

July 19, 1938.

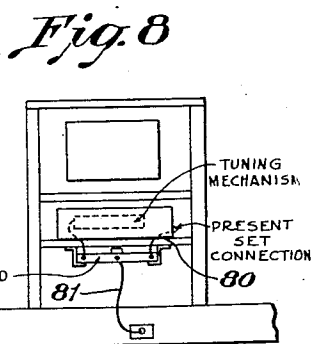
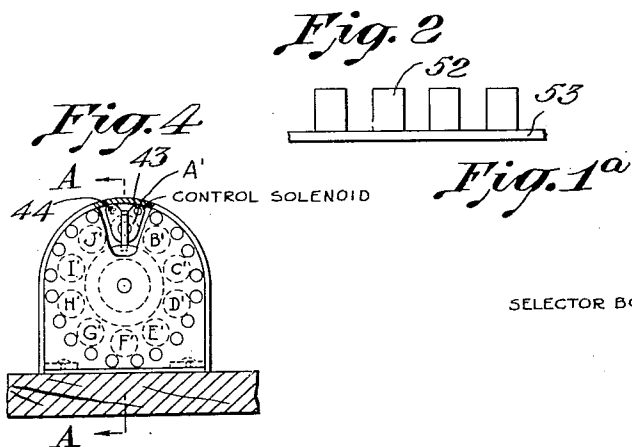
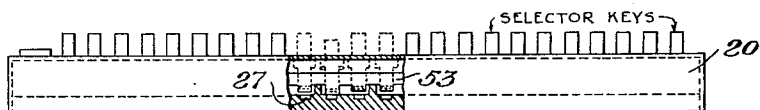
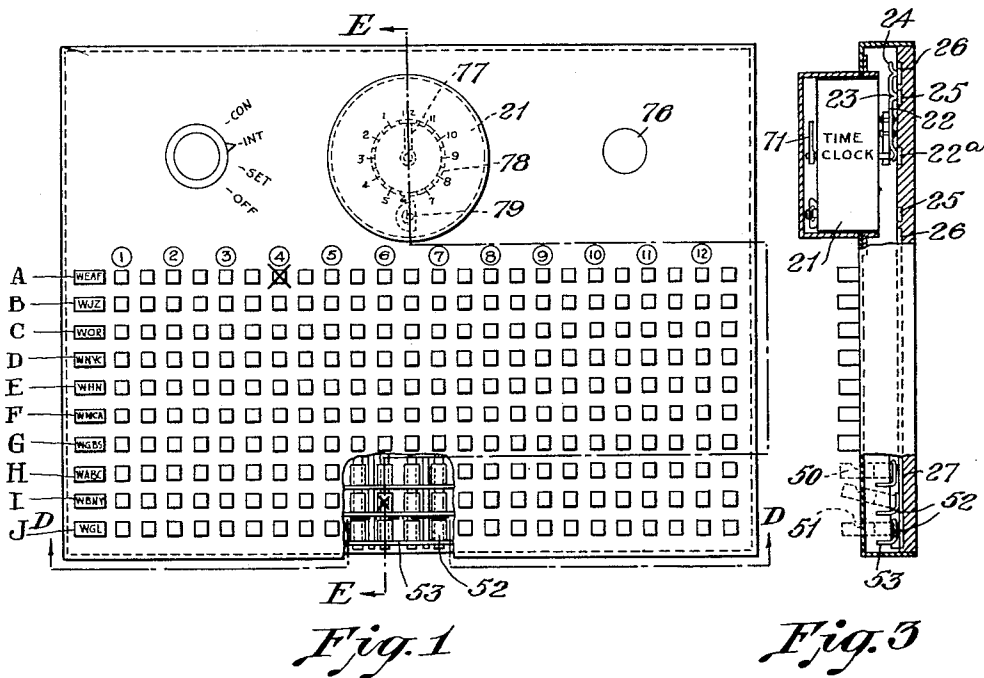
J. T. JONES

2,124,195

AUTOMATIC TUNING MEANS FOR RADIO SETS

Filed April 17, 1928

3 Sheets-Sheet 1



INVENTOR
John T. Jones

BY *Moses & Nolte*
ATTYS

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J. T. JONES

2,124,195

AUTOMATIC TUNING MEANS FOR RADIO SETS

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3 Sheets-Sheet 2

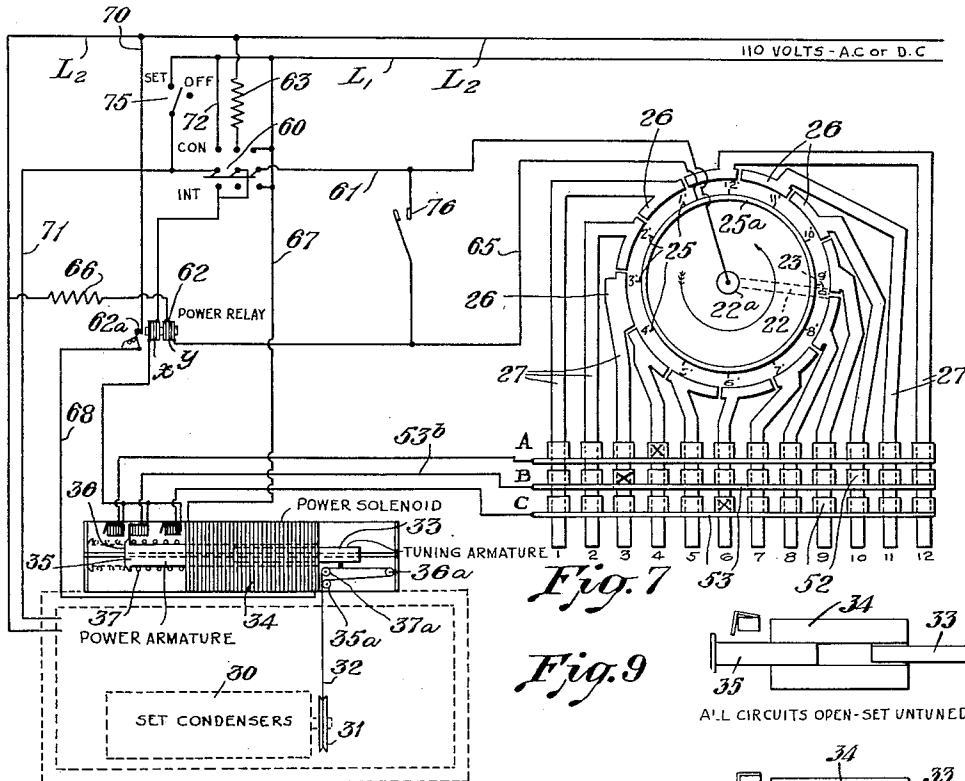


Fig. 7

Fig. 9

A.L. CIRCUITS OPEN-SET UNTUNED

Fig. 10

CONTROL SOLENOID IN OPERATION

Fig. 11

POWER SOLENOID TUNES SET

POWER ARMATURE RELEASED-SET REMAINS TUNED

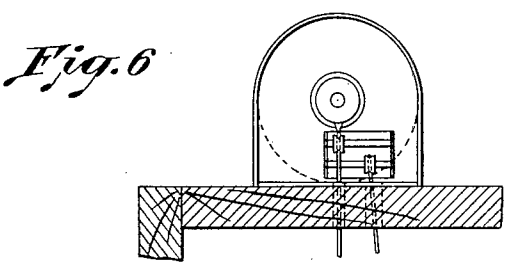


Fig. 6

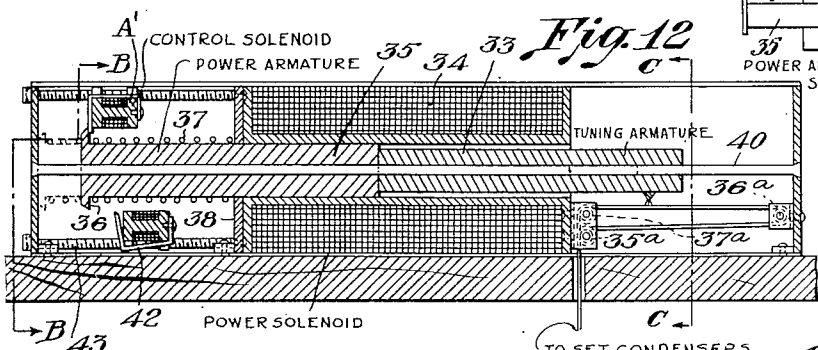


Fig. 5

Fig. 12

INVENTOR
John T. Jones

BY *Morse & Nolte*
ATTYS

July 19, 1938.

J. T. JONES

2,124,195

AUTOMATIC TUNING MEANS FOR RADIO SETS

Filed April 17, 1928

3 Sheets-Sheet 3

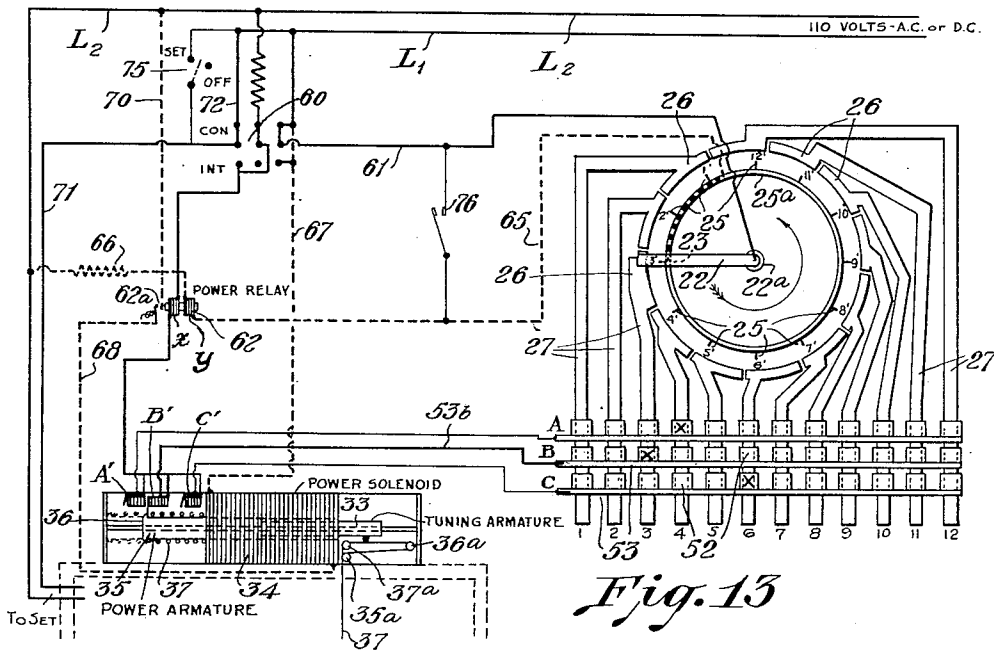


Fig. 13

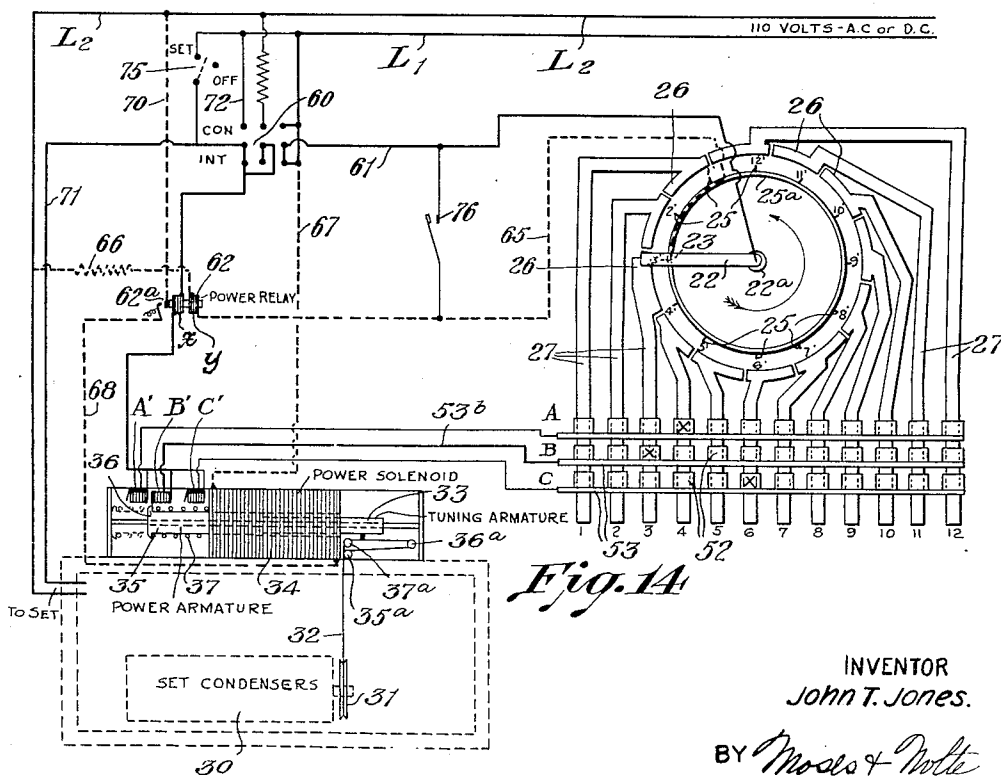


Fig. 14

INVENTOR
John T. Jones.

BY *Moses & Wolt*
ATTYS

UNITED STATES PATENT OFFICE

2,124,195

AUTOMATIC TUNING MEANS FOR RADIO SETS

John Thompson Jones, Great Neck, N. Y., assignor to Radio Corporation of America, New York, N. Y., a corporation of Delaware

Application April 17, 1928, Serial No. 270,652

28 Claims. (Cl. 250—20)

The present invention relates to a device for automatically tuning a radio set such that it will receive and reproduce programs from one or more radio broadcasting stations at predetermined future times, without the necessity of touching the tuning controls once the device is adjusted for operation.

The invention further contemplates the provision of means whereby the operation of the set may at will, be either independent of the automatic tuning control, whereby said control is not operative to turn the set off, or for making such operation dependent upon said controls whereby the set may be turned on and off at predetermined times as at the beginning and end, respectively, of a desired program.

The invention will be best understood by reference to the following detail description, taken with the annexed drawings in which:

Figure 1 shows the keyboard and operating switch of an illustrative embodiment;

Figure 1a is a detail showing a portion of a bus bar in the switchboard;

Figure 2 shows a view partly in section, as seen along the line D—D of Figure 1;

Figure 3 is a view partly in section as seen along the line E—E of Figure 1;

Figure 4 is a view partly in section of a tuning mechanism, taken along section B—B of Figure 5;

Figure 5 is a view in longitudinal section of said mechanism, and taken along section A—A of Figure 4;

Figure 6 is a sectional view taken along the line C—C of Figure 5;

Figure 7 is a wiring diagram of the apparatus;

Figure 8 is a detail showing the method of connecting the device to a radio set;

Figures 9 to 12 inclusive, are diagrams showing the operation of the tuning mechanism;

Figures 13 and 14 are wiring diagrams showing the circuits which are made during the operation of the device.

The drawings illustrate a set which is designed for operation by means of the house current, but it will be understood that by simple changes, the device may be made applicable to a battery operating set.

The illustrative device as shown consists of two principal parts comprising a selector keyboard and a tuning mechanism.

The selector keyboard 20, the details of construction of which are to be later described, is shown in Figure 1 and in the illustrative embodiment, 240 keys are provided for the tuning in of

ten broadcasting stations on a half-hourly basis throughout twelve hours playing time, after which the cycle may be repeated. Thus, if it is desired to tune the set for station A over the period of from 4 P. M. to 4:30 P. M. for example, the key beneath "4" and opposite station A, will be depressed, and similarly for any other designated station for the period desired. Any depressed key I have indicated by "X".

Said keys make a circuit which involves a clock mechanism 21, which as seen from Figures 3 and 7 has a contact arm 22, having contacts 23 and 24 which are adapted to bear upon segments or contact pieces 25 and 26 respectively. Arm 22 also has a center contact 22a by means of which it receives current. As seen from Figure 7, contacts 26 form the outer circle shown and extend substantially the entire distance between unit periods of operation, as for example, one-half hour or one hour. For sake of simplification, twelve one-hour contacts only have been shown in Fig. 7, corresponding to half the number of keys of Fig. 1. Contact pieces 25, which are mounted on a ring 25a, are on the other hand of very small area, whereby the contact 23 will bear upon same for a very short period of but a few seconds duration. As will be further seen from Figs. 3 and 7, each segment 26 has joined thereto conductor 27, each conductor being adapted to make contact with the respective keys in each of the vertical rows shown in Fig. 1 when such keys are depressed. In other words, when any key in vertical row "I" is depressed, such key will make contact with conductor 27 from the corresponding segment 1', corresponding to one o'clock, for example. When such key is depressed, it also makes the circuit through the station selector magnets as will subsequently be described.

The set, which is partially shown in Fig. 7, consists in part of the usual tuning condensers 30, which are operated by means of a single pulley 31 over which passes a driving cable 32, preferably of metal, which is connected in the manner shown, to a tuning armature 33, of a solenoid 34, such that the position of said armature determines the position of the movable condenser plates and hence the tuning of the set. As shown in Figures 6 and 7, the cable 32 passes over pulleys 35a and 36a to said armature, and thence over pulley 37a back to pulley 31. As shown in Fig. 5, the position of the tuning armature 33 is determined by what I term a power armature 35 such that the armature 33 is completely controlled by power armature 35. Power armature 35 is provided with a head 36 and its forward movement

into the solenoid is opposed by a light retractive spring 37 extending between said head 36, and a plate 38 abutting the solenoid 34. Both armatures 35 and 33 are provided with aligned bores as shown, and are mounted for reciprocation upon a common shaft 40, the latter being disposed in said bores.

For the purpose of controlling the inward travel of the power armature 35, various control electro-magnets A', B', C', etc., are provided, corresponding with stations A, B, C, etc., and placed in circuit therewith as will be more fully described. Magnets A', etc., are each provided with an armature 42, such that when the magnet is energized, a projecting portion thereof will be brought into the path of the head 36 of the power armature 35 and will prevent any further inward movement of said armature. Preferably, as shown, magnets A' to J' are arranged in squirrel cage formation about the armature 35, and are adjustably held in a frame surrounding said armature, preferably by means of a pair of shafts 43, 44, one of which is preferably screw-threaded, and has a threaded connection with its respective magnet, so that by turning said threaded shaft, as by means of a screw driver, any given magnet may be adjusted with reference to the solenoid 34, and hence the tuning as determined by any given electro-magnet accurately adjusted. It also provides means for determining a given station and also giving a control over the volume thereof.

From the foregoing it will be seen that whenever the solenoid 34 is energized, the power armature 35 will be drawn inwardly but the extent of its inward travel will be determined by the particular control electro-magnet A' to J' which happens to be energized, and whose armature 42 is in the path of movement of head 36 of said armature. At the same time, the magnetic force of the solenoid 34, which moves the power armature 35 inwardly, also moves the tuning armature 33 inwardly, but in the opposite direction, until the ends of the two armatures meet as shown in Fig. 5. Since the control electro-magnet, shown as A' in Fig. 5, has previously been set at a predetermined position corresponding to the wave length of the desired broadcasting station, the movement of the tuning armature 33 to the position shown will rotate the set condensers in such a manner as to tune in this station. When, however, the solenoid 34 is deenergized, the power armature will be returned to its extreme outer position by the spring 37 leaving, however, the tuning armature in its last position, as there is no mechanical connection between the tuning and the power armatures. Thus when the set is to be tuned by hand, for example, the tuning armature 33 moves freely along the central shaft 40 without interference from the power armature.

In order to obtain a clearer understanding of the foregoing, Figs. 9 to 12 inclusive show diagrammatically the condition of the power, tuning and magnet armatures during successive stages in automatically tuning to a predetermined station.

To return to the selector keyboard 20, the individual keys therein 50, are secured in depressed position by means of the notch 51, engaging with the cover of the keyboard as best shown in Fig. 3. In this manner a given key 50, let us say in horizontal row I, presses a segment 52 of a bus bar 53, extending horizontally of the board 20. In other words, for each station provided for, a bus bar 53 extends horizontally of the board—see Figure 7—and when any

key in that horizontal row is depressed, said bar is electrically joined to the conductor 27 corresponding to the vertical row in which the depressed key is located.

As previously stated, the mechanism provided is designed either to operate the set continuously, whereby the set is always playing regardless of the tuning mechanism, or intermittently in which the set is off, unless a key corresponding to the next unit of time is depressed. An example of tuning the set for constant operation will be as follows:

Station B from 3 o'clock to 4 o'clock; Station A from 4 o'clock to 6 o'clock; Station C from 6 o'clock throughout the nine-hour period until 3 o'clock following, when station B is again tuned in.

An example of tuning for intermittent operation, might be the following:

Station B from 3 o'clock to 4 o'clock; Station A from 4 o'clock to 5 o'clock; Station C from 6 o'clock to 7, the set being off from 5 to 6, and from 7 until the following 3 o'clock.

As will be apparent, the set may be controlled by one of two major circuits, depending on whether the switch 60, Figs. 7 and 1, is thrown to either the "Con" or the "Int" position.

Suppose now that the switch 60 is swung to "Con" and that the key for station B at 3 o'clock be depressed, all as shown in Fig. 13. At said hour by the clock 21, current will flow as follows: From the line L¹, through switch 60, the conductor 61, to central contact 22a, contact arm 22, to the edge of the 3 o'clock sector 26, (3'), thence down the corresponding conductor 27, and since the key B,—3 o'clock, has been depressed, through the bus bar 53, to magnet B', a power relay 62, switch 60, resistance 63 back to line L². The power relay 62 is composed of the coils x and y, neither of which alone is able to close the circuit controlled thereby, which as will be seen, includes the power solenoid 34. Therefore, although portion x of the power relay 62 has been energized, there has been no closing of the circuit through the power solenoid, and consequently the set is as yet untuned to station B. A few seconds, however, subsequent to the energization of the x portion of the power relay 62, contact 23 bears upon contact piece 25 corresponding to 3 o'clock, and completes a second circuit as follows: Referring to Figure 13, current flows from the line L¹, through switch 60, conductor 61, arm 22, contact piece 25, collector ring 25a, conductor 65, y portion of the power relay 62, resistance 66, line L². This actuates the power relay and completes the circuit through the power solenoid as follows: Line L¹, conductor 67, power solenoid 34, conductor 68, contact 62a of power relay 62, conductor 70 to line L². The instant this circuit is made, the power armature is actuated and its travel is determined by the fact of the energization of magnet B', whereby the set is tuned to station B.

A few seconds later, contact 23 will have moved off the contact piece 25, thus breaking the circuit therethrough, and through the y portion of the power relay, thus breaking relay contact 62a and allowing the power armature 35 to return to its inoperative position by means of the spring 37. However, the set remains tuned to station B, and the program from station B is thus received and reproduced until in accordance with the setting of the selector keyboard above given, the contact 24 of arm 22 moves off 3 o'clock segment 26 (at the instant of 4 o'clock) when the

magnet B' is released, the magnet A' is energized (in accordance with the board setting), and the station A tuned in as above described for station B.

When the clock arm 22 reaches sector 26 corresponding to 5 o'clock, since no key corresponding to said hour has been depressed, the circuits through the x and y portions of power relay 62 are opened, but the set continues to be tuned to station A, since it is connected to the line as follows: Line L¹, conductor 72, the set conductor 71, and line L².

When contact 23 bears upon contact piece 25 at 5 o'clock, the circuit is made through the y portion of power relay as before, but since the x portion of power relay continues to be inoperative, the switch 62a controlled thereby remains open, and no change occurs in the tuning of the set. Similarly, when 6 o'clock is reached, station C is tuned in, and since no other station is called for, remains tuned in, and unless manually turned off, would be played until 3 o'clock of the next cycle when station B would be tuned in again.

The operation for the intermittent setting may now be described. Referring to Figures 7 and 14, wherein the board is shown with the same keys depressed, the switch has been thrown to "Int", this having the effect of breaking the circuit from L¹ to the set through conductor 72, and placing the set in series with the circuit through the x portion of the power relay. Thus, when the clock arm reaches 3 o'clock the circuit through the x coil of the power relay will be made as before, through also the magnet B', and in addition, by virtue of the position of the switch 60, through the set, thus turning it on. As soon as the circuit is made through the y coil of the power relay upon the segment 25 being contacted by contact 23 of the clock arm, the power solenoid will be actuated as before to tune the set to station B, as shown in Figure 14.

At 4 o'clock, the set is tuned to station A in the same manner. At 5 o'clock, however, all control circuits are open, including the circuit through the set which is thus automatically turned off. A few seconds later the clock arm touches the corresponding projection 25, on the inner ring 25a, but although the current momentarily flows through the coil y of the power relay, it does not, of course, close the power solenoid circuit. At six o'clock, station C will be tuned in, and at 7 o'clock the set will be automatically turned off until the following 3 o'clock when the above cycle is repeated.

When it is desired to operate the set independently of the automatic control, the switch 60 may be opened and the set connected to the lines L¹, L², by means of a switch 75. This will be accomplished in one operation by the use of a rotary switch 60' which may be of known construction.

It may frequently be desired to change from one station to another during a unit interval without, however, having to turn off the automatic control. To this end, I provide a switch 76 conveniently in the form of a push button, which will connect conductors 61 and 65, and thereby connect the y coil of the relay 62 directly to the line, and thus energize said relay, since the x coil will have been energized by the operator having depressed the particular key 50, for the time and station desired. Were it not for push button 76, the operator would either have to turn off the automatic control entirely,

and tune the station by hand, or else he would have to wait until the arm 22 contacted with the particular contact 25, on collector ring 25a for the succeeding time interval. Thus, referring to Fig. 7, if station A were tuned in at 4 o'clock, for example, and it was immediately desired to change to station C, all that is necessary is to first depress the four o'clock-C selector key and then to actuate the push button switch 76. The first operation energizes the relay C' and the x portion of the power relay 62. The second operation energizes the y portion of said power relay thereby causing the closure of switch 62a and the completion of the power solenoid circuit to actuate the armatures 33, 35 whereby the tuning mechanism is adjusted as heretofore explained to tune in the new station C. Without switch 76, the new station C could not, except by hand, be tuned in until 5 o'clock, when the y portion of the power relay 62 would be energized by the arm 22 bearing against the contact 25 in the 5 o'clock position.

It will further be understood that if desired, the control board may be disposed apart from the radio set, and in this manner, a remote control of the set is provided for.

Preferably I provide clock 21 with a combination clock-setting and time-indicating member 77, Fig. 1, together with a dial 78 indicating the time, said members being shown as provided with a removable cover 79a. In addition, a winding key 79 is provided if a spring clock is used.

It will be noted that the clock mechanism is disposed so that the arm 22 rotates counter-clockwise as seen from the front of the contact segments 25 and 26. This has the advantage that the numbers 1 to 12 representing the hours as seen in Figure 1, may read from left to right without the necessity of the conductors 26 crossing one another, and thus enabling said conductors to be stamped from a single sheet.

It will be understood that by connections which it is not necessary to show here, that the device may be installed within a set and electrically connected thereto merely by means of a conduit 80, Fig. 8, which will connect with the set at the point where it would be connected to the source of household current, and by means of a further conduit 81, leading from said device, will be connected to such source.

Figs. 1 and 2 of the drawings show keys for every half hour, the remaining figures, however, show keys only for every hour for the purpose of making such drawings more legible and preventing overcrowding of the same.

It will be apparent that the invention may be embodied in various other forms and that parts hereof may be used to the exclusion of others and I wish it to be understood that many changes may be made without departing from the spirit of my invention or the scope of the appended claims.

What I claim is:

1. In a device of the character described, tuning actuating mechanism comprising a solenoid, a tuning armature and a power armature therefor movable relatively thereto and controlling the position of said tuning armature, and magnetically actuated selector means independent of the solenoid controlling the position of said power armature.

2. In a device of the character described, tuning actuating mechanism, station selector mechanism and time controlled mechanism determin-

ing the times when said selector mechanism is to become operative, said tuning actuating mechanism having associated therewith a relay requiring for its operation the actuation of two circuits therethrough, means whereby one of said circuits is controlled by said time controlled mechanism and is actuated during the unit interval of broadcasting, and means whereby the other circuit is also controlled by said time-controlled mechanism and is actuated substantially momentarily at the beginning of said broadcasting interval.

3. In a radio tuning device, automatic tuning means, a plurality of circuits respectively controlling said tuning means in accordance with a plurality of broadcast wave lengths, keys controlling said circuits for selecting in advance wave lengths to which the set is to be tuned, timing means cooperating with said keys to determine the times when said selected wave lengths are to be tuned, a relay associated with said tuning means, said relay requiring for its actuation the making of two circuits therethrough, means whereby one of said circuits is actuated by said key-controlled circuits, and means whereby the other circuit is actuated by said time-controlled means.

4. In a radio tuning device, automatic tuning means, a plurality of circuits respectively controlling said tuning means in accordance with a plurality of broadcast wave lengths, keys controlling said circuits for selecting in advance wave lengths to which the set is to be tuned, timing means cooperating with said keys to determine the times when said selected wave lengths are to be tuned, a relay associated with said tuning means, said relay requiring for its actuation the making of two circuits therethrough, means whereby one of said circuits is actuated by said key-controlled circuits, and means whereby the other circuit is actuated by said time-controlled means, said circuit last mentioned being actuated only momentarily, whereby said automatic tuning means will operate only momentarily and be inoperative at all other times during a unit interval of broadcasting.

5. In a radio receiver, automatic tuning actuating means, a plurality of station selector devices for said actuating means, switch mechanism pre-set in advance for selecting the station to which the receiver is to be tuned, clockwork cooperating with said switch mechanism to determine the times when said selected stations are to be tuned in, said clockwork comprising a plurality of contact segments, each having a length corresponding to a unit broadcasting interval, said clockwork also comprising a driven arm making contact with said segments, a plurality of conductors each respectively connected to one of said segments, and a plurality of conductors each respectively connected to one of said station selector devices, the number of said station selecting switches being equal to the number of clockwork conductors multiplied by the number of selector conductors.

6. In a program reproducing device, automatic selecting means, a multiple series of switch mechanisms for selecting in advance programs which the device is to reproduce, time measuring means cooperating with said switch mechanism to determine the times when said selected programs are to be reproduced, said measuring means comprising a plurality of contact segments, each corresponding to a unit program interval and arranged in a predetermined order, said measuring means also comprising a switch making contact

with said segments in said order, a plurality of conductors respectively connected to said segments, a plurality of conductors respectively connecting each series of said switch means, program selector mechanism controlled through said conductors last mentioned, said switch means connecting at will any given time measuring conductor with any given selector conductor.

7. In a radio tuning device, tuning means, a multiple series of keys for selecting in advance wave lengths to which the device is to be tuned, clock-work cooperating with said keys to determine the times when said selected wave lengths are to be tuned in, said clock-work comprising a plurality of relatively movable switch members, a plurality of conductors respectively connected to said members, a plurality of conductors respectively connecting each series of said keys, station selector mechanism controlled through said conductors last mentioned, said keys connecting at will any given clock-work conductor with any given selector conductor.

8. In a radio tuning device, automatic tuning means, a multiple series of switch mechanisms for selecting in advance wave lengths to which the device is to be tuned, clock-work cooperating with said switch mechanisms to determine the times when said selected wave lengths are to be tuned in, a plurality of conductors respectively connecting each series of said switch means, station selector mechanism controlled through said conductors, said switch means connecting at will any given clock-work conductor with any given selector conductor.

9. In a radio tuning device, automatic tuning means, mechanism comprising a multiple series of independently movable keys for selecting in advance wave lengths to which the device is to be tuned, clock-work cooperating with said mechanism to determine the times when said selected wave lengths are to be tuned in, said clock-work comprising a plurality of contact segments, each having a length corresponding to a unit broadcasting interval and arranged in clock-wise order, said clock-work also comprising a driven arm making contact with said segments successively, a plurality of conductors respectively connected to said segments, a plurality of independent conductors respectively connecting each series of said keys, a plurality of station controls connected to said independent conductors, said keys connecting at will any given clock-work conductor with any given station control.

10. In a radio tuning device, automatic tuning means, a multiple series of switch means for selecting in advance wave lengths to which the device is to be tuned, clock-work comprising a plurality of contact segments, each having a length corresponding to a unit broadcasting interval and arranged in clock-wise order, said clock-work also comprising a driven arm making contact with said segments, a plurality of conductors respectively connected to said segments, a plurality of conductors respectively connecting each series of said switch means, station selector mechanism controlled through said conductors last mentioned, said switch means connecting at will any given clock-work conductor with any given selector conductor.

11. In a radio tuning device, automatic tuning means comprising a solenoid, a tuning armature and a power armature for controlling the position of the tuning armature, switch means for selecting in advance wave lengths to which the set is to be tuned, clock-work cooperating with

said switch means to determine the times when said selected wave lengths are to be tuned in, said clock-work comprising a plurality of contact segments corresponding to unit broadcasting intervals and arranged in clock-wise order, said clock-work also comprising a driven arm making contact with said segments successively, a plurality of conductors respectively connected to said segments, a plurality of conductors respectively connecting said switch means, magnetically actuated station selector mechanism controlled through said conductors last mentioned for controlling the position of said power armature, said switch means connecting at will any given clock-work conductor with any given selector conductor.

12. In a radio receiver, automatic tuning mechanism, a multiple series of depressible keys remote from said receiver for selecting in advance wave lengths to which the receiver is to be tuned, clock-work cooperating with said keys to determine the times when said selected wave lengths are to be tuned in, said clock-work comprising a plurality of contact segments, each having a length corresponding to a unit broadcasting interval, said clock-work also comprising a driven arm making contact with said segments, a plurality of conductors respectively connected to said segments, a plurality of conductors respectively cooperating with each series of said keys, station selector mechanism controlled through said conductors last mentioned, said keys connecting at will any given clock-work conductor with any given selector conductor, and means for enabling the tuning mechanism to be automatically tuned to any of the above mentioned wave lengths under the selective control of keys capable of being rendered active by the clockwork in one of the positions of said driven arm.

13. In a radio receiver, an adjustable tuning condenser, a tuning armature, a flexible cable between the condenser shaft and the armature, an actuating solenoid for the armature, a source of power, a control armature arranged for actuation by said solenoid and adapted to move in a direction opposite to that of the tuning armature, a plurality of selector electromagnets disposed in operative relation with respect to said control armature, means for adjusting each of said selectors for a given station and the volume thereof, the control and tuning armatures being mechanically independent whereby the condenser shaft may be manually adjusted at any setting of the tuning armature, a selector key-board affixed to said receiver and including a plurality of independent, depressible keys for selecting in advance stations to which the receiver is to be tuned, the keys being arranged in accordance with unit broadcasting intervals, clock-work cooperating with said key-board to determine the times when said selected stations are to be tuned in, said clock-work comprising a ring of contact segments corresponding to said unit broadcasting intervals and arranged in clock-wise order, a second ring of contact segments, corresponding to relatively short fractions of said unit intervals, disposed concentric with said first ring, said clock-work also comprising a driven arm including a pair of elements for making contact with the segments of both rings, said driven arm being arranged for counter-clockwise rotation, a plurality of conductors respectively connected to said first ring of segments, a plurality of conductors respectively connecting said keys, said plurality of selector electromagnets being connected to

said keys and the segments of said clock-work, a power relay comprising a pair of windings and an armature, one of the windings being connected between said power source and said control electromagnets, the other winding being connected between said second ring of segments and said source, said relay armature being connected to one terminal of said solenoid and being adapted for connection to one terminal of said power source, when said second winding is energized, said solenoid having its other terminal connected to the remaining terminal of said power source whereby attraction of said relay armature results in energization of said solenoid, said second winding being energized for a period equal to the duration of contact between the driven arm of said clock-work and a segment in said second ring, a switch mechanism, disposed between said power source, receiver, and clock driven arm for selectively rendering the receiver operative or inoperative during intervals when no key is depressed, said mechanism including means for selectively connecting one terminal of said receiver to said first relay winding whereby depression of a key automatically connects the receiver to said power source, and an additional switch mechanism connected between one terminal of the power source and one terminal of the relay second winding for instantly adjusting the tuning armature to a position corresponding to a depressed key, regardless of the driven arm position of the said clock-work.

14. In a radio receiver, a power source therefor, automatic tuning means, a plurality of depressible keys for selecting in advance wave lengths to which the receiver is to be tuned, clock-work cooperating with said keys to determine the times when said selected wave lengths are to be tuned in, said clock-work comprising a plurality of contact segments corresponding to unit broadcasting intervals and arranged in clock-wise order, said clock-work also comprising a driven arm making contact with said segments successively, a plurality of conductors respectively connected to said segments, a plurality of conductors respectively connecting said keys, station selector mechanism controlled through said conductors last mentioned, said keys connecting at will any given clock-work conductor with any given selector conductor, a switch mechanism, disposed between said power source, receiver, and clock driven arm for selectively rendering the receiver operative or inoperative during intervals when no key is depressed, said mechanism including means for selectively connecting one terminal of said receiver to said selector mechanism whereby depression of a key automatically connects the receiver to said power source.

15. In a radio tuning device, an adjustable tuning condenser, a tuning armature, a flexible cable between the condenser shaft and the armature, an actuating solenoid for the armature, a remote selector keyboard including a plurality of independent depressible keys for selecting in advance wave lengths to which the receiver is to be tuned, the keys being arranged in accordance with unit broadcasting intervals, a source of power, a control armature arranged for actuation by said solenoid and adapted to move in a direction opposite to that of the tuning armature, a plurality of selector electromagnets disposed in operative relation with respect to said control armature, means for adjusting each of said selectors for a given station and the volume thereof, the control and tuning armatures being independent where-

by the condenser shaft may be manually adjusted at any setting of the tuning armature.

16. In a radio tuning device, an adjustable tuning condenser, a tuning armature, a flexible cable between the condenser shaft and the armature, an actuating solenoid for the armature, a remote selector keyboard including a plurality of independent depressible keys for selecting in advance wave lengths to which the receiver is to be tuned, the keys being arranged in accordance with unit broadcasting intervals, a source of power, a control armature arranged for actuation by said solenoid and adapted to move in a direction opposite to that of the tuning armature, a plurality of selector electromagnets disposed adjacent said control armature, means for adjusting each of said selectors for a given station and the volume thereof, the control and tuning armatures being independent whereby the condenser shaft may be manually adjusted at any setting of the tuning armature, and clock-work operated switching mechanism cooperating with the keys of said keyboard to determine the times when said selected wave lengths are to be tuned in.

17. In a device of the character described, tuning actuating mechanism comprising a solenoid and a pair of independently operated armatures controlled thereby including a tuning armature and a power armature which controls the position of said tuning armature, and magnetically actuated selector means independent of the solenoid controlling the position of said power armature.

18. In a device of the character described, tuning actuating mechanism comprising a solenoid and a pair of independently operated armatures controlled thereby including a tuning armature and a power armature which controls the position of said tuning armature, and a plurality of magnetically actuated selector means independent of the solenoid controlling the position of said power armature.

19. In a device of the character described, tuning actuating mechanism comprising a solenoid and a pair of independently operated armatures controlled thereby including a tuning armature and a power armature which controls the position of said tuning armature, magnetically actuated selector means independent of the solenoid controlling the position of said power armature, and a plurality of station selectors connected to said selector means.

20. In a device of the character described, tuning actuating mechanism comprising a solenoid, a tuning armature and a power armature therefor controlling the position of said tuning armature, magnetically actuated selector means controlling the position of said power armature, a plurality of station selectors connected to said selector means and means for adjusting the distance between said magnetically actuated selector means and said solenoid.

21. In a radio receiving set having a movable tuning element, in combination, an electrical motor device for actuating said element to any one of a plurality of predetermined broadcast wavelength positions, a plurality of electromagnetic position determining means associated with said motor device to determine the position to which said tuning element can be actuated by said motor device, a series of electrical circuits associated with each of said plurality of position determining means, means for preselecting a desired sequence of operation of said circuits of each series at intervals corresponding to broadcast periods, and a clock operated mechanism for

rendering said circuits of each series operative in accordance with the said preselected sequence.

22. In a radio receiving set having a movable tuning element, in combination, an electrical motor device for actuating said element to any one of a plurality of predetermined broadcast wavelength positions, a plurality of electromagnetic position determining means associated with said motor device to determine the position to which said tuning element can be actuated by said motor device, a series of electrical circuits associated with each of said plurality of position determining means, means for preselecting a desired sequence of operation of said circuits of each series at intervals corresponding to broadcast periods, a clock operated mechanism for rendering said circuits of each series operative in accordance with the said preselected sequence, and at least one push button device electrically associated with said clock operated mechanism and motor device to individually adjust a tuning position to which the motor device moves said tuning element.

23. In combination, a radio broadcast receiver provided with a tuning element, an electrical motor device coupled with said tuning element for adjusting it to predetermined broadcast station positions, an electrical control circuit for the motor, a plurality of station position determining devices associated with the motor device, each determining device corresponding to a desired one of said station positions and being constructed to prevent further adjustment of the tuning element by said motor device, means for controlling simultaneously the energization of said motor control circuit and the actuation of said determining devices comprising a plurality of station selector manuals adapted to be adjusted according to a predetermined broadcast program sequence, a plurality of control elements for the control circuit adapted to be preset according to said sequence by said manuals and a clock actuated mechanism, movable with respect to said manuals, for connecting said control elements to the control circuit according to the program sequence.

24. In combination, radio tuning mechanism, means for actuating said tuning mechanism, a control unit for said actuating means comprising a support provided with a series of independent members, each corresponding to a different radio station, means interconnecting said members with the actuating means, a second series of independent members corresponding to equal time intervals associated with the first series of members, clockwork mechanism having means cooperating with said second series of members, and a multiple series of selector devices, the number of such series being equal to the number of station members, and the number in each series being equal to the number of time interval members, each such device being capable of cooperatively associating a particular member of the first series with a particular member of the second series, whereby the tuning mechanism is actuated to tune in a plurality of stations in a predetermined sequence and at regular intervals depending upon which of the selector devices are actuated.

25. In combination, radio tuning mechanism, means for actuating said tuning mechanism, a control unit for said actuating means comprising a support provided with locating means for symbols representing a plurality of radio broadcasting stations and also provided with a series of

independent members corresponding respectively to such symbols and to the different carrier frequencies of such radio stations, means operatively and electrically interconnecting said members with the actuating means, a second series of independent members corresponding to time intervals associated with the first series of members, clockwork mechanism having means cooperating with said second series of members, and a multiple series of selector devices, the number of such series being equal to the number of station members, and the number in each series being equal to the number of time interval members, each such device being capable of cooperatively connecting a particular member of the first series with a particular member of the second series, whereby the tuning mechanism is actuated to tune in a plurality of stations in a predetermined sequence of time depending upon which of the selector devices are actuated.

26. In combination, radio tuning mechanism adjustable to a plurality of tuning positions, electrical means for actuating said tuning mechanism, a control unit for said actuating means comprising a cabinet provided with a series of independent members, each corresponding to a different one of said tuning positions, individual conductors operatively interconnecting said members with the actuating means, a second series of independent members corresponding to time intervals associated with the first series of members, clockwork mechanism mounted on said cabinet and having switching means cooperating with said second series of members, and a multiple series of selector devices, the number of such series being equal to the number of station members, and the number in each series being equal to the number of time interval members, each such device being operable at will to electrically connect a particular member of the first series with a particular member of the second series, whereby the tuning actuating means is energized to adjust the tuning mechanism to a plurality of tuning positions at predetermined intervals and in a definite sequence depending upon which of the selector devices are operated.

27. In combination, radio tuning mechanism, means for actuating said tuning mechanism to a plurality of predetermined station positions, a control unit for said actuating means comprising a support provided with a key-board having a plurality of keys arranged in horizontal and vertical rows, a bus bar for each horizontal row of keys corresponding to one of said plurality of station positions, means interconnecting said bus bars with the actuating means, a bus bar for each

vertical row of keys corresponding to predetermined time intervals, said horizontal and vertical bus bars being normally in non-contacting relation, clockwork mechanism mounted on said cabinet and having means for making individual electrical contact with said vertical bus bars, and means controlled by said keys for causing electrical contact to be made between their respective horizontal and vertical bus bars, the arrangement being such that upon operation of any selected number of keys their respective horizontal and vertical bus bars are electrically connected, and upon the subsequent individual engagement of the clockwork contacting means with the vertical bus bars of the operated keys in a certain sequence, energization of the tuning mechanism actuating means is effected to adjust said mechanism to station positions corresponding to the horizontal bus bars of the operated keys in the same sequence and at predetermined time intervals.

28. In combination, radio tuning mechanism, means for actuating said tuning mechanism to a plurality of predetermined station positions, a control unit for said actuating means comprising a cabinet provided with suitable means for designating a plurality of radio broadcasting stations corresponding to the predetermined station positions and also provided with a plurality of horizontal members corresponding respectively to such designating means and to the different carrier frequencies of such stations, means operatively and electrically interconnecting said members with the actuating means, a plurality of vertical members corresponding to time intervals arranged in non-contacting relation with the horizontal members, clockwork mechanism mounted within said cabinet and having a movable arm contacting with said vertical members one at a time, and a manually operated key disposed at each intersection of the horizontal and vertical members whereby said members are urged to contacting relation at a particular intersection upon operation of the corresponding key, the arrangement being such that upon the conjoint action of the clockwork movable arm with any vertical member and of the manual key associated with said vertical member with any horizontal member, the tuning mechanism actuating means is energized to move the tuning mechanism to the station position corresponding to the horizontal member and will remain in that position at least so long as the movable arm contacts with the vertical bar.

JOHN THOMPSON JONES.