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ULTRA HIGH FREQUENCY RESONATOR

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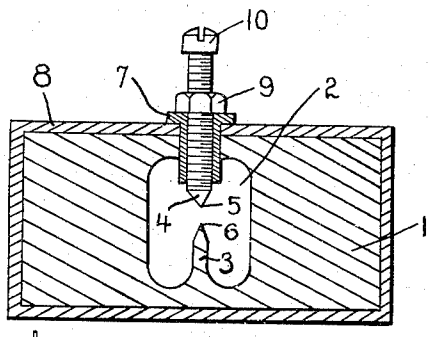


Fig. 1

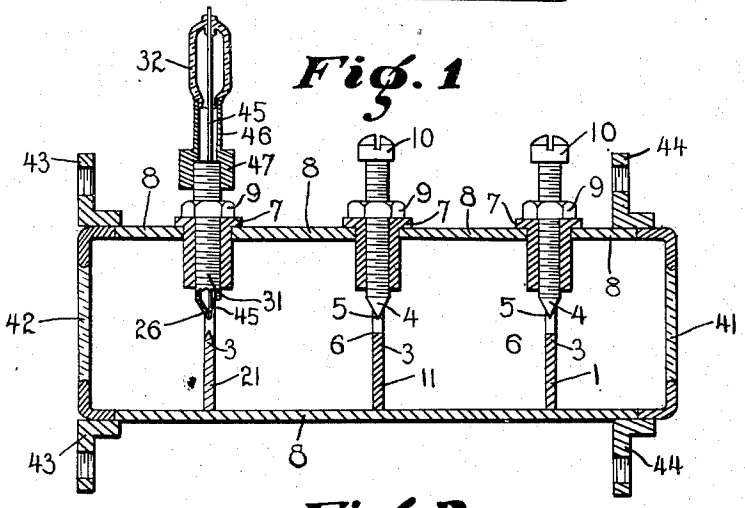


Fig. 2

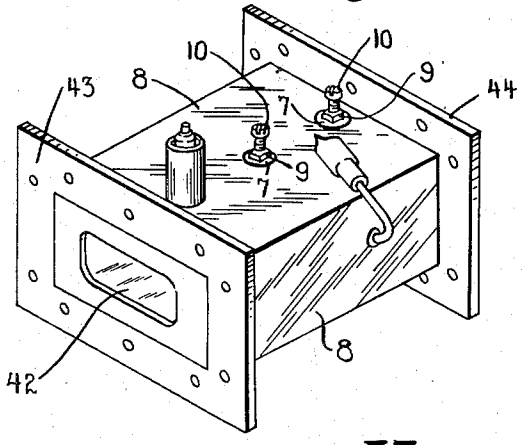


Fig. 3

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ULTRA HIGH FREQUENCY RESONATOR

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1 Claim. (Cl. 178—44)

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This invention relates to ultra-high frequency resonators and the like, and particularly to such resonators used for response to a broad band of frequencies.

Broadening of the frequency band is obtained by coupling together two or more resonators at a coefficient of coupling greater than the critical value which produces sharp resonance.

In such devices it is necessary to tune all the resonators, and I have found an adjustable screw entering the usual gap at the center of the resonator will provide the desired tuning. The screw at the center of one of the resonators may be hollow, with a "keep-alive" electrode in it.

Further details, advantages and objects of the invention will be apparent from the following specification and its accompanying drawings.

Fig. 1 is a lateral cross-section of my device, taken through one of the single resonators according to my invention;

Fig. 2 is a longitudinal section through an assembly of three such resonators in a wave-guide;

Fig. 3 is an external perspective view of the complete device.

In Fig. 1 the resonator comprises the flat resonator disk 1 having the cut-out center portion 2 with the projection 3 and screw 4 extending into center portion 2 and having pointed portions 5 and 6 at their respective ends. These points should be accurately aligned. A bushing 7 in the wave-guide 8 and resonator plate 1 forms a threaded seat for the screw 4. A lock-nut 9 holds the screw in the position to which it is desired to be set, and a slotted head 10 is provided for ease in adjustment. Once the adjustment is made, the lock-nut 9 and the externally exposed parts of the bushing 7 and screw 4 may be covered with a material suitable for vacuum sealing.

As in Fig. 2, there are preferably three resonator plates 1, 11, and 21 spaced apart in the rectangular wave-guide 8 a distance sufficient to allow the desired coupling above the critical value. One of the resonator plates 21 may have a keep-alive electrode 45 extending through the hollow screw 31, which may be formed into a half-conical point 26 at its inner end. The keep alive wire 45 will then be led out through the glass tube 32, to which it is sealed.

The wave guide 8 has the windows 41 and 42 at each of its ends. A thin glass plate is sealed to each end to allow transmission of the waves therethrough without allowing the gas inside the resonator to escape. The gas-filling may be, for example, hydrogen and water vapor at a few millimeters pressure.

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Flanges 43 and 44 may be provided near each end of the waveguide to facilitate attachment of the unit at its ends to other wave-guides.

The glass tube 32, through which the keep alive 45 passes, is sealed to the metal tube 46 which is held in communication with the interior of hollow screw 31 by the collar 47, which may be of any suitable form. The joint may be soldered to provide a vacuum-tight seal. The screws 10, 31, their locknuts 9, and the bushings 7 may also be soldered to the waveguide 1 in a vacuum tight manner. The plates 1, 11, 21 may be soldered at their outside edges to the interior of the wave guide 1.

What I claim is:

A resonator comprising: a metal waveguide having a longitudinal axis; a series of metal plates in said waveguide transverse to its longitudinal axis and spaced apart along said axis; each of said plates having a central cut-out portion with a pointed reentrant projection; a pointed screw extending from the outside of said waveguide into the cut-out region of each of said plates opposite to and in register with said pointed reentrant projection; a lock-nut for each of said screws, one of said screws being hollow having a pointed end and having an opening at that end; a metal tube attached to the end of said hollow screw outside said waveguide; a glass tube sealed to the end of said metal tube; a keep alive electrode sealed through said glass tube and extending through the interior of said hollow screw to the opening therein; a filling of gas at low pressure in said waveguide; and a sealed window at each end of said waveguide to allow wave transmission therethrough; and means at each end of said waveguide for attachment to other waveguides.

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