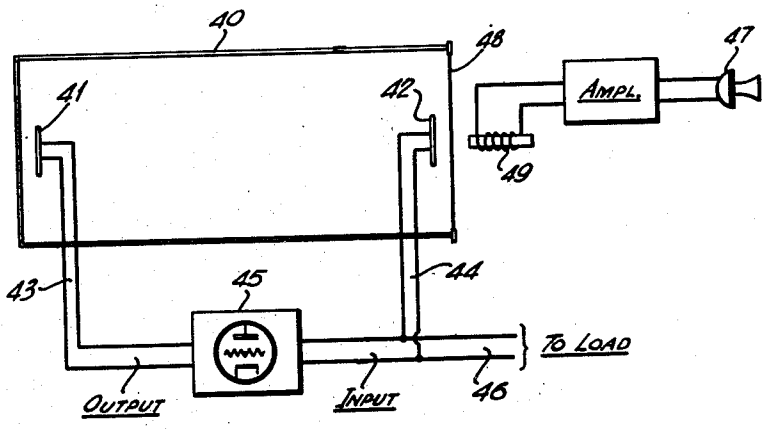
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ULTRA SHORT WAVE SYSTEM

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INVENTOR
CHARLES H. BROWN.

BY H. S. Grover

ATTORNEY

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ULTRA SHORT WAVE SYSTEM

Charles H. Brown, Baldwin, N. Y., assignor to Radio Corporation of America, a corporation of Delaware

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This invention relates to electron discharge devices and circuits therefor, for use particularly with ultra short waves below five meters, and is a continuation-in-part of my copending application Serial No. 391,063, filed April 30, 1941, now U. S. Patent 2,393,284, granted January 22, 1946.

An object of the present invention is to provide an electron discharge device arrangement employing a cavity resonator as a frequency controlling element, in which waves are produced whose instantaneous wavelengths are modulated by the signal to be transmitted.

A description of the invention follows in conjunction with a drawing, whose single figure illustrates an embodiment of the invention.

The drawing shows a scheme for obtaining frequency or phase modulated waves at ultra short wavelengths below one meter from a cavity resonator. Element 40 represents a cavity resonator of suitable dimensions, and designed to resonate at a frequency preferably below one meter, let us say, for example, at a frequency in the range between 5 centimeters and 30 centimeters. In the interior of the resonator and suitably spaced apart from each other are a pair of dipole antenna elements 41, 42 coupled respectively by way of lines 43 and 44 to the output and input of an oscillator 45 located externally of the resonator. Obviously, other coupling elements than dipoles can be used, such as circular loops. This oscillator is preferably mounted on the resonator to conserve space. A pair of leads 46 extend to a suitable load or utilization circuit. If desired, a suitable limiter may be coupled to leads 46 to insure a constant amplitude of oscillations in the output. By suitably spacing the dipole elements from the ends of the resonator 40, the resonator will be driven by the oscillator and resonate at the frequency determined by its dimensions.

According to the invention, it is proposed to vary these dimensions and also the resonant frequency of the resonator in accordance with signal modulations, as a consequence of which the frequency of oscillations of the oscillator 45 will vary. In this way it is possible to obtain from leads 46 waves modulated as to frequency in accordance with signal modulations. One way of varying the dimensions of the resonator 40 is to make one end wall 48 of the resonator movable in response to voice currents. It should be understood, of course, that end wall 48 is directly connected by contact with the side walls of the resonator. To achieve this, the movable end wall

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may include or consist of a magnetic diaphragm which is controllable by a solenoid 49, in turn coupled to the microphone 47. If desired, the stationary solenoid may be replaced by a moving coil scheme mounted in a magnetic field, the moving coil being responsive to the voice currents. This coil can be arranged in the air gap of a permanent or an electromagnet. It will thus be seen that the ultra high frequency field within the resonator 40 will be modulated at an audio frequency rate. The distance between the dipoles 41 and 42 need not be critical, although certain spacings will give better results than others. It will also be found that there will be maximum efficiency for certain spacings to be determined by trial and error between the dipoles and the end walls.

By way of analogy only, the system of the invention can be compared to an oscillator having feed back between input and output circuits through a crystal filter.

By pre-emphasis (that is, making the relative amplitude of the higher modulation frequencies greater than they are normally) it is possible to obtain a modulation in the output to the load which is phase modulation. This can be accomplished by using a pre-emphasis circuit in the amplifier between microphone 47 and solenoid 49.

What is claimed is:

1. A modulating system comprising a vacuum tube having input and output electrodes, a cavity resonator having a movable wall, individual elements within and spaced from said cavity resonator and coupling said input and output electrodes respectively to said cavity resonator, and means for varying the position of said wall to thereby vary the tuning of said cavity resonator in accordance with modulating potentials.

2. A modulating system comprising a cavity resonator, a pair of spaced coupling elements in the interior of and spaced from said cavity resonator and coupled to the field in said resonator, a vacuum tube having its input coupled to one coupling element and its output coupled to the other coupling element, whereby said cavity resonator forms a frequency selective feed back circuit, and means for varying the volume of said cavity resonator in accordance with modulating potentials.

3. A modulating system comprising a cavity resonator having a resonance frequency corresponding to a wave smaller than one meter, a movable diaphragm in one wall thereof, a coil for controlling the movement of said diaphragm,

an audio frequency modulating system coupled to said coil, and an oscillator having a feedback circuit controlling the frequency of oscillations of said oscillator, said feedback circuit including input and output circuits coupled to spaced probes in the interior of said resonator.

4. A modulating system comprising a cavity resonator resonant at an ultra high frequency and having a movable diaphragm in an end wall thereof, a pair of spaced dipoles in the interior of said resonator and coupled to the radiation field therein, an oscillator having its input coupled to one dipole and its output coupled to the other dipole, a utilization circuit coupled to the output of said oscillator, and means for controlling the movement of said diaphragm in response to signal modulations.

5. A modulating system comprising a cavity resonator resonant at an ultra high frequency and having a movable diaphragm in one end wall thereof, a pair of spaced dipoles in the interior

of said resonator, one dipole of which is adjacent said one end wall and the other dipole of which is adjacent an opposite wall of said resonator, an oscillator having its input coupled by a pair of leads to one dipole and its output coupled by another pair of leads to the other dipole, a utilization circuit coupled to one of said pair of leads, and means for controlling the movement of said diaphragm in response to signal modulations.

CHARLES H. BROWN.

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