TUNABLE CAVITY RESONATOR

March 1, 1949.

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Filed Dec. 17, 1945

FIG. 1

FIG. 2

FIG. 3

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2,463,423

TUNABLE CAVITY RESONATOR

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Application December 17, 1945, Serial No. 635,586

5 Claims. (Cl. 178—44)

1. This invention relates generally to electrical apparatus and more particularly to tunable cavity resonators.

In one type of tunable cavity resonator known to the prior art to which the case belongs, threaded plugs are used to vary the resonant frequency of the cavity. In this method, tuning is sometimes cumbersome and the frequency range may be limited.

It is an object, therefore, of this invention to provide a cavity resonator which may be conveniently tuned over a selected band of frequencies without these disadvantages.

It is a further object of this invention to provide a cavity resonator which may be tuned continuously over a relatively wide band of frequencies.

In general, this invention comprises a cavity resonator in the shape of a right elliptical cylinder having a longitudinal fold in each of the bases which will permit the physical dimensions and hence resonant frequency of the cavity to be varied by the application of a transverse compressive force at the side walls of the cavity.

Other objects, features, and advantages of this invention will suggest themselves to those skilled in the art and will become apparent from the following description of the invention taken in connection with the accompanying drawing in which:

Fig. 1 is a side view of the cavity resonator;
Fig. 2 is a top view of the same; and
Fig. 3 is an end view of the same.

Referring now to the drawings, the invention comprises a cavity resonator of a right elliptical cylindrical form. The bases 11 and 12 of the structure are made of a metal such as oxygen free high conductivity copper, and the elliptical perimeter strip 13 as illustrated in Fig. 2 is made of a metal such as phosphor bronze. Along the major axis of each base (11 and 12) there is an extruded longitudinal fold (14 and 15) as illustrated in Fig. 3, which extends only between the foot (16 and 17) of the bases (11 and 12). Two slits (18 and 19) in each base are cut perpendicular to the folds (14 and 15) and pass through the foot (16 and 17).

The slits (18 and 19) separate the end pieces (20 and 21) from the center section 22. On the exterior of the sides of the cavity, steel members (23 and 24) are arranged in such a way that a transverse compressive force can be applied to the cavity. Input radio frequency power may be supplied to the resonator by means of a loop of copper wire 25 inserted through one end of the structure or by any other convenient and well known means. The output of the resonator may be obtained from a similar loop 26 at the opposite end of the major elliptical axis. The height of the structure should be less than one-half wavelength at the desired resonant frequency.

In operation, tuning is accomplished by applying from a convenient source a transverse compressive force to two members (23 and 24) along the side walls of the cavity. Any increase in pressure on the members (23 and 24) will cause the folds (14 and 15) to deepen and the center adjustable section to become smaller thereby causing the resonant frequency to increase. A decrease in pressure will cause the folds (14 and 15) to decrease in depth and permit the center section to become larger and thereby causing the resonant frequency to decrease.

The resiliency of the side walls, which are made of a metal such as phosphor bronze, accounts for the spring-like quality of the center sections. Because the end pieces (20 and 21) are separated from the adjustable center section by slits (18 and 19), they do not change in shape.

While there has been described what is at present considered to be the preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention, and accordingly I claim all such departures as fall fairly within the spirit and scope of the hereinafter appended claims.

What is claimed is:

1. A tunable cavity resonator, a resonant cavity in the shape of a right elliptical cylinder, the bases of said cavity being formed by high conductivity copper, an elliptical perimeter strip made of a metal such as phosphor bronze, said bases being constructed in such a manner that there is an extruded longitudinal fold in each of the said bases, said folds extending only between the foot of the said bases, two transverse slits in each of said bases, said slits passing through the foot of each of said bases, and means cooperating with the side walls of said cavity and adapted to change the parameters of the cavity during the application of force to said means.

2. A tunable cavity resonator comprising an elliptical cylindrical wall and two right sections enclosing upper and lower ends thereof, said ends having transverse slits at the foot thereof and a longitudinal extrusion extending between said foot, whereby said cavity may be tuned by the
application of compressive forces to the cylindrical wall thereof.

3. A tunable cavity resonator comprising an enclosing wall and two right sections closing the upper and lower ends thereof, each of said sections having two parallel transverse slits extending thereacross at right angles to a major axis and an extrusion extending between said slits whereby said cavity may be tuned by the application of compressive forces to the enclosing wall thereof.

4. A tunable cavity resonator comprising an elliptical cylindrical wall and two right sections enclosing upper and lower ends thereof, each of said ends having a transverse slit at each focus, said slits being parallel to each other; said end sections having an extrusion extending between said slits, whereby said cavity may be tuned by the application of compressive forces to said cylindrical wall.

5. A tunable cavity resonator comprising an elliptical cylindrical wall and two right sections enclosing upper and lower ends thereof, each of said ends having transverse slits at the focus thereof, said end sections having a longitudinal extrusion extending between said focus, said slits being parallel to each other and perpendicular to said extrusion whereby said cavity may be tuned by the application of compressive forces to the cylindrical wall thereof.

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