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METAL PAINTED APERTURE OR WINDOW FOR WAVEGUIDES

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FIG. 1

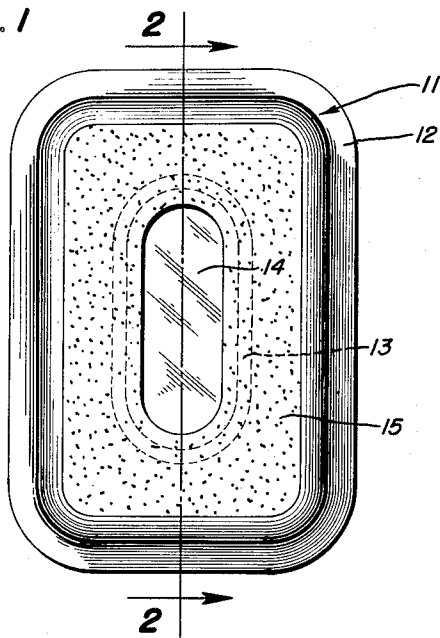


FIG. 2

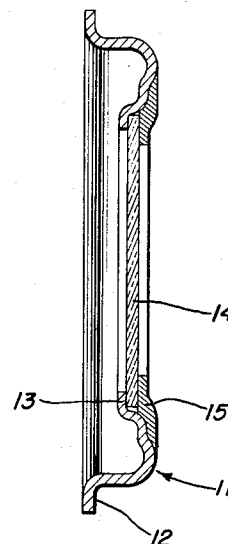
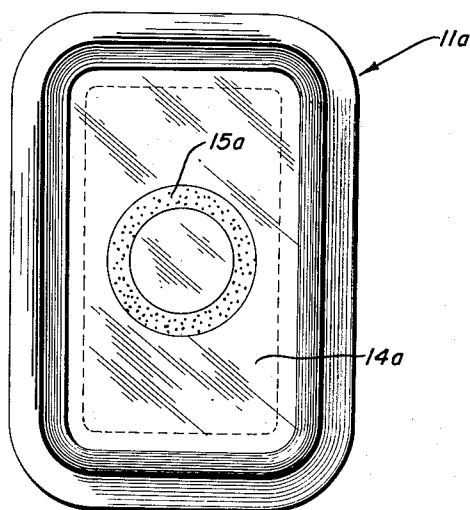


FIG. 3



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8 Claims. (Cl. 333—98)

The present invention relates generally to waveguides for transmission of radio energy, and more particularly to an aperture or window for use in such waveguides.

The use of apertured diaphragms in waveguides is well-known, being typically employed as matching devices. When the open portion or aperture of a metal diaphragm is sealed with a nonporous, energy transmissive, dielectric material such as glass or mica, the device is well adapted for pressure sealing a portion of a waveguide. The dimensions required of the energy transmissive portion of the diaphragm are generally quite critical for a particular application, and are often found by empirical experimentation. Since this experimentation has heretofore generally been accomplished by repeated machining of the diaphragm to successive approximations, the designing of apertured diaphragms for particular applications has been quite tedious and exacting.

The present invention is directed to sealed apertured diaphragms, as above indicated, which may be readily constructed in accordance with the requirements of a particular application. It is therefore one object of the present invention to provide a sealed windowed diaphragm for use in waveguides, wherein the size and dimensions of the energy transmissive window may be readily varied. Another object of the present invention is to provide a sealed windowed diaphragm for use in waveguides, wherein the size and dimensions of the energy transmissive area may be varied or adjusted after the diaphragm has been and while it is operatively seated in the waveguide. Another object of the present invention is to provide a waveguide window presenting readily varied obstructions to energy transmission therethrough.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a front elevation view of a windowed diaphragm for waveguides embodying the present invention;

Fig. 2 is a cross-sectional view of said diaphragm taken along line 2—2 of Fig. 1; and

Fig. 3 is a front elevation view of a window for waveguides providing a thin ring obstruction to energy transmission.

In its general aspects, the present invention contemplates the provision of a metallic frame whose outside dimensions are appropriate for effecting a metal to metal seal with a waveguide when it is seated transversely across the guide. The frame defines an aperture in which a sheet of energy transmissive material, which may be nonporous if a pressure seal is desired, such as glass or mica, is seated and sealed to the frame. The size or dimensions of the energy transmissive window thus formed may then be altered by applying a metallic paint coating upon one surface of the energy transmissive

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material. The paint may be applied around the periphery of the window working inwardly until the desired aperture is attained, or it may be applied as a desired energy obstructive or reflective configuration on the window. By employing the teachings of the present invention, the metal frame if initially made to provide a larger window than desired, need not be again machined, and the window size or the obstruction shape may be readily varied with the assembled diaphragm positioned in the waveguide, it being simply necessary to scrape paint off or add it in increments with the diaphragm in situ until the desired results or characteristics are observed or attained.

Referring to the drawings, Figs. 1 and 2 illustrate a sealed diaphragm embodying the present invention and having an energy transmissive window or aperture therein. The diaphragm is formed upon the metal frame 11 providing the structural base therefor, the frame 11 being formed with the peripheral outer flange 12, adapted to be sealed to a waveguide of corresponding contour, and the inner flange 13, adapted to receive and to which is sealed the energy transmissive mica window 14. As indicated above, in practicing the teachings of the present invention, it is preferable that the open area defined by the inner edge of the frame 11 be made of larger dimensions than those contemplated as required for the particular application. The dimensions of the energy transmissive window thus formed may then be diminished and/or the shape thereof changed as desired by applying a metallic paint 15 to the mica window 14 until the desired characteristics are had. The metallic paint may, of course, be added and removed as desired until the appropriate aperture configuration is obtained. Where it is desired that the painted area be grounded to the waveguide, care should be taken to extend the paint from the mica window 14 well over the metallic frame 11 in a continuous layer.

Fig. 3 illustrates a second embodiment of the present invention wherein the metallic frame 11a, substantially identical to frame 11, carries an energy transmissive window 14a, of mica for example, and upon which window is described a thin circle 15a of metallic paint. This drawing illustrates the embodiment of the present invention wherein a diaphragm is provided which permits the ready insertion in a waveguide of various energy non-transmissive configurations, and as is apparent from the description of the foregoing embodiment, the configuration represented by 15a may be readily applied to the diaphragm after it has been inserted in the waveguide, and the configuration may be readily altered and changed as desired with the diaphragm in situ.

The advantage to the art of the teachings of the present invention, in providing a means whereby apertures and the like and energy transmission obstructions for waveguides may be readily formed, varied, and adjusted to the precise requirements of a particular application, are apparent. And this advantage is particularly significant when the diaphragm is used as a pressure seal for a section of an evacuated waveguide; for in this latter instance it may be necessary to adjust the aperture dimensions after the waveguide is evacuated. To do this by the current practice of machining the aperture to the precise size desired would require either disassembling the evacuated system a number of times or performing a complex machining operation on the assembled device. When employing the present invention, however, the aperture size of the assembled device may be readily adjusted by the simple expedient of adding more metallic paint or removing a portion of the metallic paint by scraping or scratching the outside exposed surface of the window area while the diaphragm remains in situ.

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Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In combination with a hollow tubular waveguide, a diaphragm comprising a metallic frame defining a window area and being adapted along its outer periphery to be sealed across the waveguide, a window of non-porous energy transmissive material seated in said area and sealed to said frame, and an energy obstructive configuration of metallic paint described on the exposed surface of said window distal to said frame, said configuration being readily altered by the removal of metallic paint from and the addition thereof to said window.

2. In combination with a hollow tubular waveguide, a diaphragm comprising a metallic frame defining a window area and being adapted along its outer periphery to be seated across the waveguide, a window of energy transmissive material seated in said area, and an energy obstructive configuration of metallic paint described on the exposed surface of said window distal to said frame, said configuration being readily altered by the removal of metallic paint from and the addition thereof to said window.

3. In combination with a hollow tubular waveguide, a diaphragm comprising a frame defining a window area and being adapted along its outer periphery to be seated across the waveguide, a window of energy transmissive material seated in said area, and an energy obstructive configuration of metallic paint described on the exposed surface of said window distal to said frame, said configuration being readily altered by the removal of metallic paint from and the addition thereof to said window.

4. In combination with a hollow tubular waveguide, a diaphragm comprising a window member of dielectric material, a conductive supporting frame joined to the periphery of said window member for attachment to the waveguide, and energy obstructive means located on said window member isolated from said conductive frame such that the energy transmissive ability of the window member is moderated.

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5. In combination with a hollow tubular waveguide, a diaphragm comprising a window member of dielectric material, a conductive metal supporting frame joined to the periphery of said window member for attachment to the waveguide, and energy obstructive metallic means located on said window member spaced apart from said frame such that the effective energy transmissive area of said window member is reduced.

6. In combination with a hollow tubular waveguide, a diaphragm comprising a window member of dielectric material, a conductive metal supporting frame joined to the periphery of said window member for attachment to the waveguide, and an energy obstructive metallic configuration deposited on said window and spaced apart from said frame such that the energy transmissive area of said window may be varied proportionally to the amount of window area occupied by said configuration.

7. In combination with a hollow tubular waveguide, a diaphragm presenting readily varied obstructions to energy transmission comprising; a window of dielectric material, a supporting frame joined to the periphery of said window, and a configuration of metallic paint described on one surface of said window and isolated from said frame such that the energy transmissive area of the window is lessened.

8. A diaphragm for waveguides as set forth in claim 7 wherein the configuration of metallic paint is a thin ring.

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