Feb. 11, 1930. E. F. POTTER 1,746,443

RECEIVING CIRCUIT

Filed Dec. 15, 1922 3 Sheets-Sheet 1

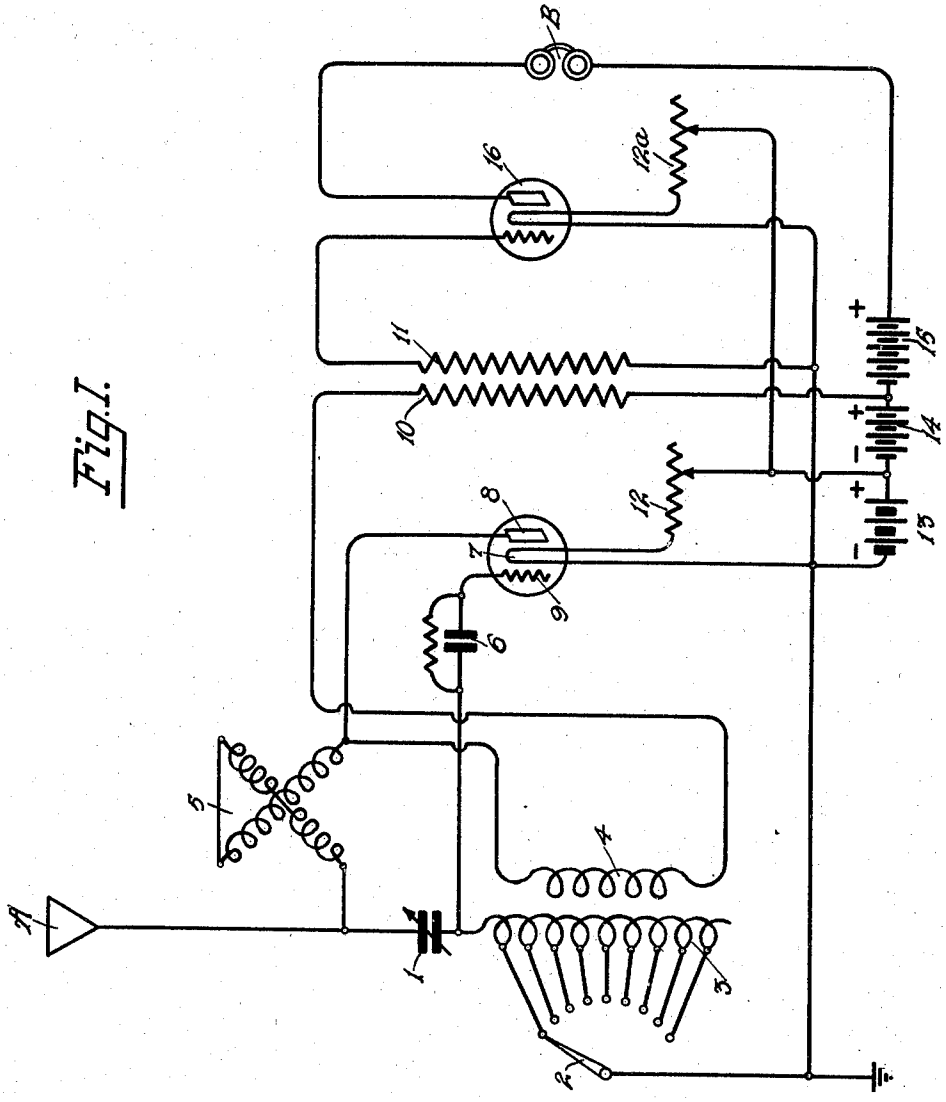

Fig. 1.

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Fig. 2.

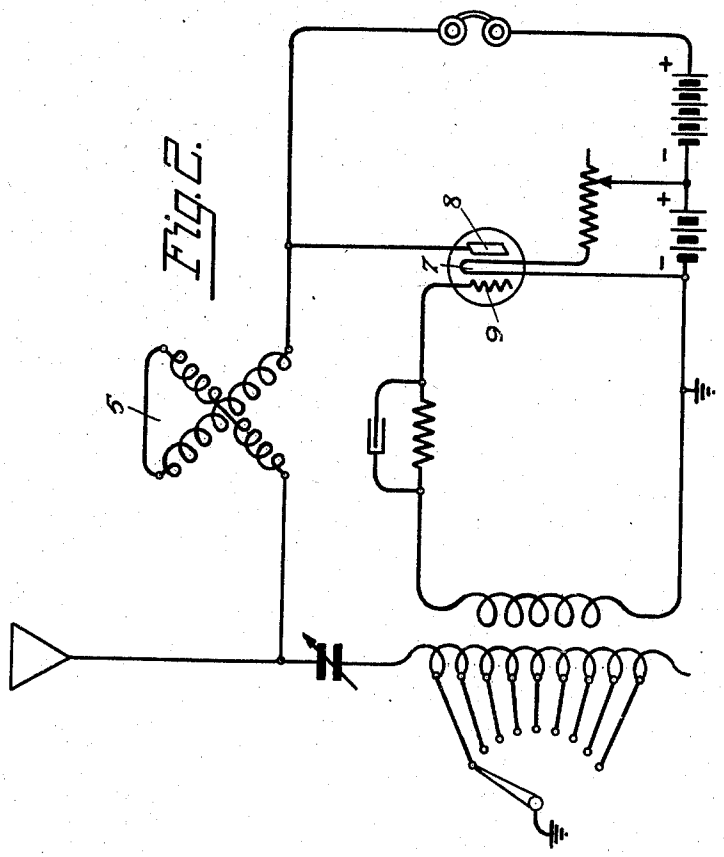

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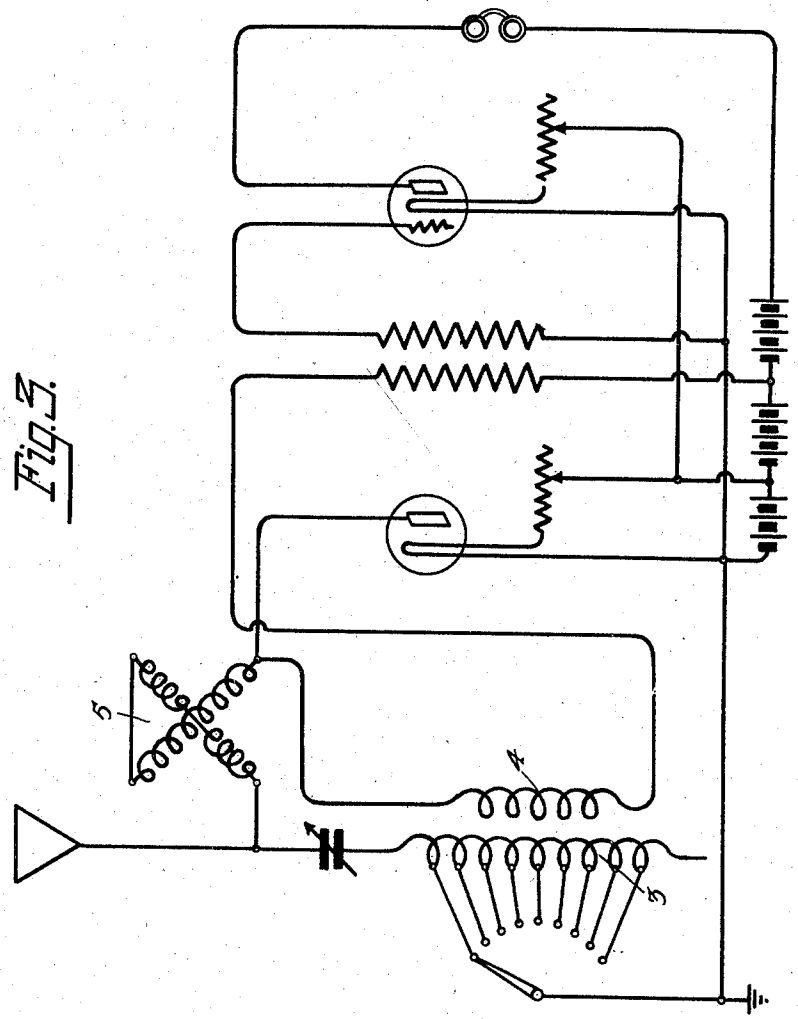
Fig. 3.



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Patented Feb. 11, 1930 1,746,443

UNITED STATES PATENT OFFICE

EARL F. POTTER, OF GLENCOE, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

RECEIVING CIRCUIT

Application filed December 15, 1922. Serial No. 607,060.

My invention relates to radio signaling circuits, and has particularly to do with the intensification of weak signals, and at the same time the employment of my invention conduces to increase sharpness of tuning, a matter of primary importance under present day conditions.

In the accompanying drawing, Fig. 1, which is a diagram showing my invention, I have elected to show the said invention in one of its applications for receiving station purposes, although it is not to be limited to such receiving station purposes, but is applicable to many situations in which intensification and sharp tuning are ends sought.

Fig. 2 is a modification of Fig. 1 in which a feed-back coil is not employed.

Fig. 3 illustrates the invention as applied to a two element detector tube.

In the said Fig. 1, A is the antenna, 1 a variable condenser, 3 a tuning coil with the switch lever 2 arranged to vary the number of turns of coil 3 that are operatively in circuit, while coil 4 is loose-coupled with coil 3. The grid 9 is linked to the antenna lead through the usual grid condenser 6 and its associated grid leak. The plate 8 is connected to the plate battery 14 through the winding 4 and the primary 10 of a step up transformer. The return circuit for the plate 8 extends to filament 7 and the return side of battery, and the return circuit of the grid also extends through filament 7 in the usual manner.

The secondary winding 11 of the step up transformer connects to the grid of the amplifying tube 16 whose elements are associated with the receiving instrument B, and the batteries 13, 14 and 15 all in the usual and customary manner, the filament rheostats being indicated at 12 and 12^a.

It will be observed that the apparatus and its organization as described constitutes a receiving system without particular elements of novelty in itself. By the introduction of the inductance 5, however, which I prefer to have of the adjustable type, a very materially different and new interaction of the various circuits and elements comprised in them is effected in that by proper adjustment of the elements 2—3, the condenser 1 and the inductance 5, the usual interaction of the circuits is preserved, while in addition thereto a by-pass is provided for a portion of the oscillations incoming over the aerial A, the said by-pass being traced from A through inductance 5, to plate 8, thence to filament 7, (whereby the oscillations will be rectified) and to ground. The current flow in the above path produces, naturally, changes of potential across the terminals of coils 4 and 10, and these changes are in phase with the changes introduced by the plate as influenced in the usual manner by the grid 9, being added to the said changes, and translated by the winding 4 to winding 3. They are thus introduced into the amplifying processes of the system as a whole and form an integral part thereof.

The by-pass arrangement described serves not only to increase the volume of reception but steadies the tube, giving clear and sharper reception of signals. A noticeable sharpness in tuning resulting in the exclusion of undesired signals will be observed by one practicing the invention.

In Fig. 2 a modification of the circuit of Fig. 1 is shown in which a feed-back coil is not employed, the by-pass through the element 5 serving as before to impress rectified oscillations over an independent path upon the grid controlled signaling currents and serving like purposes, as explained in connection with Fig. 1.

In Fig. 3 I have illustrated my invention as applied to a system employing a two element or Fleming tube for detecting purposes. Such an organization yields a volume of reception approaching that of the system indicated in Fig. 1, increasing the sensitiveness and power of a two element tube very greatly. A wholly satisfactory explanation of the precise phenomena and reactions involved in producing the effect just noted has not been ascertained, but it appears that that portion of oscillations received upon antenna A that finds its way through the inductance 5, creates an oscillatory effect in the detector tube in conjunction with the oscillations reaching the tube through the element 4 and produces a reactance effect at 3 of a regenerative nature.

The phenomena of the invention is somewhat the same as if two antennæ were employed, one reaching the tube through the elements 3—4, and the other through the element 5.

What I claim as new and desire to secure by United States Letters Patent, is:

A receiving system including an oscillation receiver, a translating device including a primary and a secondary winding, said primary winding being connected to said receiver, a variable condenser between said primary winding and said receiver, a tuning device for varying the number of turns of said primary winding that are effectively related to said secondary winding, a vacuum tube connected to the secondary winding of said translating device, a conductive connection extending from said oscillation receiver to said vacuum tube, and a continuously variable inductance for tuning said last circuit, said tuning device for said primary winding and said variable condenser constituting the sole means for controlling the oscillations furnished to said tube through said secondary winding.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 13th day of December, 1922.

EARL F. POTTER.