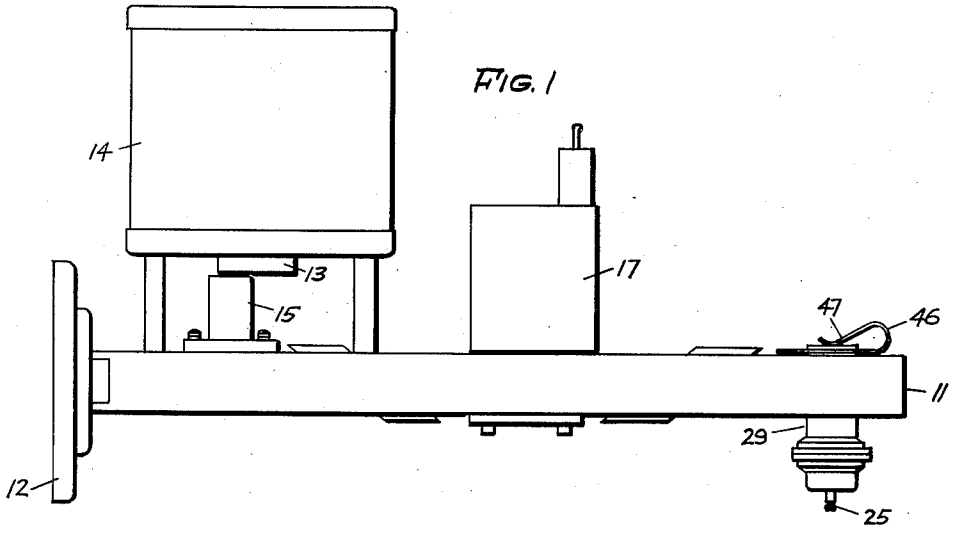
May 13, 1958 C. P. DOMENICHINI ET AL 2,834,884

WAVE GUIDE WITH CRYSTAL DIODE SOCKET HAVING CAPTIVE CLAMPING MEANS

Filed April 8, 1954

FIG. 1



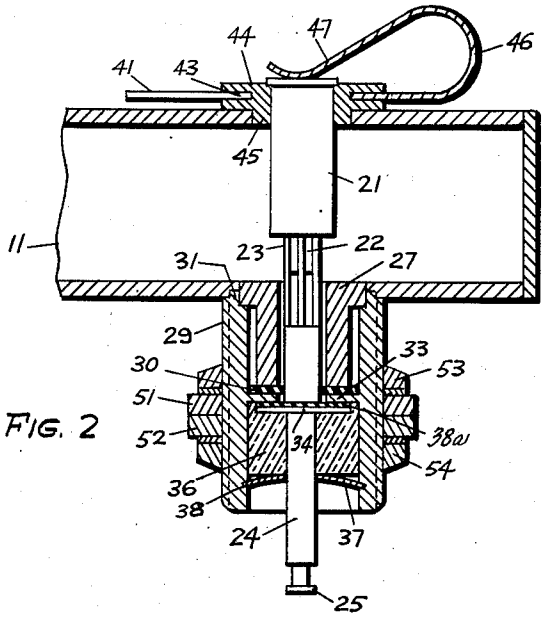


FIG. 2

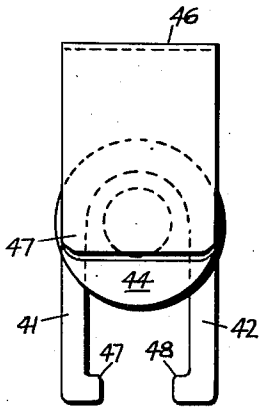


FIG. 3

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WAVE GUIDE WITH CRYSTAL DIODE SOCKET HAVING CAPTIVE CLAMPING MEANS

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1 Claim. (Cl. 250—31)

This invention relates to microwave radiation, and particularly to the construction of those components which perform the modulating or mixing function in a high frequency wave guide assembly. For such purpose, it is customary to employ a crystal composed of a material which lends itself to the accomplishment of the heterodyning function entering into the process of extracting a lower frequency band of signal energy from a carrier wave of much higher frequency.

The invention is characterized by the provision of quickly attachable and readily removable means for firmly holding such a crystalline element in good electrical contact with the terminal of a conductor leading from the wave guide to an I. F. amplifier or other point of utilization of the heterodyned output. A feature of the construction is the use of parts which do not require threading or screwing operations for insertion or removal, and which are self-captivating without reliance upon chains or similar appendages awkward to manipulate.

These and other characteristics of the invention will be better understood upon reference to the following description of the embodiment of the invention illustrated in the accompanying drawings wherein:

Fig. 1 is an elevation view of a radiant energy transmitting wave guide structure of a type to which the invention is applicable;

Fig. 2 is a longitudinal sectional view of one end of the wave guide structure of Fig. 1 showing an embodiment of the invention; and

Fig. 3 is a top plan view of the assembly of Fig. 2.

In these drawings, reference character **11** designates a microwave guiding conduit having at its outer end a coupling flange **12** for engagement with an antenna feed conduit (not shown) adapted to cooperate with a conventional reflector element (also not shown) for the radiation of high frequency radiant energy. Intermediate the ends of the wave guide **11** there is disposed a transmitting oscillator assembly including a klystron **13**, a surrounding heat controlling oven **14**, and a coaxial transducer **15** connecting the klystron generating cavity with the longitudinal wave guide **11**. Also intermediate the ends of the wave guide **11** there is disposed a second resonant cavity structure **17** constituting a second frequency control cooperating with the principal wave guide section **11** and cooperating with the crystal mixer or modulation assembly located near the inner end of the wave guide **11** and constituting the subject matter of the present invention.

As shown best in Figs. 2 and 3, the mixer assembly includes a crystal element **21** of cylindrical contour and terminating in a smaller cylindrical portion **22** adapted to enter within and to be frictionally and resiliently grasped by a plurality of resilient metallic fingers **23** extending upwardly from a metallic conducting element **24** having at its lower end a terminal formation **25** adapted to receive the end of a current-conducting wire or cable by which signal-carrying energy is supplied from the crystal

21 and the wave guide **11**. This conductor **24** is in alignment with the longitudinal axis of the crystal **21** and is retained in such alignment by the surrounding assembly including an inner guide bushing **27** fitting within an orifice formed in the cylindrical wall of the wave guide **11** in alignment with a second orifice adapted to receive the crystal **21**. The bushing **27** is retained in its orifice by interengagement with a shoulder formed internally of the outer cylindrical casing **29**, which casing is thermally united to the wall of the wave guide **11** along the outer circular shoulder **31**. The casing **29** has a transversely extending partition **33** spaced from bushing **27** by an insulating element **30**, the part **33** serving as an abutment for flange **34** on conductor **24**. A dielectric spacer **36** is retained in position by a circular retaining spring **37** fitting within a circular groove **38** formed on the inner cylindrical surface of the casing **29**. Other insulation **38***a* surrounds flange **34**.

The means for retaining the crystal **21** in operative engagement with the fingers **23** of the conducting element **24** includes a bifurcated metallic cap having its longitudinally extending portions **41** and **42** in registry with diametrically opposite portions of a circular groove **43** extending about the periphery of a metallic bushing **44** whose central bore receives the crystal **21** and whose inner reduced end **45** fits within and is thermally united to the upper orifice previously referred to. The cap has an additional portion of circular contour uniting the previously described portion with a crystal engaging upper portion resting on the end surface of the crystal and, by reason of the resiliency of the metal, causing a retaining pressure to be exerted along the axis of the crystal, thus insuring its continuing conductive relationship with the fingers **23**. The outer ends of the fingers **41** and **42** have inwardly turning portions **47** and **48** of sufficient extent to serve as limiting elements when the cap is withdrawn laterally of the bushing **44** a sufficient distance to free the upper end of the cap from engagement with the upper end of the crystal. When this has been done, the crystal **21** is free to be withdrawn from the assembly for inspection or replacement by a counterpart. During such an operation, the cap, while withdrawn, cannot actually escape from the assembly in view of the retaining action of the toe elements **47** and **48**. Thus, the assembly is maintained intact during a crystal withdrawing and replacing operation and without the necessity of resorting to retention chains or other cumbersome and obstructing devices.

The wave guide assembly of Fig. 1 may be supported upon a panel or bracket (not shown) by inserting the cylinder **29** into an opening in such panel or bracket, and clamping the cylinder thereto by means of clamping nuts **51** and **52**. These nuts may then be secured by tightening lock washers **53** and **54**. All these parts are threaded upon the threaded exterior of cylinder **29**.

This invention may be applied to either a transmitting or receiving wave guide, or to any equivalent structure to which energy pickup by crystal means is desirable. The invention, in any of its applications, is not limited to the particular details of construction, materials and processes described, as many equivalents will suggest themselves to those skilled in the art. It is, accordingly, desired that the appended claims be given a broad interpretation commensurate with the scope of the invention within the art.

What is claimed is:

In an electromagnetic wave energy guiding structure, the improvement comprising first and second spaced bushings secured to said wave guiding structure, said bushings having aligned central apertures therein communicating with the interior of said wave guiding structure, a con-

ductor mounted within the aperture of said second bushing, said conductor terminating in resilient gripping elements, a crystal element positioned in the aperture of said first bushing and projecting within said wave guiding structure, said crystal element having a portion thereof engaged by said gripping elements establishing an electrical juncture, said first bushing having a peripheral groove therein, a slidable member having a pair of spaced parallel fingers carrying a resilient element, said fingers cooperating with said peripheral groove whereby said resilient element may be slidably positioned over the aperture in said first bushing to bear upon the exposed end of said crystal element, said parallel fingers being of sufficient length to permit said resilient element to be displaced entirely clear of said aperture, and means

secured to said fingers at the ends thereof to prevent separation of said slidable member from said first bushing.

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