

Jan. 24, 1950

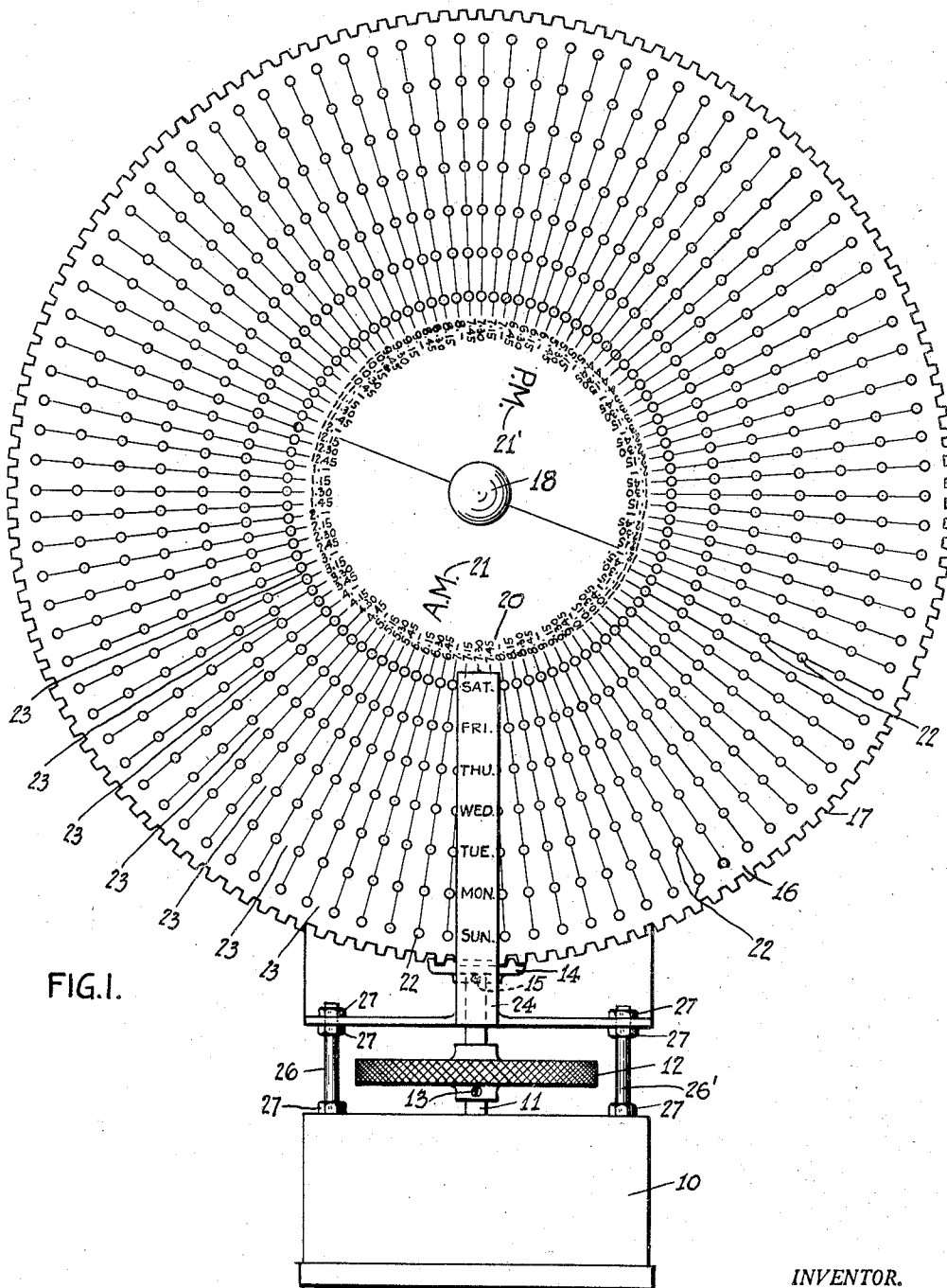
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2,495,530

TIME-CONTROLLED MEANS FOR AUTOMATIC RADIO TUNING

Filed April 1, 1946

4 Sheets-Sheet 1



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TIME-CONTROLLED MEANS FOR AUTOMATIC RADIO TUNING

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FIG.2.

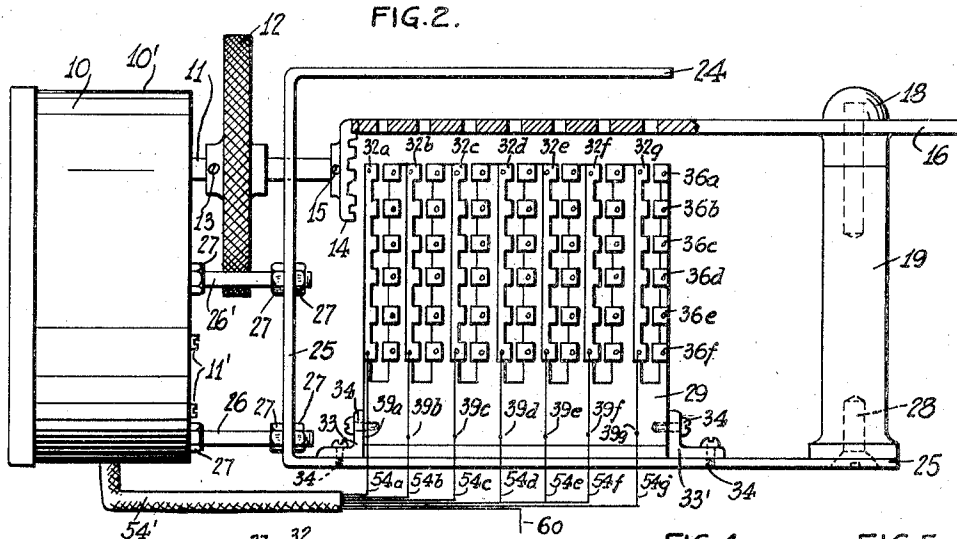


FIG.4.

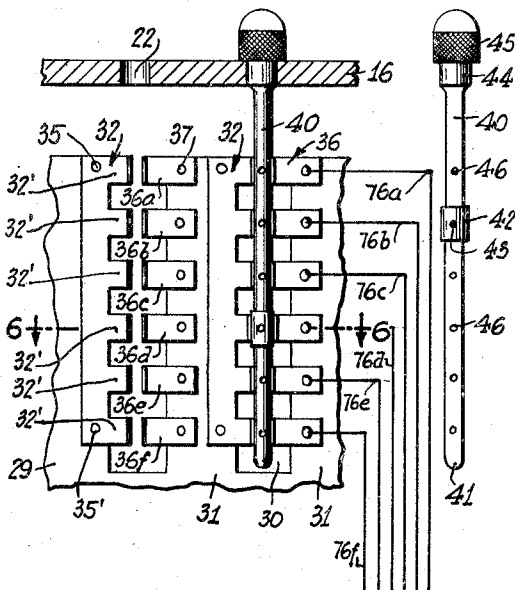
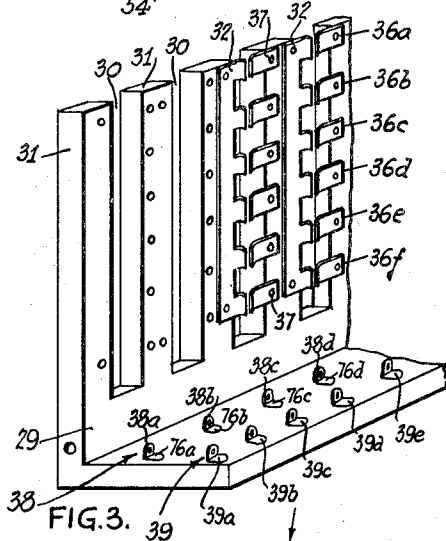


FIG. 5.



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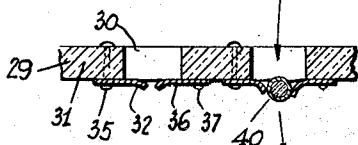


FIG. 6.

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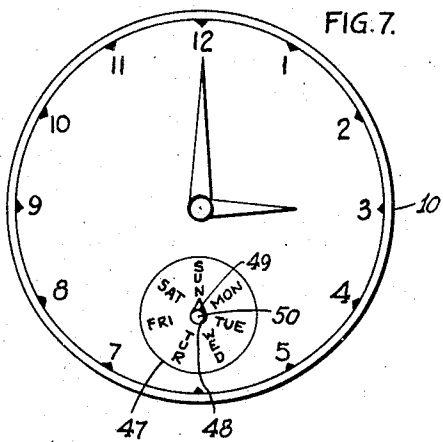


FIG. 7.

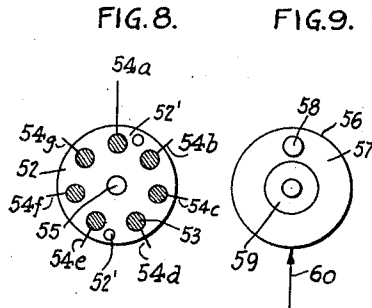


FIG. 8.

FIG. 9.

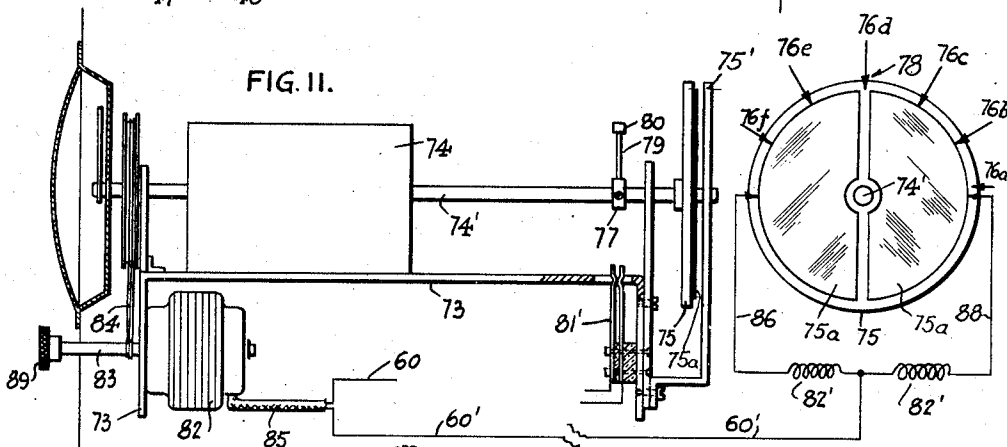


FIG. 11.

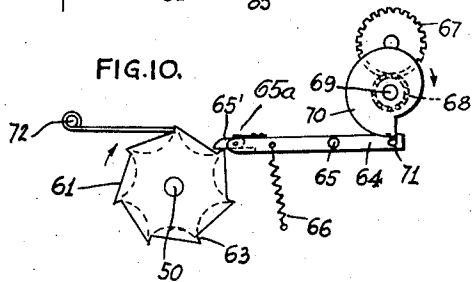


FIG. 10.

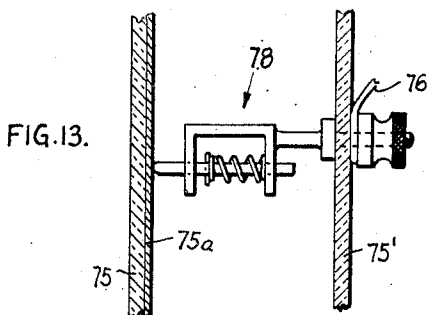


FIG. 13.

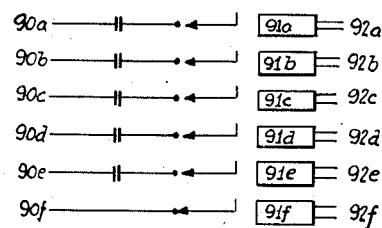


FIG. 14.

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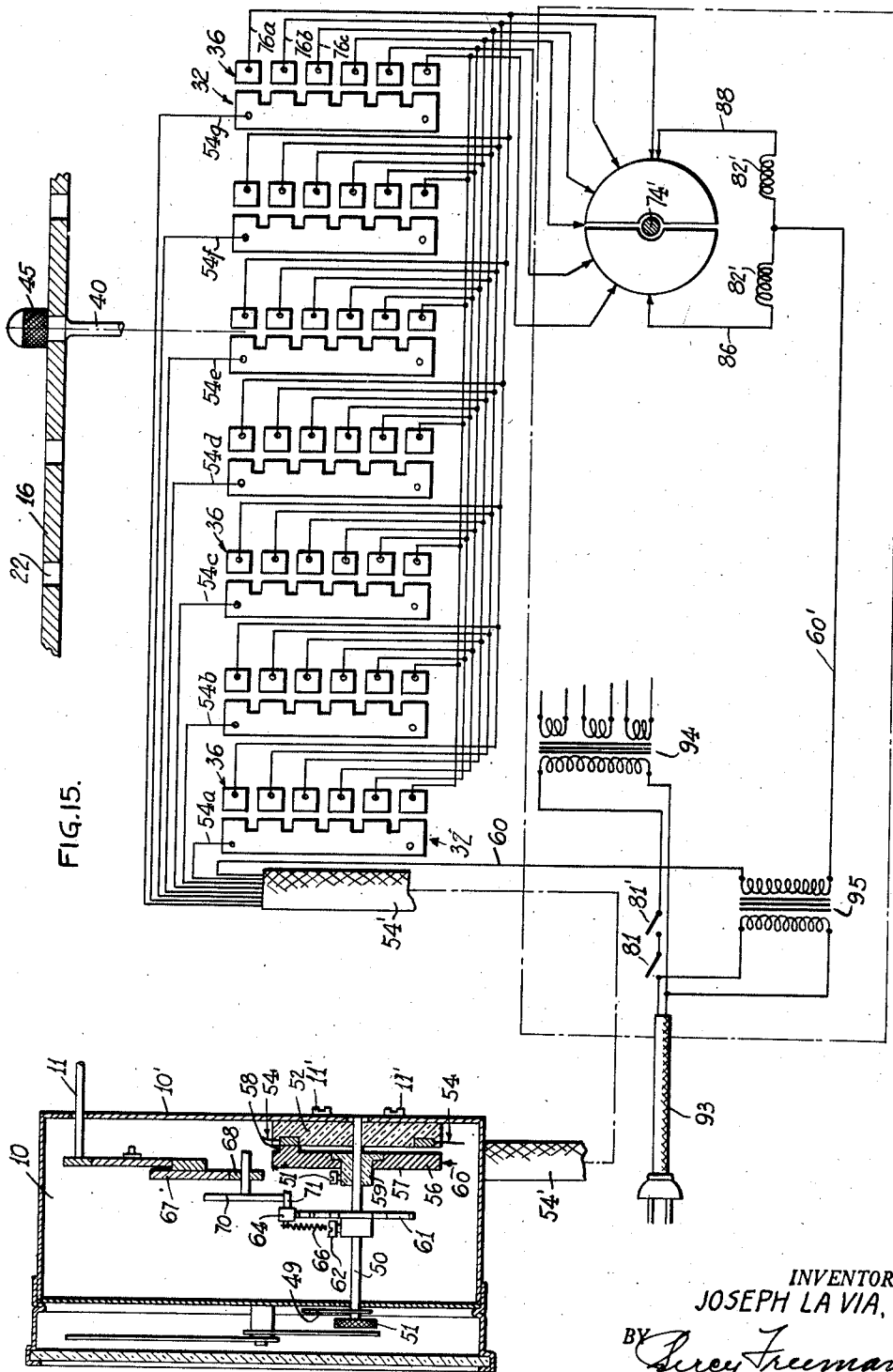
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TIME-CONTROLLED MEANS FOR AUTOMATIC RADIO TUNING

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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TIME-CONTROLLED MEANS FOR
AUTOMATIC RADIO TUNING

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Application April 1, 1946, Serial No. 658,859

3 Claims. (Cl. 250—20)

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This invention relates to methods and means whereby a radio program may be preselected so that a plurality of stations may be received, and intervals of silence may be arranged for at predetermined times.

Heretofore, devices of this general type had been limited to permit the daily reception of preselected stations at predetermined times with means co-related with said device so designed that after the stations had been tuned in the setttable means were manually or automatically restored to a neutral position requiring resetting for the following day.

It is an object of the present invention to obviate such daily setting up of a program by utilizing means to set up a complete weekly program of favorite selections which may be repeated week after week without resetting.

A further object of the invention provides means automatically operable so that the listener may turn on the receiver at any time and the favored program is instantly available.

In the drawings:

Fig. 1 is a plan view of a preselector unit showing an embodiment of the invention.

Fig. 2 is a side elevational view, partly in section, of the unit shown in Fig. 1, with the rear part of the pattern disc broken away.

Fig. 3 is a fragmentary perspective view of the terminal block shown in Fig. 2, with some of the contacts being removed for clarity.

Fig. 4 is a fragmentary elevational view of the terminal block and pattern disc of Fig. 1, with a circuit closer in place.

Fig. 5 is an elevational view of a circuit closer suitable for use with the device.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4.

Fig. 7 is a front view of the clock dial for indicating the hours of the day and the days of the week.

Fig. 8 is a front view of an electrical contact member.

Fig. 9 is a front view of the electric transfer member.

Fig. 10 is a partial sectional view showing a detail of the invention.

Fig. 11 is a vertical sectional view showing the radio receiver chassis, tuning motor and the split commutator station selector.

Fig. 12 is a face view of the split commutator station selector shown in Fig. 11.

Fig. 13 is a sectional view of a detail of the preselector unit showing one form of spring contact member.

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Fig. 14 is a diagrammatic view of a plurality of fixed tuned circuits.

Fig. 15 is a diagrammatic view showing the radio receiver, time tuning station preselector and the wiring diagram.

In Fig. 1 there is shown a timing mechanism 10, having an output shaft 11, on which is secured as by screw 13, a time setting knob 12. At the end of the shaft 11 is fastened a gear 14, by means of set screw 15. In engagement with the gear 14 is a program pattern 16, the periphery 17 of which is formed with gear teeth for being rotatably driven one revolution per day by the gear 14.

The program pattern disc is rotatably mounted atop support pillar 19 (Fig. 2), by means of screw 18. Concentrically around the disc, time indications 20, of fifteen minute intervals, are impressed in the pattern disc, these indications being divided into two groups 21—21' denoting A. M. and P. M. periods.

Radially disposed in line with each indication, seven equally spaced openings 22 are arranged to form seven concentric rings 23, each ring representing a day of the week and comprising a group of 96 openings. Overlying the output shaft 11, is an arm member 24, which may be part of the chassis 25 (Fig. 2.) On said arm coincident with each ring 23, is indicia, indicating the seven days of the week in successive order, starting with the outer ring representative of the day Sunday.

The timer 10 is shown as attached to the chassis 25, by means of screws 26—26' and six nuts 27; the pillar 19 is held in position by means of the screw 28, which extends through a hole in the chassis; the shaft 11 passes through a hole in the chassis 25 which acts as a bearing, and the day indicating arm 24 extends over the program pattern disc, as shown in Figs. 1 and 2.

Beneath the pattern disc 16 and in vertical alignment with the output shaft is a terminal block 29 of insulating material (Fig. 3), so constructed as to have seven vertical passageways 30, and eight upright members 31; this terminal block is fastened to the chassis 25 by means of brackets 33—33' and screws 34, in such position that each passageway 30 lies directly beneath a circle of openings 22. To the left of each passageway 30, there is fastened to the associated uprights 31, a contact plate respectively 32a, 32b, 32c, 32d, 32e, 32f and 32g (Figs. 3—4), each said contact plate having six similar, angularly projecting, spaced apart prongs or contacts 32'. Contact plates 32 are held in place by the eyelets

35—35' through associated holes. In opposed relation to the prongs 32' are individual contact elements respectively 36a, 36b, 36c, 36d, 36e, and 36f, each held in place by the eyelets 37 through associated holes.

Fig. 3 shows a fragmentary view of the terminal block 29, indicating the manner in which the plates 32 and the plurality of groups of station contact elements 36a, 36b, 36c, 36d, 36e and 36f are arranged. Secured to the terminal block 29 are terminal lugs 38. Suitable conductors (not shown) are connected to the first or top tier of contact elements 36a and to terminal 38a; the second tier of contact elements 36b are connected to terminal 38b and the succeeding tiers of contact elements are connected to their respective terminals 38.

Also secured to the terminal block 29 are terminal lugs 39a, 39b, 39c, 39d, 39e, 39f and 39g. Conductors are connected from the seven plates 32 to their respective terminals 39 (Fig. 2) as indicated by corresponding letters.

In Fig. 4, there is shown a fragmentary view of several of the plates 32; associated contact elements 36; the program pattern disc 16 and a circuit closer or maker 40. The circuit closers 40 are inserted through openings 22 of the pattern disc to extend into the path of one of the passageways 30, so that as the pattern disc rotates the circuit closers 40 will pass through the passageways 30 to bridge the gap between the contacts 32—36.

The circuit closer 40 may be of plastic moulding, having a shank 41, and a suitable metal tubing 42, which may be positioned on the shank to coincide with a pair of associated contact elements 32—36. The tubing 42 may be held in place by a pin 43, insertable through any one of a plurality of holes 46. Near the top of the circuit closer is a shoulder 44, of such diameter as to make a suitable fit in any opening 22, and the end is formed as a knurled knob 45, to facilitate insertion; the outer diameter of the tubing 42 is slightly smaller than the shoulder 44.

In Fig. 6 is shown a portion of the terminal block 29 and the arrangement of plates 32, contact elements 36 and the circuit closer 40 in contact with said plate and contact element, as it is traveling in an arc and through the passageway 30. It is understood that plates 32 and contacts 36 are made of a spring metal such as German silver or other similar metal to permit the passage of the tubing 42 through the contacts after bridging a gap.

The clock or timing mechanism 10, (Fig. 7) has a dial 47 having day indicia in successive order and a pointer 49 securely fastened to shaft 50 (Fig. 15). The pointer 49 may be rotated by the knob 51 to any desired day.

An electric transfer unit within the confines of the clock 10 is suitably mounted by means of the two screws 11' through holes 52' to the clock case 10' (Figs. 8 and 15). A plastic disc 52, has imbedded therein seven contacts 53 and connected to each contact is a conductor respectively 54a, 54b, 54c, 54d, 54e, 54f and 54g; in the center of the disc is a hole 55, to serve as a bearing for the shaft 50.

An electric transfer means 56 (Figs. 9 and 15) comprises a metal annulus 57 having a raised contact portion 58, and this annulus is mounted onto an insulation bushing 59 which is secured to shaft 50 by the set screw 51 so as to effect wiping contact between contact surfaces 53 and con-

tact 58. Conductor 60 carries current to the periphery of the annulus 57.

Additional parts of the transfer unit are shown in Figs. 10, 15. The shaft 50 mounts a ratchet 61 which is secured to the shaft by the set screw 62. Ratchet 61 has seven abutments 63, as will be understood. It is necessary to rotate the shaft 50 one-seventh of a revolution each day and to that end there is provided a lever 64 pivotally located on pin 65 fixed to the clock case. The lever 64 is normally biased by a spring 66. The gear 67 (part of the clock gear train) drives the gear 68 one revolution per day. The gear 68 is mounted on shaft 69, and securely attached to the gear is a cam 70. In contact with the cam is a pin 71, extending from lever 64. At the other end of the lever is a pivoted member 65' normally held in alignment with lever 64 by leaf spring 65a. The pivoted member 65' is so mounted that it may turn downwardly against the tension of spring 65a but it cannot turn upwardly beyond alignment with the lever.

As the cam 70 rotates, when the cam heel passes the pin 71, the spring 66 is free to pull down the lever 64 to cause the ratchet 61 to make one-seventh of a revolution. A suitably mounted detent spring 72, prevents further movement until the ratchet is actuated again. As the low portion of the cam gradually raises the lever, the member 65' is in a downward position since the spring 65a must yield, until the lever passes the next abutment, at which time the member 65' will spring back so that it rests upon the next abutment ready to move the ratchet again as soon as the cam 70 permits it to do so.

Fig. 11 shows a conventional motorized tuning receiver, comprising a chassis 73, tuning elements 74, connected by shaft 74' to a split commutator arrangement 75. Fastened to the shaft 74' is a collar 77 carrying a rod 79, and at the end of the rod is a plastic moulded cap 80 adapted to open the contact elements of switch 81', which is attached to the chassis 73, and is in series with the receiver switch 81 (Fig. 15).

Mounted to the chassis is a reversible tuning motor 82, and around the output shaft 83 is wound, a cord 84 which is connected to the pulley of the condenser shaft 74'; a conductor 60', of cable 85, is center tapped to the two reversing fields 82'. Conductors 86 and 88 are in suitable contact with the commutator plates 75a. The common conductor 60 is in suitable contact with the metal annulus 57 of the electric transfer member 56 (Figs. 9 and 15).

In Fig. 12 there is shown a diagrammatic arrangement of the split commutator, station determining elements 76a, 76b, 76c, 76d, 76e and 76f, and the schematic wiring of the motor 82.

Fig. 14 shows a schematic arrangement of the well-known types of fixed tuning systems employing pre-set capacitances, inductances or crystals, and actuated by a plurality of push buttons and latching means (not shown). Each tuned circuit is open other than the latched station which had been manually operated. In this case, a plurality of open tuned circuits 90a, 90b, 90c, 90d, 90e and a portion of a power circuit 90f, (normally closed), representative of the switch 81' (Fig. 11, 15), are in association with respective relays 91a, 91b, 91c, 91d, 91e, and 92f; each relay is connected to a pair of individual conductors 92a, 92b, 92c, 92d, 92e, and 92f so that when any pair of conductors becomes energized by means of the circuit closers 40, its associated relay will immediately close its associated tuned or power cir-

cuit and remain so due to the operativeness of the latching means. In this manner, a number of stations may be successively tuned to or the power circuit may be opened. The relay 91f is so arranged that when it becomes energized it will immediately open the power circuit.

Fig. 15 includes a diagrammatic showing of the complete wiring of the apparatus. A power cord and plug 93 is connected to the receiver transformer 94. On one side of the circuit are the receiver switch 81 and the series switch 81'. Directly connected to the circuit is the primary winding of a step down transformer 95, one end of the secondary winding being connected by means of the common conductor 60 to the electric transfer member 56. The other end of the winding is attached to conductor 60' and is centre tapped to the two reversing fields 82' of the motor 82. The outer windings of the fields are suitably contacted to the commutators by means of conductors 86, 88.

The operation of the electric transfer unit has already been described and briefly, when the current from the common conductor 60 is daily applied to one of the contacts 53 and conductors 54, the current is brought to its respective contact plate 32 and when one of a plurality of selectively, settable circuit closing elements closes any one of the plurality of circuits, the motor immediately rotates the tuning elements directionally to a preselected position.

It is obvious that any one skilled in the art can easily arrange the previously mentioned system of relays to the same wiring, in substitution of the motor and its associated elements.

Having described the various component parts of the apparatus, we now come to the operation of the receiver and timing means. A plurality of settable circuit closing elements 40 having the tubings 42 arranged in different positions, the lower five positions representing pre-selected radio stations and the uppermost position representing the shut-off position.

These circuit closing elements are selectively insertable in openings 22, of the program pattern disc 16, preferably starting with a particular group of openings representing a particular day. When it is desired to have a station tuned in for a period of more than fifteen minutes, consecutive openings may be skipped for as many periods as it is desired to have the set operate on that station.

After a complete series of programs have been pre-set, including silent intervals, the knob 51 (Fig. 15) is rotated to a position on the dial 47 indicating the present day, thus bringing electric current from the contact 60 (Fig. 9) to one of the contacts 53 and conductors 54, representative of the day. The current is brought to its associated contact plate 32 (we will designate 32a as Sunday and the other plates as succeeding days, as indicated on the arm 24, Fig. 1).

The clock mechanism 10 (Fig. 7), through a train of gears, (Fig. 15), shows gear 67, driving gear 68 and the cam 70, one revolution per day, so arranged that at midnight of each night period, the cam actuates the lever 64 and causes the ratchet 61 to move one-seventh of a revolution.

In this manner, current is daily applied from the contact 60, (Fig. 9), to the metal annulus 57 and contact 58, and to the contacts 53, and conductors 54a—54g (Fig. 8). That is to say, that for a period of twenty-four hours, by means of the cam and ratchet movement, current is sup-

plied to a particular contact 53 and conductor 54, representative of the present day. This electric transfer unit daily applies current by means of the cable 54 to the contact plates 32, in daily successive order to permit the energization of a plurality of open circuits by the said selective, settable circuit closers 40, to cause the motor to actuate the tuning elements to a plurality of preselected positions.

The contact plates 32 have a plurality of extending fingers, and in opposed relationship to the fingers of each contact plate 32 is a set of six contact elements 36a—36f, all of the contacts 36a being joined to terminal lug 38a and representing the shut-off position or silent period, all the contact elements 36b, 36c, 36d, 36e, and 36f being respectively joined to terminals 38b, 38c, 38d, 38e, and 38f, each separate group representing different preselected stations.

As the clock actuates the program pattern disc 16 (Figs. 1 and 2) to cause a settable circuit closer 40 to close a particular circuit, (Fig. 4), represented by the contact element 36d, the current is carried by means of the conductor 76d, which is soldered to the corresponding eyelet 37, to its associated station-determining brush assembly 78, to the binding post of which the conductor 76d is attached (Figs. 12 and 13) and the motor will then directionally rotate the condensers from a station indicated by 76d to the desired position.

It will be perceived that a plurality of pre-selected stations will automatically be tuned to at predetermined times and that when a settable circuit closer closes the circuit of a prong 32' and a contact 36a, the condenser shaft will rotate to one of its extreme positions and the members 79—80 will open the contact elements of switch 81', which is connected in series with the receiver switch 81 (Fig. 15) and the receiver will become silent until another settable circuit closer closes one of the station circuits or until the tuning knob 89 is manually operated to a desired station.

The motor is regularly equipped with a clutch (not shown) so that when the motor becomes energized, the clutch makes positive engagement with the output shaft 83 and when it becomes de-energized, the clutch immediately disengages the shaft 83 thus permitting manual tuning and preventing coasting.

It is understood that when a settable circuit closer is in engagement with a prong of a plate 32 and a contact element 36, and the motor has actuated the condensers to a preselected station, manual tuning is temporarily precluded until the settable circuit closer has passed through the said contacts, otherwise upon attempting to tune the receiver, the motor will immediately "hunt" and bring in the previously pre-selected station.

This system of motorized tuning is well-known and prevalently used in receivers and further information is not required.

In the schematic diagram shown in Fig. 14, the conductors 92a, 92b, etc., are the equivalent of conductors 60'—76a and 60'—76b, etc. respectively. Obviously, then when a selected station is to be tuned to, instead of energizing the motor, one of the station relays will be energized in a well-known manner and the station will be tuned in.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an automatic tuning radio receiver, the combination with a timing mechanism, of a program pattern disc propelled by the timing mechanism, said pattern disc having a plurality of time indications thereon arranged in concentric circles, one circle being provided for each day of the week and having an aperture through said disc at each such indication, a tuning motor and a stationary terminal block, said block being disposed radially relative to said circles and having a plurality of groups of paired spaced contacts selectively connectable in circuit with said motor said groups extending at right angles relative to the plane of said disc, each said group representing a day of the week and being in alignment with a different circle of time indications, means to daily connect one of said groups in the circuit, selectively settable means carried by the pattern disc and associated with the time indications thereon for bridging the gap between a pair of said contacts for closing the motor circuit at pre-determined times to tune the receiver to pre-selected stations, and means automatically operable when a pre-selected station has been tuned to for interrupting the motor circuit.

2. In an automatic tuning radio receiver, the combination with a timing mechanism, of a program pattern disc propelled by the timing mechanism, said disc having a plurality of time indications thereon arranged in concentric circles and having an aperture through the disc at each such indication, a tuning motor and a stationary terminal block, said block being disposed radially relative to said circles and having a plurality of paired spaced contacts, selectively settable means carried by the pattern disc and associated with the time indications thereon for closing the circuit to the motor at pre-selected times to tune the receiver to pre-selected stations, said means

comprising rods individually insertable in selected apertures in said disc and carried by said disc through the gap between the paired contacts, and a circuit closer adjustably settable on each said rod longitudinally thereof to correspond with a pre-selected pair of contacts to bridge the gap between said contacts to close the motor circuit.

3. In an automatic tuning radio receiver, the combination with a timing mechanism, of a program pattern disc propelled by the timing mechanism, said disc having a plurality of time indications thereon arranged in concentric circles, one of said circles being provided for each day of the week and having an aperture through the pattern at each such indication, a tuning motor and a stationary terminal block, said block being disposed radially relative to said circles and having a plurality of groups of paired spaced contacts said groups being normal to said disc, and said contacts being selectively connectable in circuit with said motor, each group representing a day of the week, means to daily connect one of said groups in the circuit, selectively settable means carried by the pattern disc and associated with the time indications thereon for closing the circuit to the motor at pre-selected times to tune the receiver to pre-selected stations, said means comprising rods individually insertable to a uniform depth in selected apertures in the pattern disc and carried by said disc through the gaps between the paired contacts, and a circuit closer adjustably longitudinally settable on each said rod to correspond with a pre-selected pair of contacts to bridge the gap between said contacts to close the motor circuit.

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