

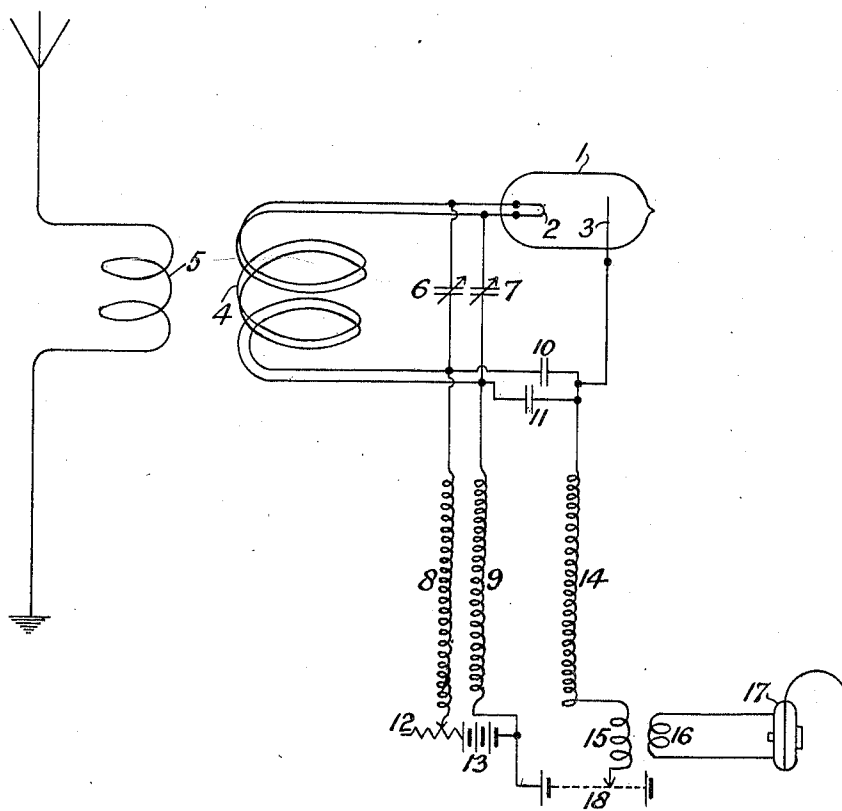
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WIRELESS TELEGRAPH RECEIVER

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UNITED STATES PATENT OFFICE.

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WIRELESS TELEGRAPH RECEIVER.

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This invention relates to improved circuits for wireless telegraph receivers, and is particularly applicable for receivers for waves of a few metres.

5 In receivers employing thermionic devices it is usual to connect the secondary circuit of the receiving transformer between the grid and filament of a valve of the three electrode type, or between the anode and filament of
10 a valve of the two electrode type. As the capacity at the filament end of the secondary is large (owing to the batteries, accessories and leads required) compared with the capacity at the grid or anode end, the variations
15 of potential produced across the secondary by the received waves cause a greater variation in the potential of the grid or anode relatively to the surroundings than in the potential of the filament.

20 It has now been found that by arranging the circuit so that the potential of the filament rather than the potential of the grid or anode is varied relatively to its surroundings, a valve receiver is made many times
25 more sensitive for short waves.

To obtain this effect it is necessary so to arrange the circuit that the capacity at the filament end of the secondary is a minimum. This may be effected by connecting the lighting
30 battery to the filament through long choking coils; the capacity of the lighting battery and accessories does not then materially affect the capacity at the filament end of the secondary. It is preferred, however, to cause
35 the secondary directly to affect the potential of the filament by connecting the secondary directly in the leads to the filament. As two wires must be employed between the battery and the filament, the secondary is
40 wound with two wires laid together on the same former, the two wires being connected at one end of the coil to the filament and at the other end, preferably through long
45 choking coils, to the heating battery and accessories. A tuning condenser is connected in parallel with the secondary; this is preferably arranged in two equal parts each connected in parallel with one of the secondary
wires.

50 The telephone or indicator may be connected in series with an adjustable battery and choking coil between the anode and the filament lighting battery.

The invention is illustrated by the accom-

panying diagram, in which 1 is a valve having
55 a filament 2 and an anode 3. 4 is a secondary coupled to a primary 5 in an aerial circuit and consisting of two wires wound together on a former and connected at one end to the
60 filament 2 and to tuning condensers 6, 7, and at the other end to choke coils 8, 9, to the condensers 6, 7, and to fixed condensers 10, 11. The coils 8, 9, are connected at one end
65 to a resistance 12 and a battery 13 which heats the filament 2, and at the other end to the condensers 6, 7. 14 is a third choke coil connected at one end to the condensers 10,
70 11, and to the anode 3, and at the other end through the primary 15 of a transformer of which the secondary 16 is connected to a
telephone 17, to the positive of a battery 18 of adjustable voltage, the negative of which
is connected to the heating battery 13.

The secondary circuit comprising the coil
4 and condensers 6 and 7, is tuned to the wave
75 received.

The choking coils 8, 9, 14, are not essential, but they are particularly useful in the case
of short waves in preventing the oscillations picked up by the telephone and battery wires
80 from affecting the secondary circuit.

It will be noticed that the filament 2 is connected solely to the secondary circuit, while
the anode 3 is connected to the coils 8, 9 and 14, and the battery leads besides being con-
85 nected to the secondary; consequently the capacity of 3 relatively to its surroundings will be greater than that of 2. It follows that when any difference of potential is produced
between 2 and 3 by the secondary, the varia-
90 tion of potential of 2 relative to its surroundings will be greater than that of 3.

What I claim is:—

1. A circuit comprising a transformer having a coil consisting of two conductors wound
95 together and insulated from each other, a thermionic valve having a filament and a cold electrode, each conductor of the coil being connected at one end of the coil to opposite
leads respectively of the filament, and a
100 battery connected to the filament through said conductors.

2. A circuit comprising a transformer, a thermionic valve having a filament and a cold
electrode connected through a circuit includ-
105 ing a coil of the transformer and a condenser, a source of space current for said valve, a source of current for heating the filament, and

means between the sources of current and the filament for neutralizing the capacity effect of said sources of current and their associated connections on the filament end of the coil whereby the variation of potential at said end, when oscillations are impressed on the coil, is increased.

3. A circuit comprising a transformer, a thermionic valve having a filament and a cold electrode coupled by a circuit which includes the transformer coil and another circuit connecting said filament and cold electrode and containing a source of current, a second source of current for heating the filament and inductances between the sources of current and filament for neutralizing capacity effect of said sources of current and their associated connections on the filament end of the coil whereby the potential at said end varies between a minimum and a maximum relative to its surroundings when oscillations are impressed on the secondary.

4. A circuit comprising a first inductance, a thermionic valve having a filament and a cold electrode connected to each other through a circuit including the first inductance and through another circuit containing a source of current, a second source of current for heating the filament, and a second inductance between the second source of current and the filament.

5. A circuit comprising a transformer having a coil consisting of two conductors wound together and insulated from each other, a thermionic valve having a filament and a cold electrode, each conductor of the coil being connected at one end of the coil to opposite leads respectively of the filament, the other ends of the conductors being separately capacitively coupled to the cold electrode, and a battery connected to the filament through the coil.

6. A circuit comprising a transformer having a coil consisting of two conductors wound together and insulated from each other, a thermionic valve having a filament and a cold electrode, each conductor of the coil being connected at one end of the coil to opposite leads respectively of the filament, the other ends of the conductors being separately capacitively coupled to the cold electrode, a battery connected to the filament through leads containing inductance, a circuit connecting the filament and cold electrode containing a battery and inductances in the connections of said circuit between the filament and cold electrode.

7. A circuit comprising a transformer having a coil consisting of two inductances and insulated from each other, a thermionic valve having a filament and a cold electrode, each inductance of the coil being connected at one end of the coil to opposite leads respectively of the filament, the other ends of the inductances being connected in circuit with the cold

electrode, and a battery for heating the filament connected thereto through the inductances.

8. A circuit comprising a transformer having a coil consisting of two conductors wound together and insulated from each other, separate tuning condensers connected across the ends of each conductor, a thermionic valve having a filament and a cold electrode, each conductor of the coil being connected at one end of the coil to opposite leads respectively of the filament and the other ends of the conductors connected to the cold electrode through a pair of condensers, and a battery for heating the filament connected thereto.

9. The combination with an electron emission tube filament which is not at the radio frequency potential of the general surroundings, and a filament heating source which is at substantially the radio frequency potential of the general surroundings of a pair of impedances arranged in series with respect to the filament heating current, and in parallel with respect to the radio frequency current for overcoming the potential difference between the source and the filament.

10. In combination, an electron emission tube having a filament which is not at the potential of the general surroundings, a radio frequency circuit associated therewith, a source of filament heating current which is at substantially the potential of the general surroundings, a pair of impedances connected to said filament and source and in said radio frequency circuit in parallel for the radio frequency current and in series for the filament heating current, said impedances being of proper magnitude to overcome the potential difference between the filament and the source.

11. An electron tube circuit comprising an electron emission tube having a filament which is not at the potential of the general surroundings and at least one other electrode, a radio frequency circuit including a coupling inductance connected between said electrodes, a source of filament heating current, said source being at substantially the potential of the general surroundings, and means connecting said source to said filament comprising the coupling inductance and another impedance in parallel therewith for overcoming the difference in potential between the filament and the general surroundings.

12. An electron tube circuit comprising an electron emission tube having a filament which is not at the potential of the general surroundings and at least one other electrode, a radio frequency circuit comprising a tuning inductance and a tuning condenser connected between said electrodes, a source of filament heating current, said source being at substantially the potential of the general surroundings, and means connecting said source to said filament comprising the tuning inductance

and another impedance in parallel therewith for overcoming the difference in potential between the filament and the general surroundings.

5 13. An electron tube circuit comprising an electron emission tube having a filament which is not at the potential of the general surroundings and at least one other electrode, a radio frequency circuit including an im-
10 pedance connected between said electrodes, a source of electrical energy for heating said filament, said source being at substantially the potential of the general surroundings, and a pair of leads connecting said source to
15 the filament, each lead including a portion of the said impedance in order to overcome the potential difference between the filament and the source.

14. In combination, an electron emission
20 tube having a hot and a cold electrode, a radio frequency circuit connected therebetween, a pair of inductances in said circuit arranged in parallel with respect to the radio frequency current, a source of energy for heating
25 the hot electrode, and means connecting the hot electrode and the source comprising said pair of inductances arranged in series with respect to current from the source.

15. In combination, an electron emission
30 tube having a hot cathode and an anode, a radio frequency circuit therebetween, a source

of cathode heating current, said source being at the radio frequency potential of the general surroundings, a pair of impedances in said circuit and arranged in parallel with
35 respect to the radio frequency current and in series with respect to the filament heating current for overcoming the potential difference between the source and the filament, whereby the radio frequency potential fluc-
40 tuations take place substantially on the cathode.

16. In combination, an electron emission tube having a hot cathode which is not at the radio frequency potential of the general sur-
45 roundings, and an anode which is at substantially the radio frequency potential of the general surroundings, a radio frequency circuit therebetween, a source of cathode heating current which is at substantially the po-
50 tential of the general surroundings, and a pair of radio frequency impedances in said circuit and arranged in series with respect to the filament heating current and in parallel with respect to the radio frequency cur-
55 rent for overcoming the potential difference between the source and the filament.

In testimony that I claim the foregoing as my invention I have signed my name this 13th day of June, 1919.

CHARLES SAMUEL FRANKLIN.