Aug. 9, 1949. B. B. CORK ET AL 2,478,245

TRANSMIT RECEIVE DEVICE

Filed May 23, 1945

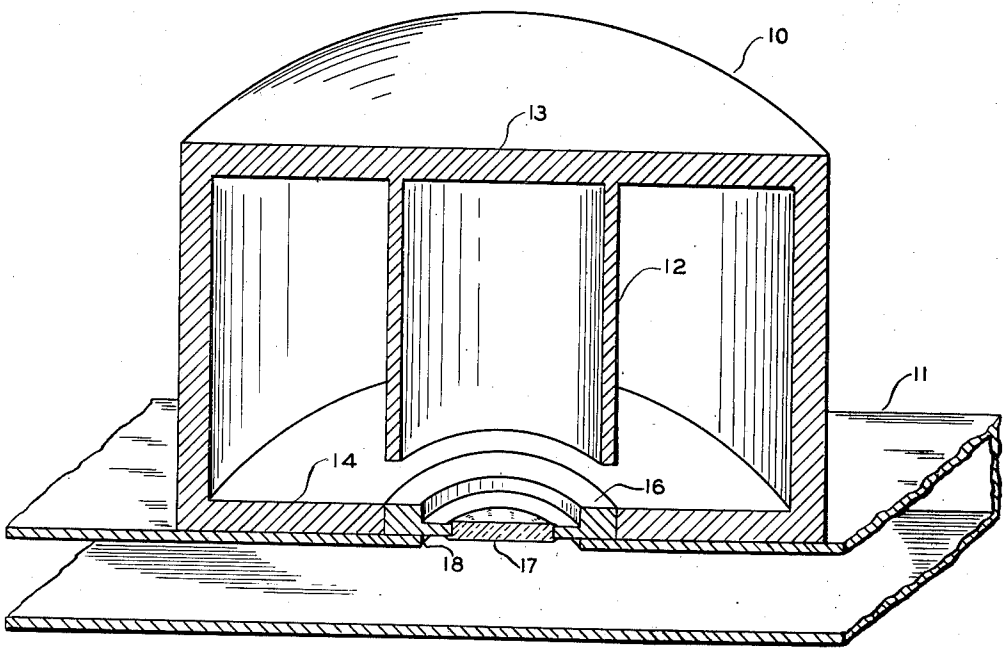


FIGURE 1

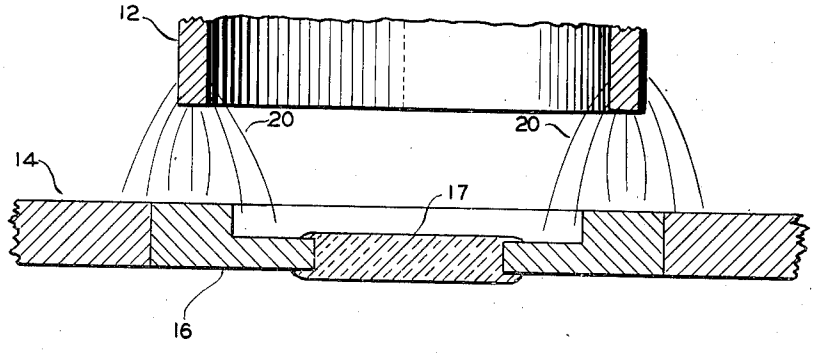


FIGURE 2

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TRANSMIT-RECEIVE DEVICE

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Application May 23, 1945, Serial No. 595,358

2 Claims. (Cl. 178—44)

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This invention relates to a transmit-receive device.

In the copending application of Bruce B. Cork and James L. Lawson, Serial No. 591,588, filed May 2, 1945, a protective discharge or T-R (Transmit-receive) device is disclosed in which electrical energy is coupled into a resonant cavity from a radio-frequency transmission means through an opening in the wall of the resonator. A glass seal is provided to seal the opening so that the pressure in the interior of the resonant cavity may be controlled. In making the glass-to-metal seal, dielectric is introduced in the path of the electrostatic lines of force within the cavity. The design of the seal disclosed in the above-mentioned application is such that the electrostatic lines from the center post tend to converge on the glass. Because of the above factors, some difficulty has been experienced in obtaining an effective Q of the resonant cavity which is sufficiently high for certain contemplated uses of the device. Q is defined as the ratio of the energy stored in the cavity to the energy dissipated in the cavity per half-cycle of the electric energy.

It is an object of the present invention to improve the seal for a T-R device so that the Q of the resonant cavity is increased.

The invention in general consists of a cavity-resonator having an opening in its wall, the metal around the opening being reduced in thickness so as to reduce the thickness of the seal. The opening in the wall of the resonator is made somewhat smaller than the center post of the T-R device, so that the electrostatic lines of force may converge on the metal.

For a better understanding of the invention, together with other and further objects thereof, reference is made to the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a sectional view of a transmit-receive device embodying my invention; and

Fig. 2 is an expanded view of the portion of Fig. 1 in the region of the seal.

Referring now more particularly to Fig. 1, there is shown a sectional view, taken in perspective, of a cavity-resonator 10, mounted on a rectangular wave-guide 11. Cavity-resonator 10 has a center post 12 extending from a wall 13, and across the cavity to a point close to, but not

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touching a second wall 14 of the cavity-resonator 10. A circular ring of metal 16 is inserted in an opening in wall 14, and the opening in ring 16 is closed by a glass seal 17. An opening 18 is formed in wave-guide 11, and is coincident with the opening in ring 16.

Referring now to Fig. 2, there is shown, on an enlarged scale, the ring 16, the glass seal 17, a portion of wall 14, and a portion of center post 12. The paths of the electrostatic lines of force extending from center post 12 in the direction of wall 14, are represented by lines numbered 20.

Ring 16 is made of a metal having substantially the same coefficient of expansion as glass. An airtight seal is made between ring 16 and wall 14. This seal is of such a nature that good electrical contact is made between ring 16 and wall 14 at all points where they fit together. Ring 16 is made thinner toward the center, whereby the thickness of the glass seal 17, where it joins ring 16, is reduced to a minimum. The diameter of the opening in ring 16 is less than the diameter of center post 12 so the lines of force 20 from center post 12 will terminate on ring 16 or wall 14, rather than on glass seal 17. Since the glass seal 17 is now almost completely removed from the path of the electric lines of force within the cavity-resonator 10, the dielectric losses that would occur in the glass are reduced to a minimum. The reduced thickness of seal 17 also minimizes the dielectric loss that occurs when energy passes from wave-guide 11 into cavity resonator 10.

While there has been described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention.

What is claimed is:

1. A transmit-receive device comprising a cavity-resonator formed with a center post extending from a first wall thereof to the vicinity of a second wall of the same, said second wall being formed with an opening therein coaxially located with respect to said center post, means for sealing said opening in said resonator comprising a metallic ring joined to said second wall, said ring having a central opening smaller in cross-sectional area than the cross-sectional area of said

center post, and a glass seal for closing said opening in said ring, the junction of said ring and said seal being so formed that the thickness of said seal is reduced substantially to a minimum.

2. A transmit-receive device comprising a cavity-resonator formed with a center post extending from a first wall thereof to the vicinity of a second wall of the same, said second wall being formed with an opening therein coaxially located with respect to said center post, means for sealing said opening in said resonator comprising a metallic ring joined to said second wall, said ring having a central opening smaller in cross-sectional area than the cross-sectional area of said center post, and a seal of glass-like material closing said opening in said ring.

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REFERENCES CITED

The following references are of record in the file of this patent:

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