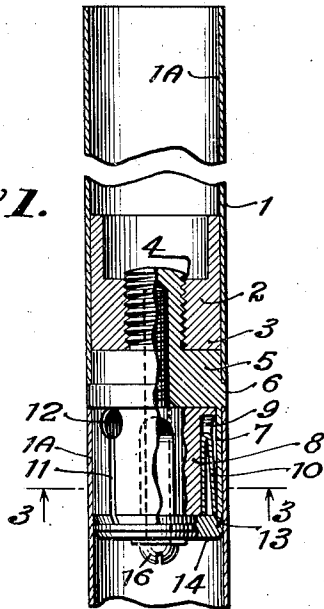
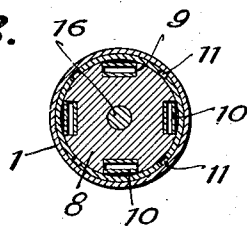


Fig. 3.



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CONNECTION PLUG

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7 Claims. (Cl. 287-2)

This invention relates to an improved electrical plug for joining sections of the internal conductor of a coaxial transmission line used for the transmission of ultra high frequency waves.

An object of this invention is to provide an improved plug for the internal conductor of a concentric transmission line, the construction being such that the entire external surface of the conductor will be smooth and free from sharp edges which frequently give cause for brushing when the transmission line is operated at ultra high frequencies.

Another object of this invention is to provide a simple, rugged plug which will permit quick assembly of the various conductor sections, and which will provide firm electrical contact between the connected sections.

A feature of this invention is the arrangement of a plug body device which is threaded at one end to be secured to a threaded end plug secured to an end of a metallic tube, which forms the inner conductor of the transmission line. The plug body device has a hollowed out portion which has spring tension means located therein for engaging the inside wall of another section of the transmission line.

This invention will best be understood by referring to the accompanying drawing, in which Fig. 1 is a longitudinal view, partly in section, of the internal conductor of a transmission line, which has attached thereto a connection plug of this invention.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a cross-section of Fig. 1, a section being taken on line 3-3.

Fig. 4 is an enlarged sectional view of the connection plug body portion.

Referring now in detail to the drawing, the inner conductor 1 is in the form of a relatively thin brass or copper tube, about 1 inch in diameter, and has secured to the lower end thereof an end plug 2, also of brass, which is soldered within tube 1, slightly above the extreme end at a point 3. Although the diameter of conductor 1 is given as 1 inch, the diameters of inner to outer conductors are optional according to impedance desired, also size of inner conductor depends upon power carrying efficiency of the circuit. End plug 2 is threaded at 4 to receive a plug body device 5, which is accurately machined at 6 to have a shouldered portion and to present a smooth outside surface which is of exactly the same outside diameter as that of tube 1. The body device 5 is hollowed out at 7 to receive a central core 8. The core 8 has four milled flutes

9 located on the outside portion thereof to receive four spring members 10, which are constructed of phosphor bronze, or other material, to provide good spring tension and to exert a pressure on the inside walls of the hollowed out portion 7, and thus tend to expand the outside wall of member 5. Although four milled slots are given by way of example, any convenient number could be used, depending upon size and necessary spring action desired. In order that the outside wall of member 5 will be capable of easy expanding, four slots 11 are provided in the side portions thereof, the slots terminating, as shown, in the aperture 12. The springs 10 are assembled within the hollowed out portion of member 5 so as to be centrally located one-half way between slots 11; or in other words, 45° from the location of slots 11. The extreme end portion of the body device 5 is beveled at 13. An end cap 14 is positioned within the hollowed out portion of member 5, and is provided with an extending lip portion 15, which is cut at substantially the same angle as the beveled portion 13, and is so arranged that the extension of lip 15 can freely move within the space the cap 14 provides, and prevents any excess spring force from distorting the side walls of the plug body device 5. The cap also serves to prevent the end of the plug from becoming burred or otherwise damaged. The cap 14 is secured to member 5 by means of a screw 16, which extends through the central core 8 and is fastened to the central upper portion of the body device 5. A spring washer 17 is provided beneath the head of screw 16 to prevent the parts from coming loose due to vibration.

It will be observed that when the entire device is assembled, the transmission line conductor sections will be firmly connected together, both mechanically and electrically. Also, my improved plug construction will permit detaching sections of the conductor at will, without the use of special tools. The improved device of this invention is used with a coaxial outer conductor having a diameter of about 2½ inches, which is fastened together with external unions or flanges, suitable insulators being provided to space the internal conductor sections coaxially within the outer conductor sections.

What is claimed is:

1. A connection plug for joining sections of an inner conductor of a transmission line comprising at least two metallic tubes, a threaded end plug secured to one end of a metallic tube forming one of the sections of the inner conductor of said

line, a threaded plug body device adapted to be attached to said threaded end plug, spring tension means within said threaded plug body device for causing its walls to engage the inside wall of one of said metallic tubes.

2. A transmission line coupling element comprising metallic coupling portions including at least one metallic tube, a hollowed out cylindrical member arranged to be located within said metallic tube, the walls of said cylindrical member being slotted to form contact fingers and springs for exerting a radial outward thrust on said fingers to engage another one of said coupling portions, and a metal cap fitted over the ends of said fingers.

3. A connection plug for electrically joining portions of an inner conductor of a transmission line comprising at least two metallic members each having a cylindrical inside aperture, a threaded end plug secured to one end of one of said metallic members forming one of the portions of the inner conductor of said line, a threaded plug body device having a hollowed out portion, said threaded plug body device adapted to be attached to said threaded end plug, a central core located within said hollowed out portion, spring tension means within said threaded plug body device for causing its walls to engage the wall of an aperture of one of said metallic portions.

4. A connection plug for joining sections of an inner conductor of a transmission line comprising at least two metallic tubes, a threaded end plug secured to one end of one of said metallic tubes forming a section of the inner conductor of said line, a threaded plug body having a hollowed out portion adapted to be attached to said threaded end plug, a central core located within said hollowed out portion, a plurality of spring members interposed between said core and the inside wall of said hollowed out portion of the core, said spring members arranged for causing the walls of the threaded plug body to engage the inside wall of one of the sections of said conductor.

5. A connection plug for joining sections of the inner conductor of an ultra high frequency transmission line of a radio transmitter, comprising at least two metallic tubes, an end plug secured to one end of one of said metallic tubes forming a section of the inner conductor of said line, a plug body portion adapted to be attached to said end plug, a plurality of U-shaped springs forming spring tension means within said plug body portion for causing the walls of the latter to engage the inside wall of at least one of said metallic tubes.

6. A connection plug for joining sections of the inner conductor of an ultra high frequency transmission line of a radio transmitter, comprising at least two metallic tubes, an end plug secured to one end of one of said metallic tubes forming a section of the inner conductor of said line, a plug body portion adapted to be attached to said end plug, a plurality of U-shaped springs forming spring tension means within said plug body portion for causing the walls of the latter to engage the inside wall of one of said metallic tubes, and an end cap located at one end of said plug body portion.

7. A connection plug for joining sections of the inner conductor of an ultra high frequency transmission line of a radio transmitter, comprising at least two metallic tubes, an end plug secured to one end of one of said metallic tubes forming a section of the inner conductor of said line, a plug body portion which is beveled at one end thereof, said plug body portion adapted to be attached to said end plug at an end opposite said beveled portion, spring tension means within said plug body portion for causing the walls of the latter to engage the inside wall of one of said metallic tubes, and an end cap having a projecting lip portion for engaging the beveled end of said plug body portion to prevent excess spring force from distorting the side wall of said plug body device.

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