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ARRANGEMENT FOR GENERATING HIGH POWER BY ULTRA SHORT WAVES

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Fig. 1

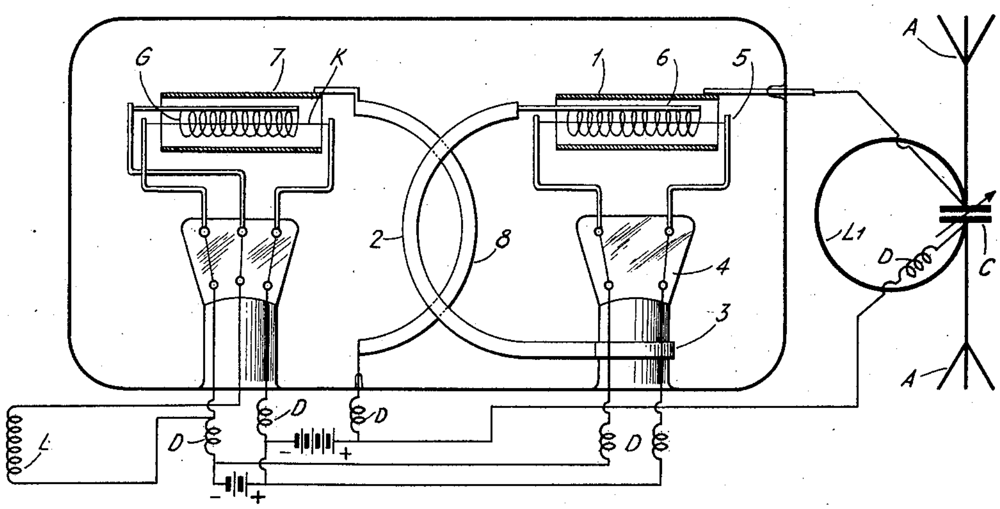
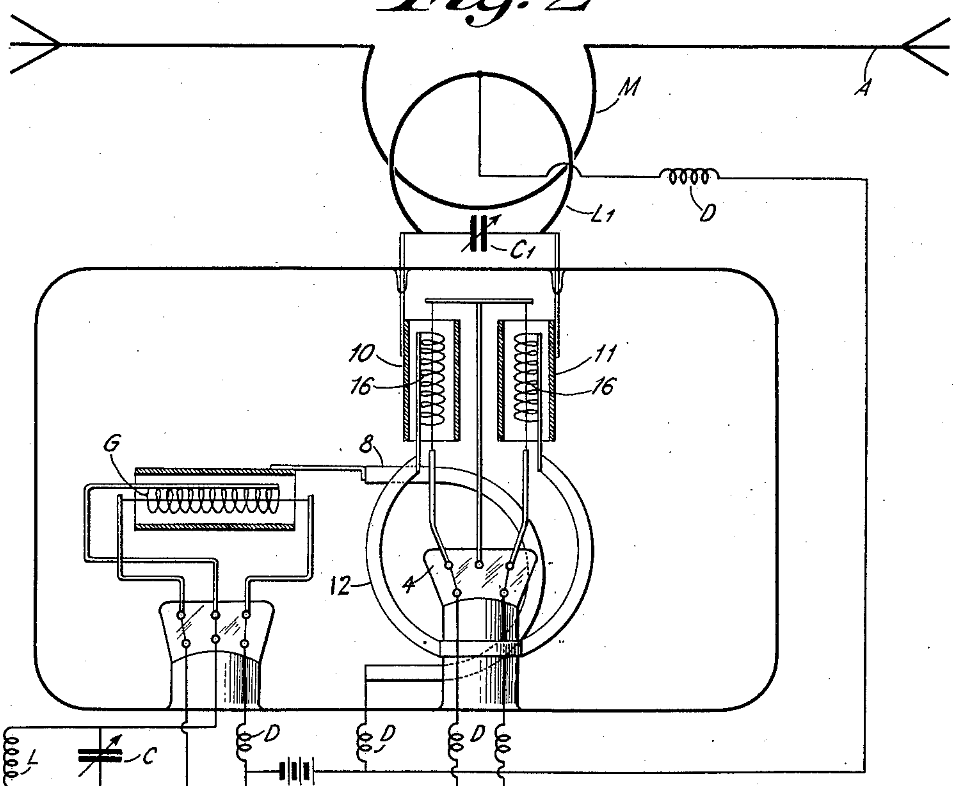


Fig. 2



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ARRANGEMENT FOR GENERATING HIGH POWER BY ULTRA SHORT WAVES

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4 Claims. (Cl. 250—36)

It is known that up to the present time no really satisfactory results have been obtained in using separate control circuits in the generation of ultra short waves. The reason for this has been that the application of any appreciable grid alternating potential to an amplifier tube system at the ultra high frequencies, requires the furnishing of nearly as much power as can be delivered by the system in the form of anode power. The losses in the grid circuit are essentially caused at all the contact points of the oscillatory grid circuit with dielectric material, particularly at the place where the grid lead extends through the glass bulb and also at the place where the grid is supported by the dielectric material. Further, it has been found that the long supply lead through the bulb to the grid causes such a grid to cathode capacity that a considerable potential at this capacity causes wattless currents which, in turn, entail considerable losses in the conducting parts of the oscillatory grid circuit.

In order to overcome these difficulties the following arrangement is proposed in accordance with the present invention.

The oscillatory grid circuit, tuned to the ultra short wave to be amplified, is not passed through the wall of the bulb but is arranged within the bulb proper. The fastening to the dielectric of the tube structure is made in such manner that only circuit elements carrying low potential extend closely to the oscillatory circuit, whereas the parts of the oscillatory circuit carrying high potential extend freely within the vacuum bulb. For supplying power to this oscillatory circuit, a source of ultra short wave energy is arranged within the same envelope, and it is this source which furnishes the frequency for which the grid circuit is dimensioned. This source may either be an arrangement which is self excited in the ultra short wave, or it may consist of a Barkhausen-Kurz arrangement or may be designed as a multiplication stage which may either be self excited, by a low frequency, or may be controlled by an alternating potential at low frequency from a generator arranged outside the bulb. In the latter case the control of this tube through the wall of the bulb is considerably simpler than in the case of direct control of an ultra short wave tube in view of the relatively low frequency compared with the ultra short waves.

It is advisable to design the amplifying tube with a view toward keeping the leads which extend through the bulb free from high frequencies. This may be accomplished by arranging chokes within the bulb as well as, also, by the use of arrangements in which the battery terminals are connected to points of the system free from high frequency potentials.

In the accompanying drawing Figure 1 shows, by way of example, an embodiment according to the invention; and Figure 2 shows another embodiment of the push-pull type.

Referring to Figure 1, the grid 6 of the main transmitter tube comprising an anode 1 is shown fastened to the stem 4 of the main tube by means of a metallic conducting loop 2 integral with a metallic shell 3 surrounding the stem. The oscillatory grid circuit comprises the loop 2, the capacitative connection from the shell 3 integral with loop 2 to the filament leads within stem 4, the cathode 5 and the capacity between the cathode and the grid 6. In this manner the loop or inductance 2 is capacitively associated with the cathode 5, the clamping ring 3 constituting one coat of a condenser whose dielectric consists of the glass material of the stem 4, the second coat consisting of the filament leads within the stem. Since there exists a low radio frequency voltage at the end of loop 2 nearest the grid, the dielectric losses in the capacity of the other end of the loop are appreciably low. The anode 1 is brought out of the container comprising the glass bulb through a seal, as shown, and connected to the anode oscillation circuit L1, C which is coupled to the antenna A. The grid oscillatory circuit 2 is coupled inductively with the anode circuit of the first or input tube which comprises the coupling anode lead 8 together with the anode-cathode capacity of the first tube formed by anode 7 and its cathode K, this circuit being also tuned to the operating frequency. The anode circuit 8 is so dimensioned that it will be in resonance with the working frequency. It is preferred, as will be described later, that the electrode system of the first tube be supplied with a lower frequency and to thereupon multiply the frequency. Higher harmonics of the fundamental wave may thus be obtained in anode circuit 8 which is tuned to the desired harmonic. It is assumed that this first or input tube in this arrangement operates as a multiplying stage.

Figure 2 shows a push-pull arrangement in which the center of the oscillating grid circuit, i. e. the center of the loop 12 connecting the two grids 16, 16 does not carry high frequency, but is fastened to the stem 4 and is led to the outside from such connecting point.

In the operation of the circuit and referring to

Figure 1 in more detail, the alternating current voltage to be multiplied is fed to the coil L which is inserted between the grid G and the filament K of the first or input tube. Connected in the battery supply leads are choke coils D which prevent the flow or drain of radio frequency energy into the source of potential and thus cause a reaction of the battery lead upon the tuning of the oscillation circuits. The plate circuit of the second stage consists of an inductance L1 and a tuning condenser C. The antenna A, being of the dipole type, is in coupling relationship with the antenna circuit by way of the condenser C.

Figure 2 involves the same principle, but employs a push-pull stage. The input voltage of lower frequency is fed to the grid G by way of the tuned circuit LC. The plate inductance 8, similarly as in the preceding illustration, is in coupling relation with the grid circuit 12 of the end or power stage. Connected to the two plates 10 and 11 of the power stage is the output circuit L1, C1 from which the resultant energy is fed into the aerial A by way of a coupling loop M.

We claim:

1. An ultra short wave generator system comprising within a single container two sets of electrodes, each including an anode, a cathode and a grid, the anode of one set being inductively coupled to the grid of the other set within said container solely through leads which are individual to said last electrodes and located adjacent each other, one of said sets of electrodes comprising a source of ultra short waves and the other of said sets comprising a power amplifier, means external of said container for energizing said electrodes through leads extending through said container, high frequency choke coils serially connected in certain of said leads with respect to said means and said electrodes, and a utilization circuit comprising an antenna coupled to a parallel tuned circuit of capacity and inductance in circuit with said power amplifier.

2. An ultra short wave generator system comprising within a single container two sets of electrodes, each including at least an anode and a grid, the anode of one set being inductively coupled to the grid of the other set within said container solely through two physically separated, substantially semi-circularly arranged leads located near each other, said leads being individual to said last electrodes, one of said sets of electrodes comprising a source of ultra short waves and the other of said sets comprising a power amplifier, said power amplifier comprising a push-pull type of system having two groups of electrodes, each of said groups including an anode and a grid, the anodes and grids of said groups being respectively connected together, and a parallel tuned circuit of capacity and inductance located externally of said envelope in the output of said amplifier, means external of said container for energizing said electrodes through leads extending through said container, and a utilization circuit coupled to said parallel tuned circuit.

3. An ultra short wave oscillation generator system comprising within a single container first and second sets of electrodes, each including an anode, a cathode and a grid, a stem of insulating material for supporting each set of electrodes within said container, means externally of said container for energizing said electrodes, leads for said cathodes extending through said stems to said energizing means, the anode of said first set of electrodes being inductively coupled to the grid of said second set through two physically separated leads within said container, located near and inductively coupled to each other, said leads being individual to said last electrodes, said lead which is individual to the grid of said second set being supported by its associated stem and comprising with the cathode leads within said stem a capacitance whose dielectric is the stem, said first set of electrodes comprising a source of oscillations, and a utilization circuit coupled to the anode of said second set.

4. An ultra short wave oscillation generator system comprising within a single container first and second sets of electrodes, each including an anode, a cathode and a grid, a stem of insulating material for supporting each set of electrodes within said container, means externally of said container for energizing said electrodes, leads for said cathodes extending through said stems to said energizing means, the anode of said first set of electrodes being inductively coupled to the grid of said second set through two physically separated leads within said container, located near and inductively coupled to each other, said leads being individual to said last electrodes, said lead which is individual to the grid of said second set being supported by its associated stem and comprising with the cathode leads within said stem a capacitance whose dielectric is the stem, a source of relatively lower frequency energy coupled to the grid and cathode of said first set, said anode of said first set being so dimensioned as to tune the output of said first set of electrodes to a harmonic of said lower frequency, and a utilization circuit coupled to the anode of said second set.

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