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F. J. BINGLEY

2,511,896

DEVICE FOR FLEXIBLY INTERCONNECTING WAVE GUIDES

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Fig. 1.

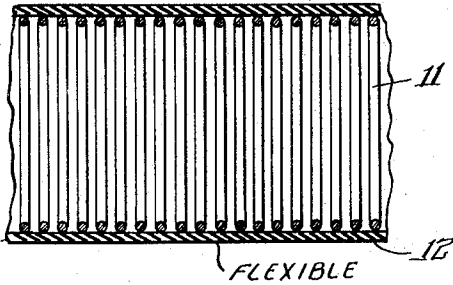


Fig. 2.

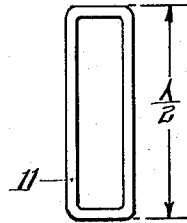


Fig. 3.

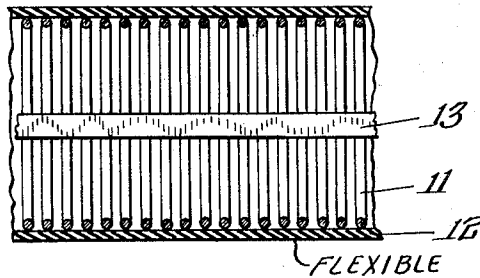


Fig. 4.

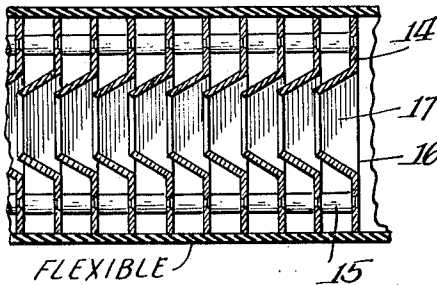
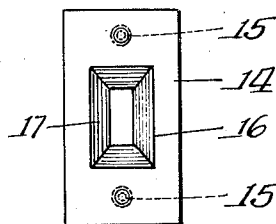


Fig. 5.



INVENTOR.
Frank J. Bingley
BY
Howson & Howson
attys

UNITED STATES PATENT OFFICE

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DEVICE FOR FLEXIBLY INTERCONNECTING
WAVE GUIDES

Frank J. Bingley, Philadelphia, Pa., assignor, by
mesne assignments, to Philco Corporation,
Philadelphia, Pa., a corporation of Pennsylvania

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2 Claims. (Cl. 178-44)

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The present invention relates to wave guide apparatus and more particularly to a device for flexibly interconnecting two rigid rectangular wave guide sections.

In the use of ultra high frequency apparatus it frequently occurs that it is necessary to manipulate the wave guides by a movement which may be longitudinal or at an angle to the normal direction of the wave guide. In order to provide for such movement various types of flexible wave guide connecting devices have been utilized, most of which employed a sliding or wiping contact which subsequently developed leakage and deterioration of the contacts with age. It, therefore, would be desirable to provide an improved type of device to permit a certain degree of angular movement between wave guide sections which will overcome certain of the disadvantages of the prior art.

It, therefore, is an object of the present invention to provide an improved device for interconnecting wave guides so as to permit longitudinal and angular movement between wave guide sections.

It is another object of the present invention to provide a device for flexibly interconnecting wave guide sections which does not utilize sliding or moving contact parts.

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 for flexibly interconnecting wave guides constructed in accordance with the present invention;

Figure 2 is a plan view of one of the elements used in the device shown in Figure 1;

Figure 3 shows a modification of the embodiment shown in Figure 1;

Figure 4 is a cross sectional representation of another manner of constructing a flexible wave guide or wave guide connecting device in accordance with the principles of the present invention; and

Figure 5 is a plan view of one of the embodiments utilized in the construction of the device shown in Figure 4.

Referring to the drawing and more particularly to Figures 1 and 2 it will be seen that there has been shown a portion of the device for flexibly interconnecting the plurality of sections of rigid wave guides, as for example rectangular wave guides. In accordance with the present inven-

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tion the device shown in Figure 1 is formed of a plurality of loop conductors 11 having as a maximum dimension a value commensurate to one half of the wave length of the ultra high frequency energy to be transmitted by the wave guide. A plurality of loop conductors are positioned in closely adjacent parallel planes spaced at equal distances from each other. In order to hold the plurality of rectangular loop conductors in position there is provided a flexible outer covering or casing 12 which supports the loop members 11 in normal position as shown. Preferably the outer casing or covering 12 is formed of a flexible, elastic material so as to permit flexure of the device for angular displacement of wave guide sections to each other, and to permit a certain degree of compression or extension of the flexible section for limited longitudinal movement between the wave guide sections.

The embodiment disclosed in Figure 3 is similar to that shown in Figure 1 with the addition of a connecting conductive strip 13 which preferably is made of phosphor bronze or other flexible material. Two phosphor bronze strips 13 are joined to each of the loop conductors 11 at opposite sides of the loop. If desired the conductor strips 13 may then be connected at each end to the wave guide sections to which the device is to be attached.

Figures 4 and 5 show another embodiment of the present invention wherein a plurality of conductive members 14 each formed of a generally rectangular piece of sheet metal are arranged in equally spaced apart planes determined by spacing lugs or members 15 which preferably are made of an insulating or dielectric material. Each of the members 14 is provided with a rectangular opening 16 which corresponds generally to a configuration of a cross section of the wave guides to be interconnected by the flexible device. Each rectangular opening 16 is surrounded by adjacent forwardly bent portions 17 extending to the aperture or opening in the next adjacent sheet metal member 14. The forwardly bent portions 17 are so arranged that they may engage the inner edge of the aperture 16 of the adjacent openings when the device is flexed. The entire assembly is retained in alignment by an outer covering member 18 which preferably is formed of an elastic material such as rubber. The openings 16 preferably have a maximum dimension equal to about one half of the wave length of the energy to be transmitted by the wave guides.

Each of the flexible interconnecting devices

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shown in the drawing may be provided with suitable connectors of the type commonly utilized between wave guide sections so that the flexible interconnecting device is readily interposed between two wave guide sections to permit limited longitudinal and angular movement therebetween.

While for the purpose of illustrating and describing the present invention certain specific embodiments have been shown in the drawing, it is to be understood that the invention is not to be limited thereby since obviously such variations and other embodiments may be made as are commensurate with the spirit and scope of the invention defined in the appended claims.

This invention is hereby claimed as follows:

1. A flexible wave guide for conducting ultra high frequency electromagnetic wave energy, comprising a plurality of flat sheet metal members arranged in a plurality of equally closely spaced, parallel planes, each metal member having an opening therein surrounded by bent portions extending into the opening in the next metal member, and an outer flexible support maintaining said members in position.

2. A flexible wave guide for conducting ultra high frequency electromagnetic wave energy, comprising a plurality of flat sheet metal members arranged in a plurality of equally closely spaced parallel planes, each metal member having an opening therein surrounded by bent por-

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tions extending into the opening in the next metal member, spacer elements interposed between consecutive ones of said members to maintain the spacing thereof, and an outer flexible support maintaining said members in position.

FRANK J. BINGLEY.

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