

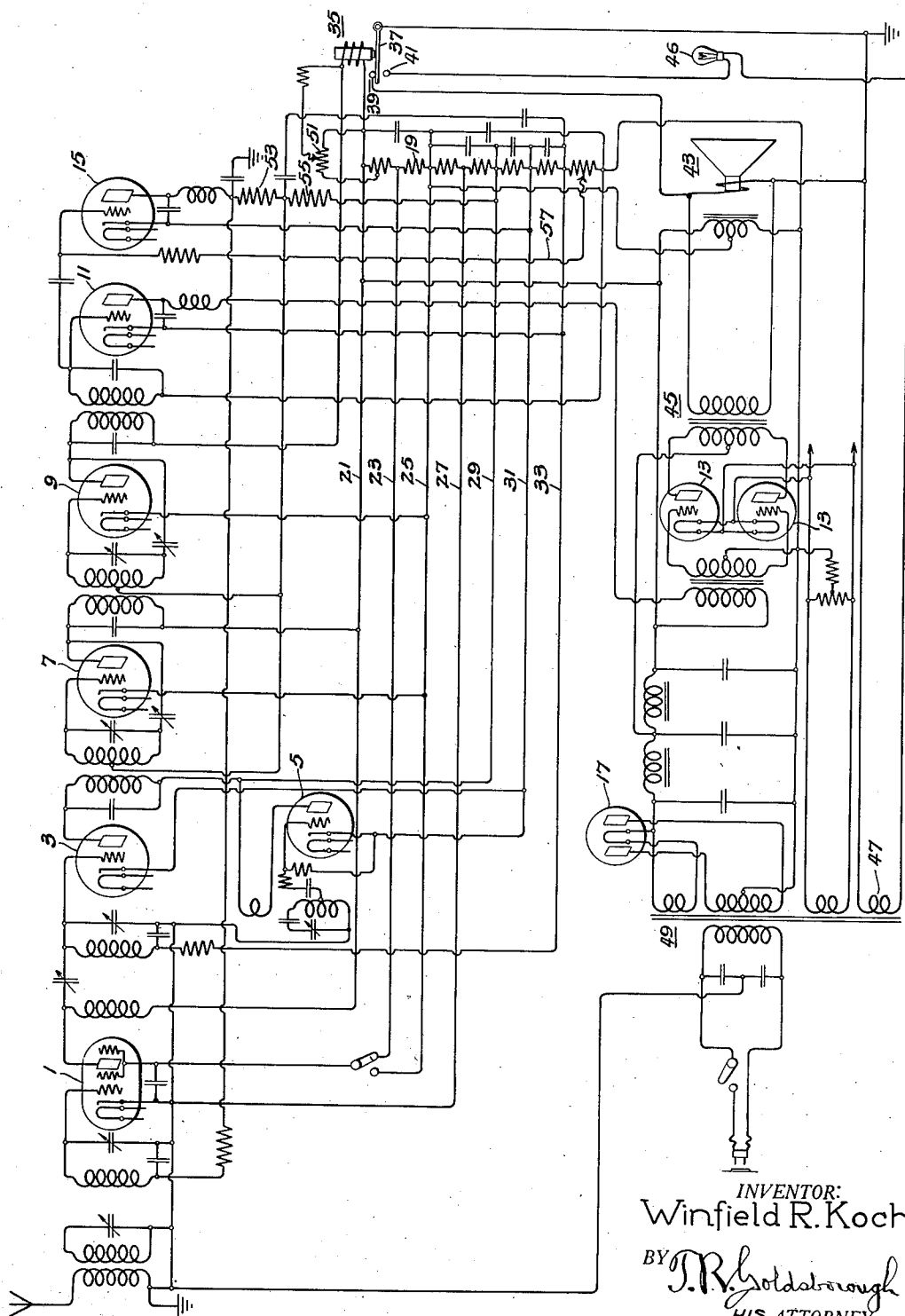
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SIGNAL RECEIVING SYSTEM

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SIGNAL RECEIVING SYSTEM

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My invention relates to signal receiving systems and, although not restricted thereto, it has particular relation to systems of the type wherein means for automatic volume control are included.

When an attempt is made to tune a radio receiving system of the type including automatic volume control means, some difficulty is experienced in obtaining exact tuning. The difficulty is accentuated when the system is remotely controlled and it is particularly apparent when the receiving system is based upon the super-heterodyne principle.

It is accordingly an object of my invention to provide means for visually indicating the tuning of a radio receiving system to exact resonance with an incoming signal.

Another object of my invention is to provide visual indicating means that shall be energized only during the reception of a signal from a desired transmitting station.

Another object of my invention is to provide, in a radio receiving system of the type comprising visual indicating means, instrumentalities whereby the said indicating means shall be de-energized during the tuning operation.

A still further and more specific object of my invention is to provide, in a radio receiving system of the type disclosed in the co-pending application of G. L. Beers, Serial No. 475,474 filed August 15, 1930, and assigned to RCA Victor Company, Inc., means whereby the actuation of a background-suppressor device shall also de-energize a visual indicating device.

The foregoing objects and others appurtenant thereto that, hereinafter, will become apparent, I prefer to accomplish through the medium of a relay device that is serially included in the plate or output circuit of an amplifier tube.

The relay device is provided with a front and a back contact that cooperate with a movable armature, the front contact and the armature together constituting a short circuiting network for a loud speaker, and the back contact and the armature being utilized for the purpose of controlling the energization of a light-source.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawing.

The single figure of the drawing is a schematic

circuit diagram of a complete radio receiver of the super-heterodyne type including a preferred embodiment of my invention.

Referring specifically to the drawing, a radio receiver of the super-heterodyne type comprises a blocking tube 1, a first detector tube 3, an oscillator tube 5, a plurality of intermediate frequency amplifier tubes 7 and 9, a second detector tube 11 and a plurality of power-amplifier tubes 13 arranged in push-pull relation. In addition, the specific receiver illustrated includes a volume control tube 15 and a rectifier tube 17 across the output terminals of which is connected a resistor or potentiometer 19 from which a plurality of leads 21, 23, 25, 27, 29, 31 and 33 extend for the purpose of supplying plate and bias potentials to all of the thermionic tubes in the system.

The winding of a relay device 35 is included in the output circuit of the intermediate frequency amplifier tube 9, the said device being provided with a movable armature 37, a front contact 39 and a back contact 41.

The front contact 39 and the movable armature 37 are connected across the voice coil of a loud speaker 43 that is supplied with audio frequency current from the secondary winding of an audio frequency transformer 45, the primary winding of which constitutes the output circuit of the power-amplifier tubes 13.

The back contact 41 and the movable armature 37 are serially connected with a light source 46 to the terminals of a secondary winding 47 associated with a power transformer 49 which supplies filament and plate potential for the rectifier.

From an inspection of the drawing it will be noted that the plate of the intermediate frequency amplifier tube 9 is supplied with potential over two parallel circuits, one circuit including the winding of the relay device 35, and the other circuit including the movable contact of a potentiometer 51 connected across a portion of the output resistor 19 associated with the rectifier.

The purpose of the parallel plate-supply circuits will hereinafter be explained in detail.

In order that the operation of my improved radio receiving system may be thoroughly understood, it should first be assumed that no signal is being received. In such event no current flows in a plurality of resistors 53 and 55 that are serially included in the output circuit of the volume control tube 15 since the grid thereof, normally, is biased to substantially the cut-off point by reason of a connection 57 extending therefrom

to a point on the resistor 19 adjacent to the negative end thereof.

Inasmuch as the grids of the amplifying tubes 1, 7 and 9 are connected to the resistors 53 and 55 which, in turn, are connected to a point on the rectifier output-resistor 19 that is more negative than the points to which the leads 25 and 27 thereto from the cathodes of the several are connected, the said grids are normally biased, during the no-signal condition of the system, to a potential such that a predetermined amount of plate current flows therein.

By adjusting the contact element of the potentiometer 51 connected around the upper end of the resistor the current flow in the winding of the relay during the no-signal condition, may be so fixed that the armature thereof is normally maintained against the front contact, thus establishing a short circuit around the voice coil of the loud speaker and preventing the tuning operation from being accompanied by a background of noise.

As soon, however, as the system is tuned to an incoming signal the said signal is impressed upon the grid of the volume control tube causing an increase in the output current therefrom and a consequent application of a more negative potential to the grid of the amplifying tube 9 connected to the resistor 53.

The more negative potential applied to the amplifier grid causes a decrease in the plate current therefrom and a partial de-energizing of the relay winding. The de-energization of the relay winding permits the armature to fall out against the back contact 41, thus removing the short circuit previously established around the voice coil of the loud speaker and completing a circuit whereby the light source is supplied with energizing potential from the secondary winding 47.

If the tuning of the system is not exact no signal is impressed upon the grid of the volume control tube and the relay device remains energized, thus giving an indication of the tuning of the system to exact resonance with the frequency of the incoming signal.

I have purposely refrained from indicating the light source as being disposed in any particular position. It may, without departing from the spirit of my invention, be included in a remote control device, disposed behind the dial of a radio receiver, or so mounted behind the panel of the receiver that it illuminates a small window inserted therein.

Although I have illustrated and described a specific embodiment of my invention, many modifications thereof will be apparent to those skilled in the art to which it pertains. My invention, therefore, is not to be limited except insofar as is necessitated by the prior art or by the spirit of the appended claims.

I claim as my invention.

1. In a signal receiving system, the combination of tuning means for the selection of signals, means for translating received signals into audible sounds, visual indicating means including a lamp, means for normally maintaining said sound translating means and said lamp de-energized, means responsive to selected signals for permitting energization of said sound translating means and said lamp, means for adjusting the energization permitting means to be responsive only to signals of predetermined minimum strength, whereby the lamp provides a visual indication of the operation of the tuning means in selecting a signal to be received, and the sound translating

means is prevented from indicating and responding to incoming signals of less than the predetermined amplitude during the tuning operation.

2. In a signal receiving system, an amplifier tube, a relay device connected to the output circuit of said tube and normally energized by space current therein, a light source, a power circuit for the light source, means responsive to energization of said relay for normally interrupting the continuity of the power circuit, signal responsive automatic volume control means for causing diminution of space current in the amplifier tube and consequent de-energization of the relay during reception of a desired signal, and means for completing the power circuit upon de-energization of the relay whereby the illumination given by the light source indicates exact tuning of the receiver.

3. In a signal receiving system an amplifier tube having an input circuit and an output circuit, a volume control tube having an input circuit and an output circuit, means for impressing potentials proportional to incoming signals upon the said input circuits, means for deriving unidirectional potentials from the output circuit of the volume-control tube, connections for applying said unidirectional potentials to the input circuit of the amplifier tube to control the gain therein, the said connections being such that the gain varies inversely with the amplitude of the signals, a loudspeaker, a light source, a relay winding included in the output circuit of the amplifier tube, said relay being provided with front contacts interposed in a circuit which controls the energization of the loudspeaker and back contacts interposed in a circuit including the light source and potential-supply means therefor, and means for so adjusting the space current traversing the relay winding that the front contacts are maintained closed during the operation of tuning the system and are permitted to open when a desired signal is impressed upon the input circuit of the volume control tube to cause the latter to reduce the space current in the amplifier tube.

4. In a signal-receiving system, an amplifier tube, means for applying a negative bias to the input circuit of said tube inversely proportional to the amplitude of an incoming signal, a light source, a loudspeaker, and means responsive to changes in the output current from said amplifier tube for controlling the energization of the light source and for rendering said loudspeaker ineffective.

5. In a signal-receiving system, an amplifier tube, means for applying a negative bias to the input circuit of said tube inversely proportional to the amplitude of an incoming signal, a light source, a loudspeaker, and means responsive to changes in the output current from said amplifier tube for so controlling the energization of the light source and the loudspeaker, that the light source and loudspeaker are energized only upon the tuning-in of a sustained signal of predetermined amplitude.

6. In a signal-receiving system, an amplifier tube, means for applying a negative bias to the input circuit of said tube inversely proportional to the amplitude of an incoming signal, a light source, a loudspeaker, and means responsive to changes in the output current from said amplifier tube for controlling the energization of the light source and the loudspeaker, the output current responsive means being constituted by a relay, the winding of which is included in the

output circuit of the controlled amplifier tube to be energized by the plate current therein.

5 7. In a signal-receiving system, an amplifier tube, means for applying a negative bias to the input circuit of said tube inversely proportional to the amplitude of an incoming signal, a light source, a loudspeaker, and means responsive to changes in the output current from said amplifier tube for controlling the energization of the
10 light source and the loudspeaker, the output current responsive means being constituted by a relay, the winding of which is included in the output circuit of the controlled amplifier tube to be energized by the space current therein and
15 means for manually controlling the amplitude of the current transversing said winding.

8. In a signal receiving system, an amplifier tube, a relay device connected to the output cir-

cuit of said tube, a light source, a power circuit for the light source, means responsive at all times to energization of said relay for rendering said power circuit ineffective to energize said light source, automatic volume control means for causing sufficient space current flow in said amplifier tube to energize said relay and thereby de-energize said light source in response to tuning said receiving system away from an incoming signal and for causing diminution of space current in said amplifier tube to de-energize said relay in response to tuning said receiving system to an incoming signal, said first means also rendering said power circuit effective to energize said light source in response to de-energization of said relay whereby the illumination given by said light source indicates exact tuning of the receiver.

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