Nov. 8, 1927.

1,648,592

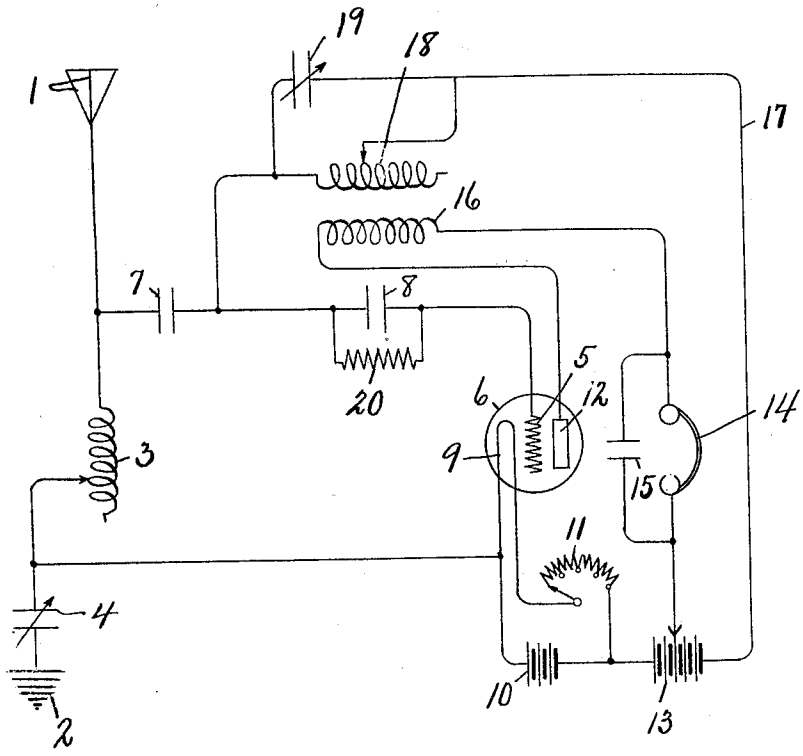
L. R. RUOFF

WIRELESS APPARATUS

Filed Jan. 11, 1923

2 Sheets-Sheet 1

Fig. 1.



INVENTOR

Leroy R. Ruoff.

BY

Dennison & Thompson

ATTORNEYS.

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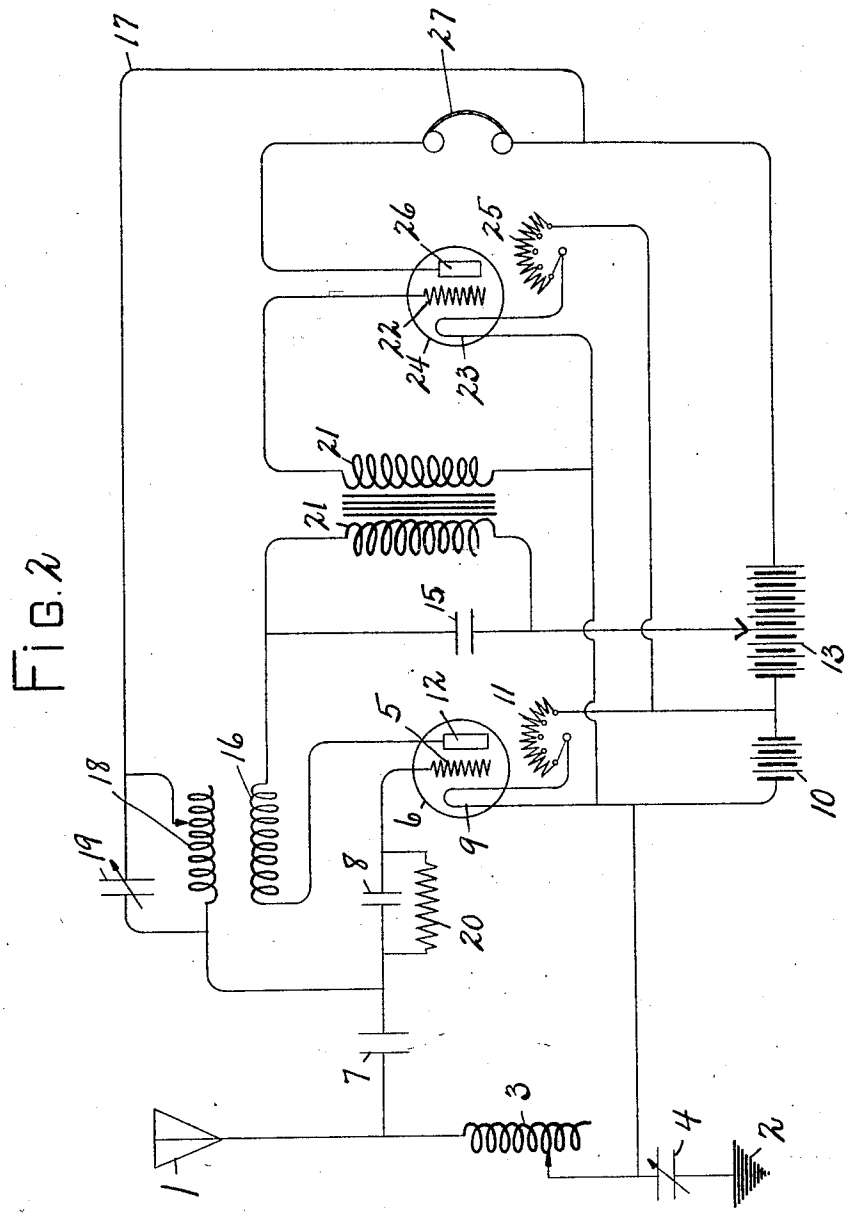

FIG. 2

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UNITED STATES PATENT OFFICE.

LEROY R. RUOFF, OF SYRACUSE, NEW YORK, ASSIGNOR OF ONE-FOURTH TO HOWARD P. DENISON AND ONE-FOURTH TO EUGENE A. THOMPSON, BOTH OF SYRACUSE, NEW YORK.

WIRELESS APPARATUS.

Application filed January 11, 1923. Serial No. 611,980.

This invention relates to a certain new wireless apparatus, and is at present more specifically adapted to the improvement of wireless receiving apparatus.

The main object of the invention is to produce a more efficient wireless receiving apparatus, and I find from tests of the apparatus hereinafter described that it allows of the use of the full capacity of the tube without permitting it to reach the stage of audible oscillation. It is found that received and rectified oscillations or those made audible in the telephones or other instrument of delivery or translating devices may be fed through any added amplification in such a way that signals are not distorted thereby making possible any degree of amplification at audible frequencies, a condition which has not heretofore been obtainable.

The apparatus is capable of producing received signals that can be amplified to any extent desirable without becoming mushy or distorted.

Further, the tube emits no foreign noises such as hissing, popping or frying noises, these being eliminated or reduced, when properly tuned, to such an extent as to be imperceptible even under a large amount of amplification, with the result that clear signals are produced.

Further, the operation of the apparatus permits of a very high degree of selectivity, thereby reducing interference caused as for instance by broadcasting stations on very nearly the same wave length at the point of reception.

Further, the apparatus is extremely simple to tune.

Other objects and advantages relate to the details of construction of the apparatus and the arrangement of the parts thereof, all as will more fully appear from the following description taken in connection with the accompanying drawings, in which:—

Figure 1 is a diagrammatic illustration of an embodiment of my invention.

Figure 2 is a diagrammatic illustration of a further embodiment of my invention involving added amplification.

The apparatus as shown, comprises an antenna —1— connected to the ground —2— through a variable inductance —3— and a variable capacity such as the condenser —4—.

The grid —5— of the vacuum tube —6— is connected in circuit with the antenna —1— at a point between the antenna —1— and the variable inductance —3— through the two condensers —7— and —8—. The filament —9— of the tube —6— may be heated in any suitable manner as by battery —10— connected in circuit with the filament such circuit preferably including an adjustable resistance, such as the rheostat —11—. The negative side of the filament —9— is connected to the ground circuit of the antenna —1— between the variable inductance —3— and the capacity —4—. The positive side of the filament —9— is connected in circuit with the plate —12— of the tube —6—, such circuit including a source of potential which is preferably variable, such as the battery —13—, a translating device such as the telephone receivers —14— preferably having a condenser —15— in shunt therewith, and an inductance —16—. Preferably the filament plate circuit contains a source of potential such as the battery —13— of about 18 to 22½ volts.

The positive side of the filament —9— is connected to the antenna grid circuit at a point between the condenser —7— and the condenser —8— by means of a circuit which contains a source of potential which may include the battery —13— of the filament plate circuit, together with an added potential which in effect is found to increase the amplification produced by the apparatus.

My experiments at present indicate that the filament plate circuit as above stated, is most effective under 18 to 22½ volts, while the third circuit which is tapped into the antenna grid circuit and is connected to the positive side of the filament —9— is most effective under a voltage of 70 to 90 volts dependent upon the character of the vacuum tube used. The source of potential of the circuit —17— may, as above stated, include all or any portion of the source of potential used in the filament plate circuit or may be an entirely independent source of potential.

The circuit —17— further includes a variable inductance —18— variably coupled to the inductance —16— in the filament plate circuit and the variable inductance —18— is provided with a variable condenser —19— in shunt therewith. The audio grid circuit is provided with a grid leak in the form of non-inductive high resistance —20— in shunt with the condenser —8—.

In Figure 2 substantially the same apparatus is illustrated with an added step of amplification in that the primary of an audio-frequency transformer —21— is inserted in the filament plate circuit in place of the translating device such as the telephones —14—, the secondary of such transformer being connected in circuit with the grid —22— and the negative side of the filament —23— of an electron discharge device or tube —24—, the filament being heated by circuit connections with the battery —10— under control of a rheostat —25—. The plate —26— is connected in circuit with the filament —23—, such circuit including a translating device, such as the telephones —27— and the battery —13—. The circuit —17— in like manner as heretofore described is connected to the positive side of filament —23— by tapping into the circuit between the plate —26— and the filament —23— or by direct connection through a suitable source of potential.

Any further amplification desired may be effected in the same manner as here illustrated by the use of further electron discharge devices —24— additionally coupled in the manner here illustrated. The exact method of operation of the apparatus herein described is not at present fully known or understood, and any statement as to the reasons why the improved results described are effected would be largely a matter of speculation and the disclosure of this application is, therefore, limited to a description of the apparatus, and certain of the advantages attained thereby without advancing any theory as to the reasons why those advantages are attained.

Altho I have shown a preferred construction in that the grid —5— and the filament —9— are directly connected to the antenna ground circuit, it should be understood that that connection is deemed a substantial equivalent for that in which the inductance —3— is utilized as the primary of a transformer and the grid —5— and the filament —9— are connected upon opposite sides of the secondary of such transformer, and claims calling for the connection of the grid to the antenna circuit are deemed to include the substantial equivalent in the connection of such grid to the secondary of such transformer.

Altho I have shown and described specific constructions of apparatus as illustrative of embodiments of my invention, I do not desire to limit myself to the details of the apparatus or the parts thereof, except as the same may be specifically called for in the claims hereto appended.

I claim:

1. A wireless receiving apparatus comprising an electron discharge device, a grid filament circuit upon which the received oscillations are impressed, a plate filament circuit containing a source of potential and an inductance, and an additional circuit connecting the filament grid circuit to the filament plate circuit at a point between the plate and the source of potential, said third circuit containing an inductance coupled with the first-named inductance.

2. A wireless receiving apparatus comprising an electron discharge device, a grid filament circuit upon which the received oscillations are impressed, a plate filament circuit containing a source of potential and an inductance, a condenser in the filament grid circuit and a third circuit connecting the filament grid circuit at a point between the said condenser and the grid, to the plate filament circuit on the positive side of said source of potential, said third circuit containing an inductance coupled with the first-named inductance.

In witness whereof I have hereunto set my hand this 5th day of January, 1923.

LEROY R. RUOFF.