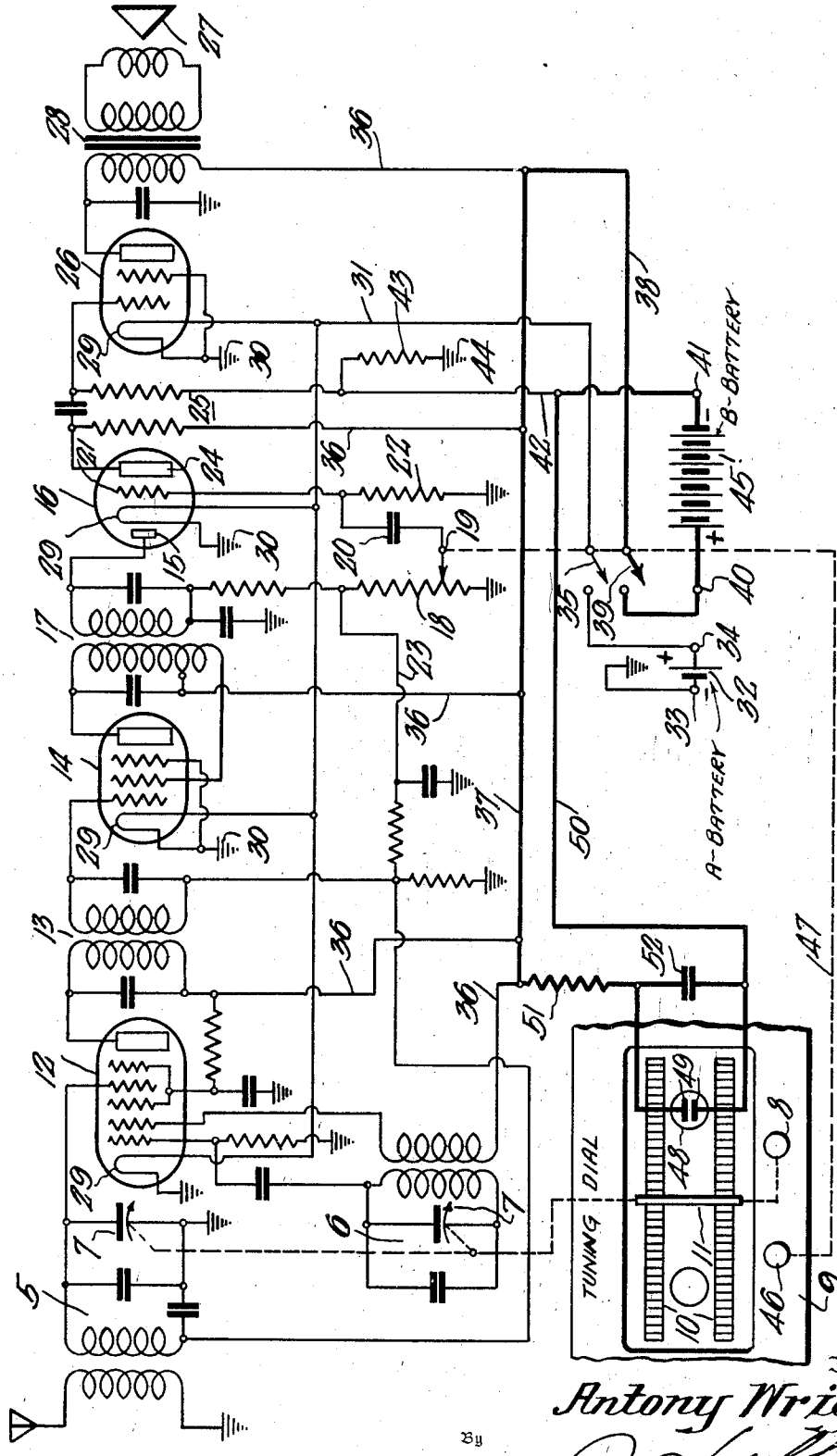
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ON-OFF INDICATOR CIRCUIT

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ON-OFF INDICATOR CIRCUIT

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2 Claims. (Cl. 177—311)

The present invention relates to an on-off indicator circuit for radio receiving apparatus and the like, and has for its primary object, to provide an improved on-off indicator of the electrical type for battery operated radio and like apparatus, which is economical of current consumption to replace current consuming indicator devices such as pilot lamps ordinarily used.

It is also an object of the present invention, to provide an on-off indicator for battery operated receivers and the like, which provides an illuminated indication when energized and which consumes substantially no battery power.

It is also a further object of the present invention, to provide an improved on-off indicator for radio receivers and like apparatus, of the battery operated type, which consumes substantially no current and which is of the intermittent flashing type being thereby further effective in conserving battery power while providing a dynamic indication when energized.

In battery operated radio receivers and the like, the number of amplifier and other tubes employed is reduced to a minimum to conserve battery power, and for this reason such apparatus is rarely provided with a pilot lamp which remains on while the apparatus is energized.

Mechanical indicators do not attract the eye and pilot lamps and the like consume a large proportion of battery power. Therefore, without pilot lamp or indicator, it often happens that the apparatus is unintentionally left on and in an operating condition when it would otherwise be turned off, and thereby wasting battery power.

The invention will, however, be better understood from the following description when considered in connection with the accompanying drawing, and its scope is pointed out in the appended claims.

In the drawing, the figure is a schematic circuit diagram of a radio receiver provided with an on-off indicator circuit embodying the invention.

Referring to the drawing, the radio receiver circuit illustrated may be taken to represent any radio or other apparatus embodying amplifier tubes and adapted for battery operation and, by way of example, comprises a tuned signal input circuit 5 and a tuned oscillator circuit 6 each provided with a variable tuning capacitor 7 having a common tuning control means 8 on the control panel 9 of the receiver and the usual tuning dial 10 and indicator 11.

The oscillator and signal input circuits are connected with an oscillator-detector or mixer tube 12 which, in turn, is coupled through an intermediate frequency coupling transformer 13 with an intermediate frequency amplifier tube 14. The second detector is a diode 15 contained in a tube 16 and is coupled with the amplifier 14 through a suitable intermediate frequency output transformer 17.

Audio frequency signals from the diode are derived from the diode output resistor 18 which is in the form of a potentiometer or volume control device having a movable volume control contact 19 coupled through a capacitor 20 with a control grid 21 in the tube 16. The grid is provided with a grid resistor 22. A. V. C. potentials are also derived from the resistor 18 through the lead indicated at 23. The tube 16 is provided with an output anode 24 coupled through suitable audio frequency coupling means 25 to an audio frequency output tube 26 which supplies the amplified signal output to a loudspeaker 27 through an output coupling transformer 28.

The tubes are all of the battery operated type having filament type cathodes 29, each connected to ground or a common return circuit for the receiver indicated at 30 and to a common filament supply lead 31, whereby the filaments are connected in parallel between ground and the lead 31.

The filament circuit is energized from a suitable single cell battery 32 connected with the terminals 33 and 34, which are respectively connected to ground and to the lead 31, the latter connection including an on-off switch 35 connected with and operable by the volume control device 18—19 as indicated, whereby the switch 35 is opened as shown, when the volume control contact 19 is moved to a position for substantially minimum volume. The anode and screen grid circuits of the several tubes, indicated at 36, are also connected in parallel to a positive anode supply lead 37—38, the latter being connected through a switch 39 to the positive B supply terminal 40 of the receiver.

The negative B supply terminal is indicated at 41 and is connected through a lead 42 and a bias potential supply resistor 43 to chassis or ground 44. The B supply battery is indicated at 45 being connected between the terminals 40 and 41.

The volume control device 19 and the switch 35 are also connected to operate conjointly with the switch 39 whereby the latter is opened and closed simultaneously with the switch 35, the control being provided by the usual volume control knob indicated at 46 on the front panel of the receiver and the operating connection being in-

dicated in the drawing by the dotted connection 47.

It is obvious that with a receiver or other electrical apparatus of this type having battery power for both the filament and high voltage anode circuits, conservation of energy is important. Therefore, as hereinbefore considered, current or energy consuming devices as indicators are not permissible for economical operation and the lack of any indicator may often result in large continued operation of the apparatus after it normally would be turned off.

However, it has been found to be possible and practicable to provide a positive indication that such apparatus is on, or to call attention to the necessity for turning off the apparatus, when not in use or during periods of silence, in order to conserve battery power.

In accordance with the invention, an indicator 48 is provided adjacent to or within the tuning dial area, whereby it may be observed through the dial, and comprises a neon tube having electrodes 49 connected with and controlled by relatively high voltage between the B supply lead 37 and the negative B supply lead 42 in the receiver, together with a time delay or filter network comprising resistance and capacitance connected with the tube.

In the present example, one electrode of the tube 48 is connected through a lead 50 with the negative B supply lead 42 while the other electrode is connected through a series filter resistor 51 with the positive B supply lead 37. A capacitor 52 is connected in parallel with the electrodes 49 of the tube 48.

With this arrangement, when the switch 35—39 is turned on and the receiver is energized, the neon tube flashes intermittently as the voltage across the capacitor 52 in successive cycles builds up to the breakdown potential of the tube, which is lower than the particular B battery or anode potential employed in the apparatus, and discharges through the tube. The flash discharges the capacitor and the tube is normally darkened while the capacitor is recharging and the cycle repeats causing a continued flashing and a visible indication of the dynamic type that the apparatus is energized. The period of the flash is determined by the time constant of the capacitor and resistance network.

The neon indicator is of relatively small size and is mounted in the rear of the translucent dial and together with the simple resistor and capacitor provides a relatively low cost indicator circuit for battery operated apparatus. In practice, the resistor 51 may be of the order of 4 megohms and the capacitor 52 may be of the order of .1 mfd. with with a positive B voltage of 90 volts between the terminals 40 and 41, hence the current or energy consumption of the indicator circuit is negligible.

I claim as my invention:

1. In an A and B battery operated radio receiver, an on-off indicator circuit comprising a neon type tube having a flash-over voltage lower than the anode supply voltage of said receiver, an anode voltage supply circuit for said receiver comprising a positive and a negative lead, a switch in one of said leads for energizing said circuit, a controlling capacitor connected in parallel with said tube between said positive and negative supply leads, and a series high resistance control element in said connection whereby said tube flashes intermittently at a predetermined rate when said switch is closed to energize said circuit.

2. In an A and B battery operated radio receiver, an on-off indicator circuit comprising a neon type tube having a flash-over voltage lower than the anode supply voltage of said receiver, an anode voltage supply circuit for said receiver comprising a positive and a negative lead, a switch in one of said leads for energizing said circuit, a controlling capacitor connected in parallel with said tube between said positive and negative supply leads, and a series high resistance control element in said connection whereby said tube flashes intermittently at a predetermined rate when said switch is closed to energize said circuit, said high resistance element having a resistance greater than 1 megohm whereby the energy consumption of said indicator circuit is substantially negligible.

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