March 7, 1933. C. V. LOGWOOD 1,900,293

MEANS FOR INCREASING THE SELECTIVITY OF TUNED RADIO FREQUENCY SYSTEMS

Original Filed Oct. 29, 1926

Fig. 1.

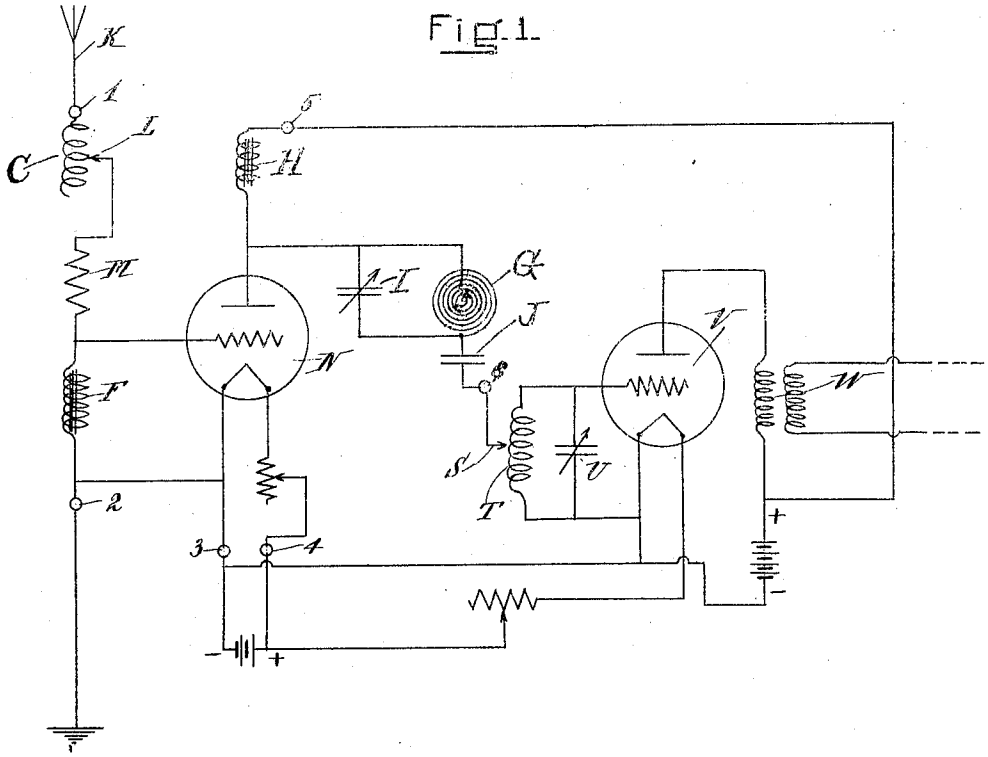


Fig. 2.

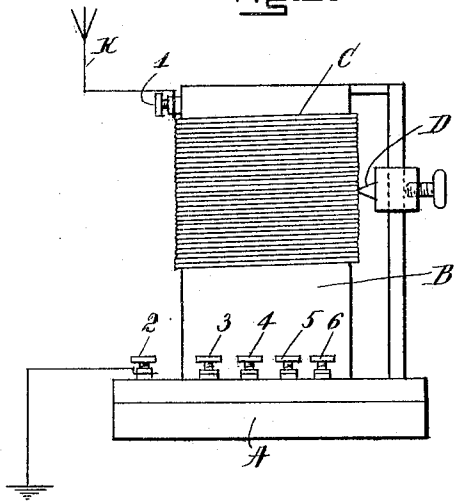
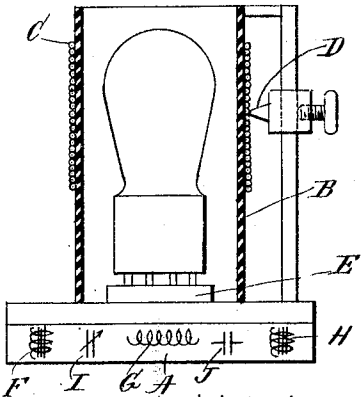


Fig. 3.



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UNITED STATES PATENT OFFICE

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MEANS FOR INCREASING THE SELECTIVITY OF TUNED RADIO FREQUENCY SYSTEMS

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The object of the present invention is to provide means to be connected between the antenna and the first stage of a tuned radio frequency system for increasing the selectivity of said system.

With this object in view my invention comprises a simple compact structure embodying a casing carrying an inductance coil mounted on a suitable support, a three-electrode vacuum tube socket on said casing and within said support and three radio frequency choke coils, an adjustable condenser and a fixed condenser carried in said casing and suitably connected in the manner hereinafter set forth. Said attachment is provided with binding-posts whereby it may readily be interposed between the antenna and the first stage of the system with which it is to be used.

An illustrative embodiment of my invention which has given good results in practice is shown in the accompanying drawing in which—

Figure 1 is a diagram showing the first stage of a tuned radio frequency system provided with my invention;

Fig. 2 is an elevation of my improved attachment means; and

Fig. 3 is a central longitudinal section of said attachment means showing conventionally the several electrical elements enclosed within the same.

In the particular drawing selected for more fully disclosing my invention, A is a casing upon which is mounted the cylindrical support B for the inductance coil C which is adjusted by the slider D, or in any other suitable manner. Carried by said casing and enclosed within the inductance support is the socket E of a three-electrode vacuum tube, and carried within said casing are the high frequency inductances F, G, H, the adjustable vernier condenser I and the fixed stop condenser J. Binding-posts or other suitable terminals 1, 2, 3, 4, 5 and 6 may be provided, as shown.

As indicated in Fig. 1, which represents one system of connections whereby my improvement may be applied to a tuned radio frequency system, the antenna K is connected to one terminal of the adjustable inductance C and the other terminal thereof is connected by means of the sliding contact L to earth through the choke coil F. Preferably a resistance M is inserted in the antenna system. The said choke coil F and the resistance M, if employed, should be so adjusted as to make the antenna system non-oscillatory.

The grid and filament of the tube N are connected across the terminals of the choke coil F and preferably it is the negative side of the filament that is connected to one terminal of said choke coil rather than the positive. The plate circuit of said tube includes a second high-frequency choke coil H which may have an inductance as high as 700 millihenries, so as to make it a fair audio frequency choke and a good radio frequency choke. Between the second choke coil H and the plate of said tube N is connected a parallel-branch circuit having in its respective branches a third radio choke coil G and an adjustable vernier condenser I. The choke coil G preferably has low distributed capacity and may have an inductance of 300 millihenries. The condenser I may have a range of from .5 to 20 microfarads. The choke coil G may, as indicated, be a flat spiral coil or a coil of the honeycomb type.

I have successfully used a coil of such type having 900 turns, such coil being one-eighth inch in thickness, one-half inch inside diameter and one and one-eighth inches outside diameter. Connected to one terminal of the parallel-branch circuit G, I is a fixed stopping condenser J which may have a capacity of .001 microfarads, and the binding-post 6 to which said condenser J is connected is arranged to be connected to the first stage of a tuned radio frequency system, the means for effecting such connection being shown in the present instance as the slidable contact S and the adjustable inductance T across which is connected the adjustable condenser U and the vacuum tube V, the plate circuit of which is connected by the transformer W to the next stage of said tuned radio frequency system or to a detector.

I have demonstrated by actual practice that by means of the attachment above de-

scribed, tuned radio frequency systems which are obsolete and practically worthless in large centers located in the vicinity of a number of powerful broadcasting stations, can be made highly selective, the parallel-branch circuit G, I forming substantially a very loose coupling between the tube N and the first stage of the tuned radio frequency system to which my invention is applied.

Having thus described an illustrative embodiment of my invention without however limiting the same thereto, what I claim and desire to secure by Letters Patent is:—

1. Means for increasing the selectivity of tuned radio frequency systems comprising in combination an antenna, an adjustable inductance and a radio-frequency choke coil in series with said antenna, a three-electrode vacuum tube having a grid, a filament and a plate, connections from the terminals of the said choke coil, respectively, to said grid and filament, a second radio frequency choke coil in the plate circuit of said tube, and a circuit connected between said second choke coil and said plate, said circuit including a fixed condenser and a parallel-branch circuit having in its respective branches a third choke coil and an adjustable condenser.

2. Means for increasing the selectivity of tuned radio frequency systems comprising in combination an antenna, an adjustable inductance, a resistance, and a radio-frequency choke coil in series with said antenna, a three-electrode vacuum tube having a grid, a filament and a plate, connections from the terminals of the said choke coil, respectively, to said grid and filament, a second radio-frequency choke coil in the plate circuit of said tube, and a circuit connected between said second choke coil and said plate, said circuit including a fixed condenser and a parallel-branch circuit having in its respective branches a third choke coil and an adjustable condenser.

3. Means for increasing the selectivity of tuned radio frequency systems comprising in combination an antenna, an adjustable inductance, and a radio-frequency choke coil in series with said antenna, a three-electrode vacuum tube having a grid, a filament and a plate, connections from the terminals of the said choke coil, respectively, to said grid and filament, a second radio frequency choke coil in the plate circuit of said tube, a circuit connected between said second choke coil and said plate, said circuit including a fixed condenser and a parallel-branch circuit having in its respective branches a third choke coil of low distributed capacity and an adjustable condenser.

4. Means for increasing the selectivity of tuned radio frequency systems comprising in combination an antenna, an adjustable inductance and a radio frequency choke coil in series with said antenna, a three-electrode vacuum tube having a grid, a filament and a plate, connections from the terminals of the said choke coil, respectively, to said grid and filament, a second radio frequency choke coil in the plate circuit of said tube, a circuit connected between said second choke coil and said plate, said circuit including a fixed condenser and a parallel-branch circuit having in its respective branches a third choke coil and an adjustable condenser, a tuned radio frequency system, and means connecting said fixed condenser and said filament to the input side of the first stage of said tuned radio frequency system.

5. As an article of manufacture, an attachment for increasing the selectivity of tuned radio frequency systems comprising in combination a casing, an inductance coil, a support for said inductance coil carried by said casing, means for varying said inductance supported on said casing, a socket for a three-electrode vacuum tube carried by said casing and enclosed within said support for said inductance coil, three high frequency choke coils, an adjustable condenser and a fixed condenser in said casing, means connecting the terminals of one of said choke coils to the grid and filament terminals respectively of said socket, means connecting the second choke coil to the plate terminal of said socket, means connecting said adjustable condenser across the terminals of the third choke coil, means connecting one terminal of said adjustable condenser to the plate contact of said socket, and means connecting the other terminal of said adjustable condenser to said fixed condenser.

6. In a radio signalling system in combination, an electron discharge device having an anode, a control electrode and a cathode, said device having coupled thereto an aperiodic input circuit including an antenna, the radio frequency output circuit of said device including the parallel connection of a radio frequency choke means and a condenser, and another condenser in series with said parallel connection.

7. In a radio signalling system in combination, an electron discharge device having an anode, a control electrode and a cathode, said device having coupled thereto an aperiodic circuit including an antenna, the radio frequency output circuit of said device including the parallel connection of a radio frequency choke means outside of the direct current potential path of said device and a variable condenser, and a fixed condenser in series with said parallel connection.

8. In a radio signalling system in combination, a signal pick-up circuit including an inductance coil, an electron discharge device having an anode, a control electrode and a cathode coupled to said circuit, a container for said electron discharge device, said container being adapted to form a support for

said coil, the radio frequency output circuit of said device including a circuit comprising a radio frequency choke coil and a condenser in parallel, and another condenser in series with said last-named circuit.

9. In a radio signalling system in combination, a signal pick-up circuit including an inductance coil, an electron discharge device having an anode, a control electrode and a cathode coupled to said pick-up circuit, a container for said electron discharge device, said coil being wrapped around said container, the radio frequency output circuit of said device including a circuit comprising a radio frequency choke coil and a condenser in parallel, a second condenser in series with last-named circuit and a second choke coil and a source of current in series shunted across said last-named circuit and said second condenser.

10. In a radio signalling system in combination, a source of signal energy, an electron discharge device having an anode, a control electrode and a cathode coupled to said circuit, a second electron discharge device having an anode, a control electrode and a cathode, an output circuit for said first-mentioned electron discharge device including a radio frequency choke coil and a condenser in parallel, and another condenser in series with said last-named circuit, an input circuit for said second-named electron discharge device and means for including a portion of said input circuit in the output circuit of said first-named electron discharge device.

11. In a radio signalling system in combination, a source of radio frequency energy, an electron discharge device having an anode, a control electrode and a cathode coupled to said source, a second electron discharge device having an anode, control electrode and a cathode, an output circuit for said first-mentioned electron discharge device including a radio frequency choke coil outside of the direct current potential path of said device, and a condenser in parallel with said radio frequency choke coil and another condenser in series with the parallel arrangement of the choke coil and first named condenser, a variably tuned input circuit for said second-named electron discharge device and means for including a portion of said input circuit in the output circuit of said first-named electron discharge device.

12. In a radio signalling system in combination, a source of radio frequency energy, an electron discharge device having an anode, a control electrode and a cathode coupled to said source, a second electron discharge device having an anode, control electrode and a cathode, an output circuit for said first-mentioned electron discharge device having a radio frequency choke coil outside of the direct current potential path of said device, an effective capacity in parallel with said coil and a condenser in series with the parallel arrangement of the choke coil and effective capacity, an input circuit for said second-named electron discharge device and means for including a portion of said input circuit in the output circuit of said first named electron discharge device.

13. In a radio signalling system in combination, a source of radio frequency energy, an electron discharge device having an anode, a control electrode and a cathode coupled to said source, a second electron discharge device having an anode, control electrode and a cathode, an output circuit for said first-mentioned electron discharge device having a radio frequency choke coil outside of the direct current potential path of said device and an effective capacity in parallel with the coil, and a condenser in series with the parallel arrangement of the choke coil and effective capacity, a variably tuned input circuit for said second-named electron discharge device including a coil and means for including a portion only of said last-mentioned coil in the output circuit of said first-named electron discharge device.

14. In a radio signalling system in combination, a source of radio frequency energy, an electron discharge device having an anode, a control electrode and a cathode coupled to said source, a second electron discharge device having an anode control electrode and a cathode, an output circuit for said first-mentioned electron discharge device having a radio frequency choke coil outside of the direct current potential path of said device and an effective capacity in parallel with the coil and a condenser in series with the parallel arrangement of the choke coil and effective capacity, an input circuit for said second-named electron discharge device including a second coil and means for including at least a portion of said second coil in the output circuit of said first-named electron discharge device.

15. In a radio signalling system in combination, a source of signal energy, an electron discharge device having at least an anode, a control electrode and a cathode coupled to said source, a second electron discharge device having at least an anode, control electrode and a cathode, an output circuit for said first-mentioned electron discharge device including a radio frequency choke coil outside of the direct current potential path of said device and a condenser in parallel with the coil and another condenser in series with the parallel arrangement of the choke coil and condenser, said last-named condenser being substantially larger than said first-named condenser, an input circuit for said second-named electron discharge device, means for including a por-

tion of said input circuit in the output circuit of said first-named electron discharge device and means for tuning said input circuit.

In testimony whereof, I have hereunto subscribed my name this 26th day of October, 1926.

CHARLES V. LOGWOOD.