

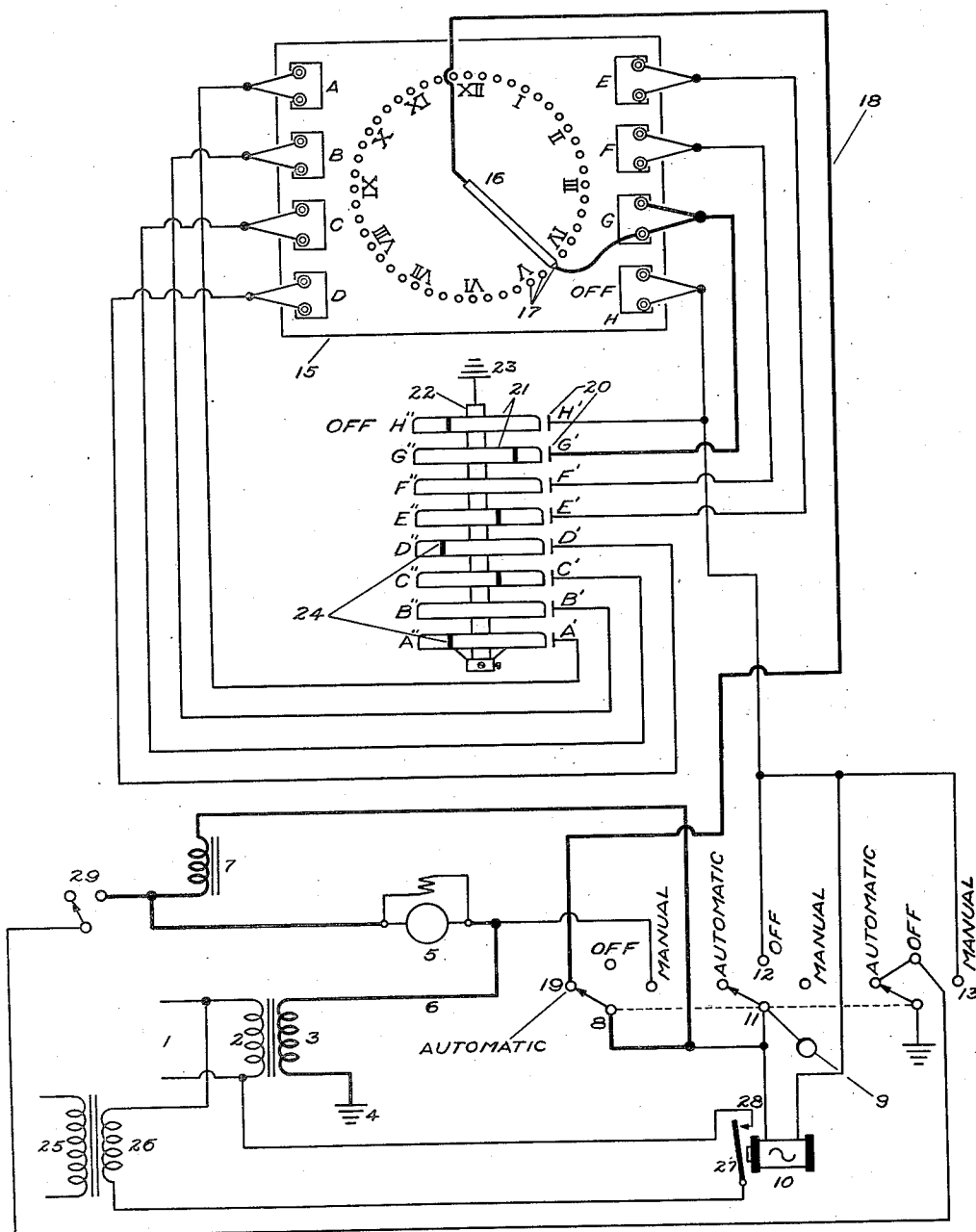
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K. M. McLAUGHLIN

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AUTOMATIC TUNING SYSTEM FOR RADIO RECEIVERS

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KENNETH MERRILL McLAUGHLIN

PER
James L. Schwank
ATTORNEY

UNITED STATES PATENT OFFICE

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AUTOMATIC TUNING SYSTEM FOR
RADIO RECEIVERS

Kenneth Merrill McLaughlin, Philadelphia, Pa.,
assignor to Atwater Kent Manufacturing Com-
pany, Philadelphia, Pa., a corporation of Penn-
sylvania

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3 Claims. (Cl. 250—40)

My invention relates to automatic tuning systems for radio receivers. In automatic tuning systems one of the problems is the elimination of audio signals from undesired stations as the automatic mechanism tunes through the undesired signals to the desired signal. I am aware that several solutions have been offered; such as, short circuiting the audio responsive element by means of relays, or governors operating open or closed circuiting switches.

One of the objects of my invention is a simplified and improved system of eliminating undesired audio responses as the automatic tuning means tunes to desired signals. Another object is a system which permits the audio responsive element to gradually respond to the desired signal instead of abruptly operating at full intensity. A further object is to proportion the electrical constants of the means for eliminating the undesired stations with respect to the means for automatic tuning so that the operation of the one depends upon the other.

The single figure of the drawing shows the apparatus and circuit employed.

The details of my device may be best understood by referring to the accompanying drawing. 1 represents a conventional commercial supply of alternating current, for example 110 volts, 60 cycles. 2 is a step-down transformer which may have a secondary voltage of about twenty-four volts. The secondary 3 of transformer 2 is grounded at 4, and connected to the automatic tuning motor 5 by conductor 6. The motor 5 in turn connects to motor tripping solenoid 7. The other terminal of the solenoid connects to switch arm 8 of triple pole position switch 9, and also to one terminal of the high impedance winding of relay 10 and switch arm 11. The remaining terminal of the winding of relay 10 connects to the off terminal 12, the manual terminal 13 of switch 9, and to the off terminals H on time clock face 15.

Contact arm 16 of time clock 15 is advanced every 15 minutes to one of the contact studs 17. The contact arm 16 is connected by wire 18 to terminal 19 of switch 9. The clock face 15 also contains a series of flexible leads and plugs. The pairs of leads A to G each correspond to particular stations which may be selected by the user. The ends of these leads include plugs which may be plugged into terminals 17 at the desired hours of operation or connection H may be used to turn off the radio receiver at a predetermined time. Each of the terminals A to H are electrically connected to a corresponding

brush A' to H' which in turn contacts commutators A'' to H'' on shaft 22 which is grounded at 23. The shaft 23 is mechanically connected to the tuning mechanism of the radio receiving set which is not shown. The radio set may be any receiver of the broadcast types now commercially available. Each of the commutators A'' to H'' has an insulated segment such as 24. Each commutator may be adjusted on shaft 22 so that the circuit from the commutator through its corresponding brush will be interrupted by the insulated segment when the tuning mechanism of the radio receiver is set at the desired incoming signal.

The clock mechanism, the commutator arrangement, the motor drive and tripping solenoid are not part of my invention but are fully described in the co-pending application Serial No. 719,266, filed April 6th, 1934 by Mandel and Schoebel.

The transformer 25 for supplying power to the radio receiving set is connected in parallel to the power source 1 and consists of transformer 25 whose primary 26 is connected to the power source through the contacts 27 and 28 of relay 25.

The operation of the invention is as follows: The flexible lead G is connected to the clock terminal corresponding to 4:30. Contact blade 16 has made connection with the 4:30 terminal and its circuit continues through connection 18 to switch blade 8 which has been placed in the automatic position. The relay 10 is open because both terminals of its winding are at ground potential. Contacts 27 and 28 are open and hence the radio receiver is not energized. The connection from 8 continues through solenoid 7 and motor 5 to transformer 3 which is grounded at 4. The ground 4 is common with ground 23. The circuit from 23 continues through 22, commutator G'', brush G', and back to G.

The current flowing through this circuit starts motor 5 and the motor trip solenoid 7. The motor trip solenoid mechanically couples the drive shaft of the motor to the shaft 22 as described in the above mentioned pending application of Mandel and Schoebel. The shaft is rotated until the insulated section 24 of G'' engages G', and thus interrupts the motor and solenoid circuits by including in their path the high impedance winding of relay 10 whose circuit is now completed through brush H' and commutator H'' to ground 23.

The impedance of the relay winding is chosen so high relative to the motor tripping solenoid

and the motor circuit that the current flow will operate the relay but will be totally insufficient to operate the motor or solenoid. By the way of example, I have found a solenoid impedance of 1.25 ohms, a motor impedance of 7.0 ohms, and a relay of 465 ohms impedance (all measured at 60 cycles) satisfactory. The current through 10 is sufficient to attract 27 and make contact through 28. The completion of the circuit of 26 through 27, 28 to the power supply energizes the radio receiver and permits the signals to gradually build up in the audio responsive element of the receiver.

It should be observed that H'' is the commutator for an automatic off position which may be selected by connecting the terminal plug of H into the desired clock contact stud. The commutator H'' is so adjusted that H' makes contact with H'' at all positions corresponding to tuning positions of the other commutators A'' to G''. The insulated section 24 of H'' engages H' outside of the usual tuning range of the radio receiver. When the switch 9 is placed in the off position, 10 is short circuited and the tuning mechanism automatically operated until H' rests on the insulated section of H''.

During the operation with switch 9 on the off position no signals will be heard because 27 will not contact 28. With switch 9 on the manual position, relay 10 will be energized which permits manual operation of the receiver but the motor and motor tripping solenoid circuits are short circuited thereby preventing automatic operation.

The switch 29 is a reversal switch which is used to reverse the direction of rotation of the commutators and tuning mechanism as described in the above mentioned Mandel and Schoebel application.

It should be understood that a manual switch box may take the place of clock mechanism 15 or may be used concurrently.

In the alternating current operated broadcast receivers, thermionic tubes are employed. About thirty seconds is required to heat the cathodes of these tubes to the proper operating value. During the later part of this interval the tubes gradually come up in operating efficiency, and permit a gradual response to incoming signals.

If the tubes are turned off for about ten seconds, then turned on, they will begin to operate within one or two seconds. The operating effi-

ciency gradually increases and after ten seconds the efficiency is about a maximum. I employ this time lag and gradual restoration of operating efficiency. As I have described above the power supply to the radio receiver is disconnected during automatic tuning. The maximum automatic tuning time has been adjusted to ten seconds. After initial operation the radio receiver responds within one or two seconds to the desired signals, the audio response increasing to full value with the increasing operating efficiency of the tubes. The effect on the listener is a pleasant and gradual fading in of the desired signal.

I claim:

1. The combination of a radio tuning system, an electric motor of relatively low impedance for automatically tuning said radio system, a source of power for said motor and said system, a relay having a relatively high impedance winding for de-energizing said radio system during the operation of said motor, and circuit connections for serially connecting said low impedance motor and said high impedance relay after automatically tuning to a desired signal.

2. The combination of a radio tuning system, an electric motor of relatively low impedance for automatically tuning said radio system, a source of power for said motor and said system, a relay having a relatively high impedance winding for disconnecting said power from the radio system during the operation of said motor, and connections for serially connecting said motor and said relay upon termination of operation of said motor, whereby said high impedance relay prevents operation of said low impedance motor.

3. The combination of a radio tuning system, an electric motor of relatively low impedance for automatically tuning said radio system, a source of power for said motor and said system, a relay having a relatively high impedance winding for disconnecting said power from the radio system during the operation of said motor and connecting said power to the radio system upon completion of automatic tuning of a desired signal by said motor, and connections for serially connecting said motor and said relay upon termination of operation of said motor, whereby said high impedance relay prevents operation of said low impedance motor.

KENNETH MERRILL McLAUGHLIN.