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2,311,491

RADIO ACOUSTIC APPARATUS

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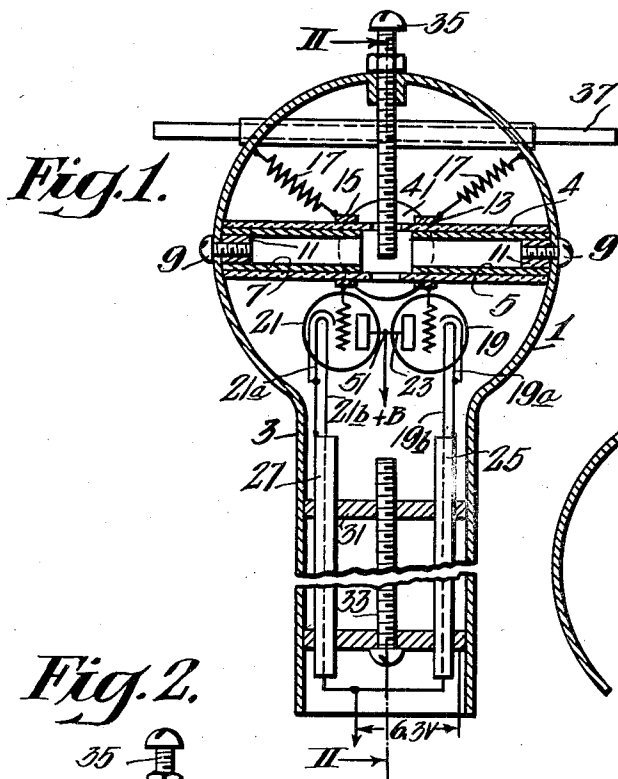


Fig. 3.

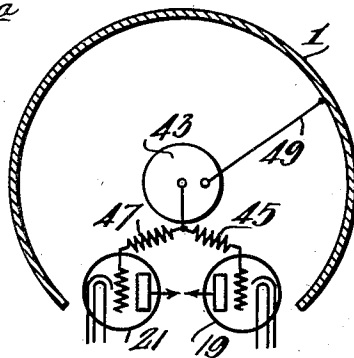


Fig. 2.

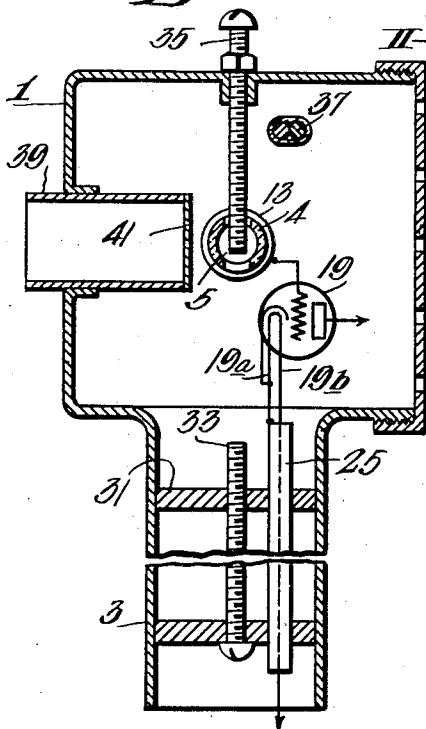
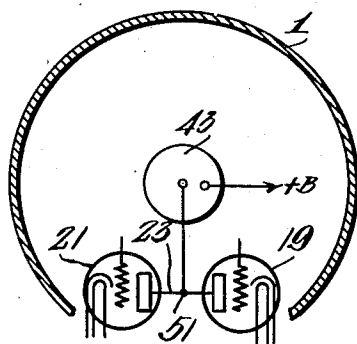


Fig. 4.



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RADIO-ACOUSTIC APPARATUS

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6 Claims. (Cl. 250—17)

This invention relates to radio-acoustic apparatus, and more particularly to an ultra high frequency transmitter, the principal object of my present invention being to provide a light, compact hand transmitter of this sort.

More particularly, it is an object of my present invention to provide a novel hand transmitter of the type set forth which is especially suitable for military communication over short, line-of-sight distances.

Another object of my present invention is to provide a novel transmitter as above described which is subject to minimum possibility of detection by opposing forces.

Still another object of my present invention is to provide a novel hand transmitter as aforesaid which is simple in construction and highly efficient in use.

In accordance with this invention, I employ an ultra high frequency hand transmitter, such as any one of those disclosed in my U. S. Patent No. 2,125,969, and combine therewith a voice-operated, or acoustically responsive, microphone unit such that either frequency or amplitude modulation may be applied directly to the oscillator circuit. The microphone is preferably mounted on the shell which encloses the oscillator and which itself constitutes a part of the tuned resonant circuit of the transmitter, and may be of any one of several approved types. For example, the microphone may comprise a conductive diaphragm arranged to vary the characteristics of the radio frequency oscillations generated by the oscillator by varying, at acoustic frequencies, the capacity of the aforementioned tuned circuit to which the oscillator is coupled. This results in frequency modulation of the ultra high frequency oscillations at audio frequencies. On the other hand, a carbon button microphone connected in series with either the plate or the grid circuits of the oscillator tubes may be employed to give amplitude modulation of the ultra high frequency oscillations. The device may also be used either as a super-regenerative receiver for amplitude modulation or as a frequency converter for reception of frequency modulated waves. In the former case, this may be accomplished by suitably increasing the value of the grid leak resistor or of the capacitor. For reception of frequency modulated oscillations, an additional frequency discriminator would be necessary.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and

method of operation, as well as additional objects and advantages thereof, will best be understood from the following description of several embodiments thereof, when read in connection with the accompanying drawing, in which

Figure 1 is a central sectional view of one form of my present invention,

Figure 2 is a sectional view taken on the plane of line II—II of Fig. 1, and

Figures 3 and 4 are fragmentary sectional views similar to Fig. 1 but showing two other modifications of the invention.

Referring more particularly to the drawing, wherein similar reference characters indicate corresponding parts throughout, there is shown, in Figs. 1 and 2, a shielding shell 1 provided with a handle 3 and made of copper, for example, the hollow shell 1 constituting a shielding member for the parts housed therein. The shielding shell 1 carries a tube 4 of glass or other suitable insulating material within which are mounted a pair of metal tubes 5 and 7 the inner ends of which are spaced from each other, so that these tubes, which constitute a pair of armatures, are capacitively related to each other. The tubes or armatures 5 and 7 may have suitable electrical connection with the shell 1, as by means of the screws 9 threaded into blocks or bushings 11 within the tubes 5 and 7. Two metallic bands or rings 13 and 15 are mounted on the outside of the glass tube 4, these bands being, of course, insulated from each other by the tube 4. Each of the bands 13 and 15 is connected to the shell 1 by a resistor 17.

Also mounted within the shell 1 are two thermionic tubes 19 and 21 comprising a pair of oscillators arranged in push-pull relation, the grids of the tubes 19 and 21 being connected, respectively, to the bands 13 and 15, and the plates of the tubes 19 and 21 being connected together by a connection 23 the center point of which is connected to the positive pole of a suitable battery.

Within the handle 3 are a pair of conductive tubes 25 and 27 with which are connected, respectively, one of the filament leads 19a and 21a of the tubes 19 and 21. The other filament leads 19b and 21b pass down through the tubular members 25 and 27 and are connected to a suitable source of power. A conductive shorting bar 31 connects the conductive tubes 25 and 27 and is adjustable along the tubular members 25 and 27 by means of an adjusting screw 33. In this way, the cathode circuit of the oscillators 19 and 21 may be suitably tuned to its resonant frequency

by varying the effective length of the conductors 25 and 27, and hence the tuned circuit.

The grid circuits of the oscillators 19 and 21 may be tuned by means of the inductance of the shielding member 1 and the capacity between the armatures 5 and 7. For varying this capacity, there is provided an adjustable conductor, such as a screw 35 mounted on the shield 1 and extending down between the adjacent ends of the armatures 5 and 7. A pair of antenna rods 37 serve to radiate the oscillations supplied thereto by the oscillatory system heretofore described.

For modulating the ultra high frequency oscillations generated by the oscillatory system, there may be provided, on the shell 1, a tubular mouthpiece 39 which extends into the shell 1 and vibratively carries, at its inner end, a thin, membranous, conductive diaphragm 41 disposed in close proximity to the adjacent ends of the armatures 5 and 7. The diaphragm 41 may be made of aluminum or any other suitable material. When acoustic waves are applied to the diaphragm 41 through the mouthpiece 39, the diaphragm vibrates in response thereto and thus varies the capacity between the armatures 5 and 7 at acoustic frequencies, thereby modulating the ultra high frequency oscillations generated by the oscillatory system. The ultra high frequency oscillations, thus modified, are radiated by the antenna 37.

In Figs. 3 and 4, I have shown two modifications of my invention suitable for amplitude modulation, instead of frequency modulation, as in the case of the modification of Figs. 1 and 2. In the modification of Fig. 3, I employ a carbon button microphone in place of the diaphragm 41 and connect the button 43 thereof to the grids of the oscillators 19 and 21 through resistors 45 and 47, respectively. A lead 49 connects the button 43 to the shield 1. In the modification of Fig. 4, I connect the button 43 between the midpoint 51 of the lead connecting the plates of the two oscillators 19 and 21 and the positive pole of a suitable battery.

Although I have shown and described several embodiments of my invention, it will be apparent to those skilled in the art that many other modifications are possible. I therefore do not wish to limit myself except insofar as is made necessary by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. A radio-acoustic device comprising, in combination, a conductive shell, means within and including said shell for generating radio frequency oscillations, electro-acoustical means carried by said shell and associated with said first-named means for varying its radio frequency characteristics, and means carried by said shell for radiating said varied radio frequency oscillations.

2. A transmitter comprising, in combination,

an oscillatory system including a hollow shielding member, an adjustable capacity disposed within and connected to said member, said shielding member and said capacity forming a resonant circuit, an electronic oscillator disposed within said member, means coupling said oscillator to said member, an antenna associated with said member, and acoustically responsive means carried by said shield for modulating the oscillations supplied to said antenna by said system.

3. A transmitter comprising, in combination, an oscillatory system including a hollow shielding member, an adjustable capacity disposed within and connected to said member, said shielding member and said capacity forming a resonant circuit, an electronic oscillator disposed within said member, means coupling said oscillator to said member, an antenna associated with said member, and a conductive, acoustically-responsive element vibratively carried by said shielding member in capacitive relation to said adjustable capacity for modulating the oscillations supplied to said antenna by said system.

4. A transmitter comprising, in combination, an oscillatory system including a hollow shielding member, a pair of armatures disposed within and connected to said shield, said armatures having their adjacent ends spaced from each other whereby they are capacitively related, said armatures and said shield forming a resonant circuit, means associated with said armatures for varying the capacity therebetween whereby to tune said circuit, an electronic oscillator disposed within said shield, means coupling said oscillator to said shield, an antenna associated with said shield, and a conductive, acoustically responsive element vibratively carried by said shield in proximity to the adjacent ends of said armatures, said element being capacitively related to said armatures and being adapted to further vary the capacity between said armatures upon being vibrated in response to acoustical energy whereby to frequency modulate the oscillations supplied to said antenna by said system.

5. The invention set forth in claim 4 characterized in that said acoustically responsive means comprises a carbon button microphone, characterized further in that said oscillator comprises a pair of electronic oscillator tubes connected in push-pull relation, each of said tubes including a control electrode, and characterized still further in that the button of said microphone is connected to each of said control electrodes.

6. The invention set forth in claim 4 characterized in that said acoustically responsive means comprises a carbon button microphone, characterized further in that said oscillator comprises a pair of electronic oscillator tubes connected in push-pull relation, and characterized further in that the button of said microphone is connected in the output circuits of said tubes.

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