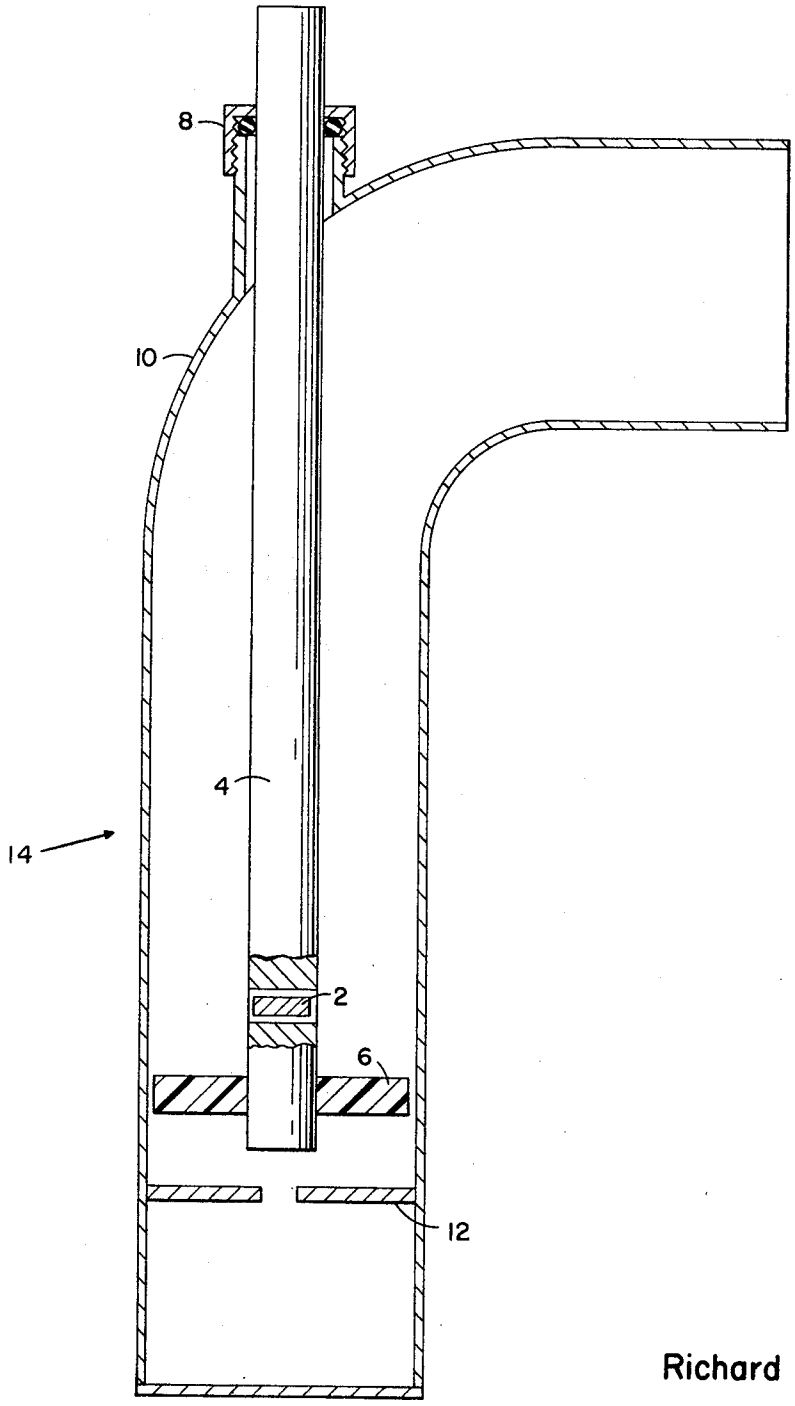
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DEVICE FOR ADJUSTING THE COUPLING BETWEEN A TRANSMISSION LINE AND RESONANT CAVITY

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DEVICE FOR ADJUSTING THE COUPLING BETWEEN A TRANSMISSION LINE AND RESONANT CAVITY

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ABSTRACT OF THE DISCLOSURE

A device for adjusting the coupling between a microwave transmission line and resonant cavity wherein a dielectric rod having a conductive pin through its axis is rotated or moved axially in a waveguide.

DEDICATORY CLAUSE

The invention described herein may be manufactured, used, and licensed by or for the Government for governmental purposes without the payment to me of any royalty thereon.

BACKGROUND OF THE INVENTION

There is a need for a device which can efficiently adjust the coupling between a microwave transmission line and a resonant cavity, or any other component. Prior art devices such as slide screw tuners or crossed or offset cavities with penetrating probes are available for use in coupling. However, these or similar devices are expensive, difficult to construct, and often require precision machining.

It is an object of this invention to provide an inexpensive variable microwave coupler which is easily constructed and requires no precision machining.

Another object of this invention is to provide a device which can efficiently adjust the coupling between a microwave transmission line and a resonant cavity without affecting the frequency of the cavity.

Yet another object of this invention is to provide a device which is sealed against leaks.

A remaining object of this invention is to provide a device whose sensitivity can be quickly changed.

SUMMARY OF THE INVENTION

In the instant invention, a small conductive pin is placed through the axis of a long dielectric rod and the rod is then inserted into a waveguide. The pin acts like a small driven dipole. By moving the rod axially or by rotating the rod, the position and of the conductive pin is varied. This varies the coupling effect within the waveguide.

BRIEF DESCRIPTION OF THE DRAWING

The single figure drawing is a partial sectional view of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The active element of the present invention is a small conductive pin **2** placed through the axis of a dielectric rod **4**. The rod is placed in a 90 degree waveguide bend so that it extends along leg **14** of the bend and emerges through the bent portion **10** of the waveguide bend. One end of the rod rests in a dielectric bearing **6** so that the rod can be rotated or moved axially. The other end of the

rod emerges through a hermetically sealed joint such as an O ring joint **8** in a portion of waveguide bend **10**. The conductive pin **2** can be rotated or moved axially from outside the waveguide. It should be understood that bearing **6** is fixed to rod **4** and is free to move in leg **14**.

Pin **2** acts like a small driven dipole. Its behavior can be understood by considering the reflected wave from the dipole. Since the pin is thin, it reflects an amount of power which varies with the angle between the pin and the electrical field in the waveguide. Thus, by rotating rod **4** the amount of reflection can be varied. The height of pin **2** determines the time difference between waves going to cavity **12** and those reflecting from pin **2**, and thus the relative phase of these two signals. The longitudinal axial placement of the pin is varied until the reflected signal is a minimum, indicating that the two signals are 180 degrees out of phase. Then the dielectric rod is rotated to vary the angle of pin **2**. When the reflected signal is zero, the amount of reflection is just that needed to cancel out any reflection from the cavity. This is then the condition of perfect match or coupling.

This device requires no precision machining. It is relatively inexpensive and easy to construct. The principle can be utilized in waveguides which are filled with low loss dielectric or in waveguides which are sealed against microwave or gas leaks.

The sensitivity of the instant invention depends upon the physical size of pin **2**. Keeping in mind that pin **2** acts like a small driven dipole, one needs only to change the length of pin **2** to change the sensitivity of the device.

It will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of the invention as set forth in the appended claims, and that in some cases certain features of the invention may sometimes be used to advantage without a corresponding use of the other features. Accordingly, the scope of this invention is to be limited only by the appended claims.

I claim:

1. Means for producing a reflected wave within a waveguide comprising: a dielectric rod; a conductive pin inserted into a first portion of said rod transverse to the longitudinal axis of said rod; said waveguide having first and second portions connected by a bent portion, said dielectric rod being axially disposed within said first portion; a second portion of said rod emerging from said bent portion of said waveguide; a dielectric bearing, said bearing surrounding and supporting said dielectric rod within said waveguide, said rod being movable both axially and rotationally.

2. The invention as set forth in claim **1** wherein said dielectric rod emerges from said bent portion of said waveguide through a hermetically sealed joint.

3. The invention as set forth in claim **2** wherein said first portion of said waveguide comprises a cavity, said rod being in axial alignment with the opening of said cavity and external to said cavity.

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PAUL L. GENSLER, Primary Examiner

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