June 27, 1950 I. L. STEPHAN 2,513,067

DEVICE FOR INTERCONNECTING WAVE GUIDES

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Fig. 1.

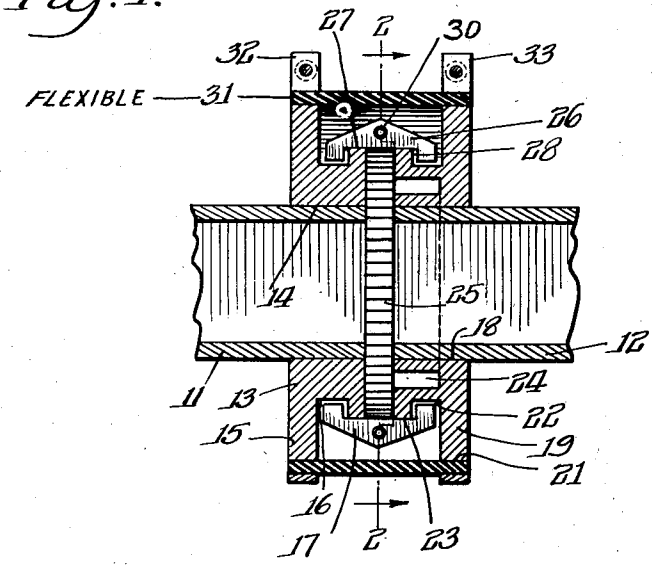
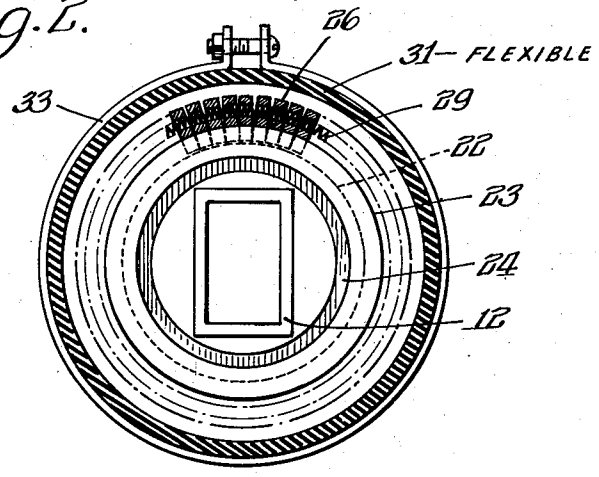


Fig. 2.



INVENTOR.
Ingo L. Stephan
BY
Howson & Howson
attys.

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DEVICE FOR INTERCONNECTING WAVE GUIDES

Ingo L. Stephan, Delanco, N. J., assignor, by mesne assignments, to Philco Corporation, Philadelphia, Pa., a corporation of Pennsylvania

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4 Claims. (Cl. 178—44)

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The present invention relates to devices for flexibly interconnecting rigid wave guide sections.

In ultra high frequency apparatus it is necessary to provide for limited longitudinal and axial movement of wave guide sections relative to each other and heretofore such movement has been arranged by using flexible wave guide sections which involved sliding contacts which however deteriorated with age and introduced undesirable leakage. It, therefore, would be desirable to provide a different form of connection between wave guide sections which will obviate the objections to the devices in the prior art.

It, therefore, is an object of the present invention to provide an improved device for flexibly interconnecting rigid wave guide sections.

Still another object of the present invention is to provide an improved connection for flexibly interconnecting rigid wave guide sections which is relatively simple to construct and which does not deteriorate with age.

Other and further objects of the present invention subsequently will become apparent by reference to the following description taken in connection with the accompanying drawing wherein

Figure 1 is a cross sectional representation of a device embodying the present invention for interconnecting rigid wave guide sections; and

Figure 2 is a view in the direction of the arrows along the line 2—2 of Figure 1.

In the drawing there are shown two wave guide sections 11 and 12 of the rectangular wave guide type having similar cross sections. The wave guide section 11 has mounted adjacent its end a connecting member 13 having a rectangular opening 14 for receiving the rectangular wave guide 11 and has a generally circular or cylindrical outer periphery 15. At the intermediate portion of the member 13 the outer diameter is considerably less than the diameter of the portion 15. A reduced diameter portion 16 is provided at an intermediate point adjacent another portion 17 having a slightly greater diameter so as to provide an annular stepped configuration.

The wave guide 12 is similarly mounted in a rectangular opening 18 in a connecting member 19 having a generally circular or cylindrical outer configuration and surface 21. Two reduced diameter portions 22 and 23 are provided so as to form a stepped annular configuration similar to the configuration provided on the other coupling member 13. In addition the device 19 is provided with an annular recess 24 of such dimensions as to form with the space 25 between the ends of the wave guides 11 and 12 and the inner end portions

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of the members 13 and 19 a high frequency choke for the energy being transmitted by the wave guides. The space 25 between the wave guides 11 and 12 forming a portion of the choke is delineated by a generally cylindrical wall surface formed by a plurality of link members 26. The link members 26 have straight edged bottom portions 27 and depending end portions 28 to engage the reduced diameter portions 16, 17, 22, and 23 of the members 13 and 19. Each of the members 26 is provided with an aperture 30 wherein is positioned a resilient retaining member or coil spring 29. The link members 26 retained in position by the coil spring 29 therefore form a generally cylindrical wall surface interconnecting the circular members 13 and 19 in a manner which will permit limited longitudinal and angular movement between the wave guide sections 11 and 12. In permitting relative longitudinal and angular movement between the wave guide sections 11 and 12, it is necessary to prevent angular rotation of one wave guide relative to the other. This may be accomplished by providing a resilient or elastic covering 31 which engages the outer peripheral portions 15 and 21 of the members 13 and 19 and which is retained in position thereon by a plurality of clamping members 32 and 33. The member 31 may be a portion of a rubber hose held in position by the clamping rings 32 and 33 so as to restrain any rotational movement of one wave guide relative to the other and yet permit angular displacement of the axis of one wave guide relative to the other. The rubber hose covering of the coupling member 31 also serves as an air tight shield for the entire flexible joint. The members 13 and 19 are secured to the wave guides 11 and 12 in a permanent manner so as to insure positive conductive connection therebetween, and the annular recess together with the space 25 operates as a choke at the frequencies being transmitted. The contacts between the individual link members 26 and the contacting surfaces engaged on the members 13 and 21, are good conductive contacts because of the action of the resilient retaining spring member 29. Furthermore deterioration of the contact surfaces is minimized by the air tight enclosure provided by the hose covering 31. It therefore will be appreciated that there has been provided an improved flexible joint for interconnecting rectangular wave guides which obviates the disadvantages heretofore found in the devices commonly used.

While for the purpose of illustrating and describing the present invention, a certain specific embodiment has been shown in the drawing, it is

to be understood that the invention is not to be limited thereby since obviously such variations in the embodiment may be made as are commensurate with the spirit and scope of the invention as defined in the appended claims.

This invention is claimed as follows:

1. A connecting device for flexibly interconnecting rectangular wave guide sections formed of conductive material and adapted to convey ultra high frequency electromagnetic wave energy therein, said device comprising two spaced apart members each adapted to be rigidly secured to a wave guide section, said members having a rectangular opening for said wave guide section and a circular outer configuration, a plurality of link bridging members each extending from one of said circular members to the other, said link members forming a generally cylindrical wall surface and interconnecting said circular members to permit limited longitudinal and angular movement between said guide sections, and resilient means for retaining said link bridging members in position.

2. A flexible joint for rectangular wave guides formed of conductive material and adapted to convey ultra high frequency electromagnetic wave energy therein, said joint comprising two spaced apart members each adapted to be secured to a wave guide, said members each having a rectangular opening for said wave guides and a cylindrical outer surface portion, a plurality of link bridging members engaging the adjacent portions of said spaced members and forming a generally cylindrical wall surface encircling the space between the adjacent faces of said spaced members, said link bridging members permitting limited longitudinal and angular movement between said wave guides, and resilient means interconnecting said circular outer surface portions of said spaced members to enclose said joint and to restrain rotary movement of one guide relative to the other.

3. A wave guide joint structure for interconnecting wave guides formed of conductive material and adapted to convey ultra high frequency electromagnetic wave energy therein, said joint structure comprising a pair of spaced members adapted to be connected to wave guides to be joined, an articulated band encircling and engaging the adjacent portions of said members, and forming a surface enclosing the space between said members, and a resilient cover member engaging said members and surrounding said band.

4. A structure for joining two longitudinally spaced wave guides formed of conductive material and adapted for the propagation of ultra high frequency electromagnetic wave energy, said structure comprising: a pair of members, one of said members being adapted for connection to one of said wave guides, the other of said members being adapted for connection to the other of said wave guides and each of said members having a circumferentially channeled outer configuration; a plurality of U-shaped links, their side arms engaging the channels in both said members, and their cross arms extending between said channels to form longitudinal bridging connections therebetween, said links being disposed in circumferential adjacency along the outer faces of said members; and resilient means circumferentially interconnecting said links and tending to maintain said links in the stated circumferential adjacency.

INGO L. STEPHAN.

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