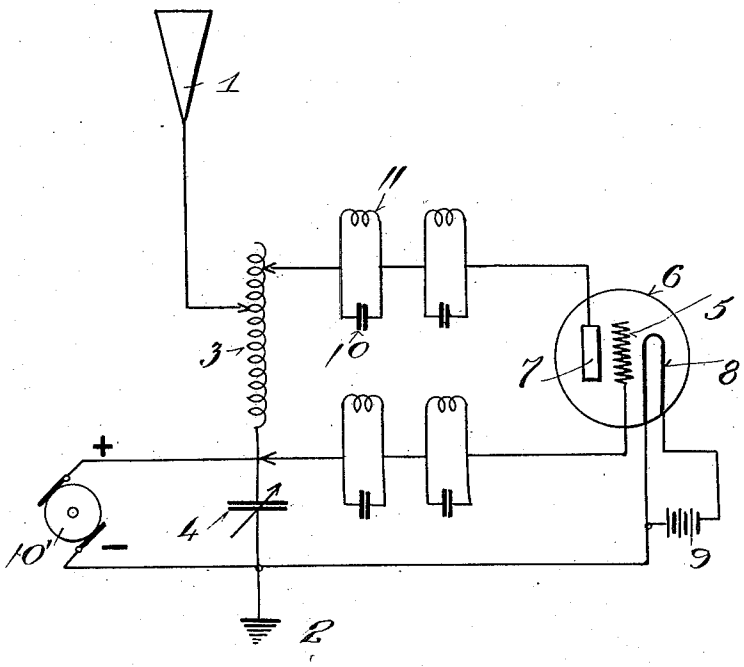
Jan. 13, 1925. 1,523,011

W. E. GARITY

CONTINUOUS WAVE TRANSMISSION SYSTEM

Filed Sept. 23, 1920



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UNITED STATES PATENT OFFICE.

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CONTINUOUS WAVE-TRANSMISSION SYSTEM.

Application filed September 23, 1920. Serial No. 412,322.

To all whom it may concern:

Be it known that I, WILLIAM E. GARITY, a citizen of the United States, residing in New York, in the county of Kings and State of New York, have made a certain new and useful Invention in Continuous Wave-Transmission Systems, of which the following is a specification.

The object of the invention is to provide a continuous wave system wherein the oscillating current is generated by means of one or more oscillions and wherein parasitic oscillations are suppressed, and particularly such oscillations which are harmonics of the main or fundamental frequency.

A further object, therefore, is to provide a transmission system which is more efficient in its operation than those heretofore employed.

Further objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts in the circuit arrangements employed, all as will be more fully hereinafter set forth, as shown by the accompanying drawing and finally pointed out in the appended claims.

In the drawing the figure illustrates a circuit arrangement embodying my invention.

Present continuous wave transmitters of the arc type are very objectionable because of the relatively large percentage of total radiated energy represented in parasitic oscillations which usually are of frequencies which are harmonics of the main or fundamental frequency, or, in some instances, approximating such harmonic frequencies. These harmonics not only waste energy which should be sent out at the fundamental frequency of the system, but also cause a great amount of quite unnecessary interferences at the receiving stations which are tuned far away from the universal frequency of the arc transmitter. Even with continuous wave transmitters of the oscillion type, parasitic harmonics exist, although far less in number and of relatively small energy compared with that in the fundamental frequency. The existence of such parasitic harmonics, even in continuous wave transmitters of the oscillion type, is objectionable, a detriment, and decreases the efficiency of the system. It is towards methods and circuits for suppressing such harmonics in a transmitting system of the oscillation type that my present invention is directed. In the drawing I have shown one simple type of oscillation transmitting system to which, of course, I do not desire to be limited, or restricted, as the particular transmitting circuit selected has been selected merely for the purpose of illustrating the principles of my invention as applied thereto, and it will be obvious that my invention may equally well be applied to any transmitting circuit. In the illustration selected, however, the antenna 1 is connected to the earth 2 through the usual inductance 3 and capacity 4. One end of the inductance is connected to the grid electrode 5 of the oscillion tube 6, the plate electrode 7 of which is adjustably connected to the opposite end of the inductance. The filament electrode 8 of the oscillion 6 is lighted in the usual well known manner from any suitable source, for example, by means of a battery. The B current in the form selected for illustration is supplied from a D. C. generator 10′ which in this instance is connected to opposite sides of the capacity 4. In accordance with my invention I insert in the lead between the oscillating circuit 1, 3, 4, 2, and one of the electrodes of the oscillion a "branch" or "rejector" circuit, the natural period of which is tuned to the frequency of the harmonic which it is desired to suppress. Such branch circuit consists of a capacity 10 and an inductance 11 connected in series with each other but in parallel with the electrode lead in which the rejector circuit is included. For example, in the principle of the invention, if the inductance 11 and the capacity 10 of the rejector circuit be such that $2\pi\sqrt{C_{10}L_{11}}$ equals the period of the objectionable harmonic, this rejector circuit will offer an infinite impedance to impulses of this frequency (provided the resistance, dielectric and radiation losses from this rejector circuit be neglected). Secondly, no harmonic impulse of this frequency can reach the electrode of the oscillion in the lead of which the rejector circuit is inserted, to thereby cause the tube or oscillion 6 to oscillate at the said objectionable frequency. Similarly, if there are two harmful harmonics which

it is desired to suppress, a second rejector circuit can be inserted in the lead of the electrode as desired. It will be apparent from the foregoing that one or more rejector circuits may be inserted in the lead of either the grid electrode 5 or the plate electrode 7 or one or more rejector circuits, as desired, may be inserted in the lead of both grid and plate electrodes 5 and 7 respectively, as shown.

Many other modifications will readily occur to those skilled in the art without departing from the spirit and scope of my invention, but having now set forth the objects and nature thereof, and having shown and described one application thereof, what I claim as new and useful and of my own invention and desire to secure by Letters Patent is:—

1. In a radio transmitting system, and in combination with a source of undamped oscillations including a vessel having associated therewith a hot electrode and a plurality of cold electrodes, and circuits therefor, of a plurality of rejector circuits each tuned to a frequency to be suppressed, and included in the circuit of each cold electrode.

2. In a radio transmitting system and in combination with a source of undamped oscillations including a vessel having associated therewith a hot electrode, and plate and grid electrodes, and circuits for said electrodes, of a rejector circuit tuned to the frequency to be suppressed included in the grid-filament circuit, said rejector circuit otherwise not affecting the oscillations produced.

3. In a radio transmitting system and in combination with a source of undamped oscillations including a vessel having associated therewith a hot electrode, and plate and grid electrodes, and circuits for said electrodes, of a plurality of rejector circuits each tuned to a frequency to be suppressed and included in the circuit of said grid electrode.

4. In a radio transmitting system and in combination with a source of undamped oscillations including a vessel having associated therewith a hot electrode, and plate and grid electrodes, and circuits for said electrodes, of a plurality of rejector circuits each tuned to a frequency to be suppressed and included in the circuits of said grid and plate electrodes, said rejector circuits otherwise not affecting the oscillations produced.

5. In a radio transmitting system, and in combination with a source of undamped oscillations including a vessel having associated therewith a hot electrode and a plurality of cold electrodes, and circuits therefor, and means for suppressing parasitic oscillations consisting of a circuit comprising an inductance and capacity connected in series with each other and included in the circuit of each cold electrode said suppressing circuit otherwise not affecting the oscillations produced.

6. In a radio transmitting system, and in combination with a source of undamped oscillations including a vessel having associated therewith a hot electrode and a plurality of cold electrodes, and circuits therefor, and means for suppressing parasitic oscillations consisting of a plurality of circuits each comprising an inductance and a capacity in series, included in the circuit of each cold electrode, said suppressing circuit otherwise not affecting the oscillations produced.

7. In a radio transmitting system, and in combination with a source of undamped oscillations including a vessel having associated therewith a hot electrode, and plate and grid electrodes, and circuits for said electrodes, and means for suppressing parasitic oscillations consisting of a circuit comprising an inductance and capacity connected in series with each other and included in the grid-filament circuit, said suppressing circuit otherwise not affecting the oscillations produced.

8. In a radio transmitting system and in combination with a source of undamped oscillations including a vessel having associated therewith a hot electrode, and plate and grid electrodes, and circuits for said electrodes, and means for suppressing parasitic oscillations consisting of a plurality of circuits each comprising an inductance and a capacity in series, included in the circuit of said grid electrode, said suppressing circuit otherwise not affecting the oscillations produced.

In testimony whereof I have hereunto set my hand on this 20th day of September A. D., 1920.

WILLIAM E. GARITY.