Jan. 16, 1945. J. MATT 2,367,363

CONTROL DEVICE FOR RADIO RECEIVERS

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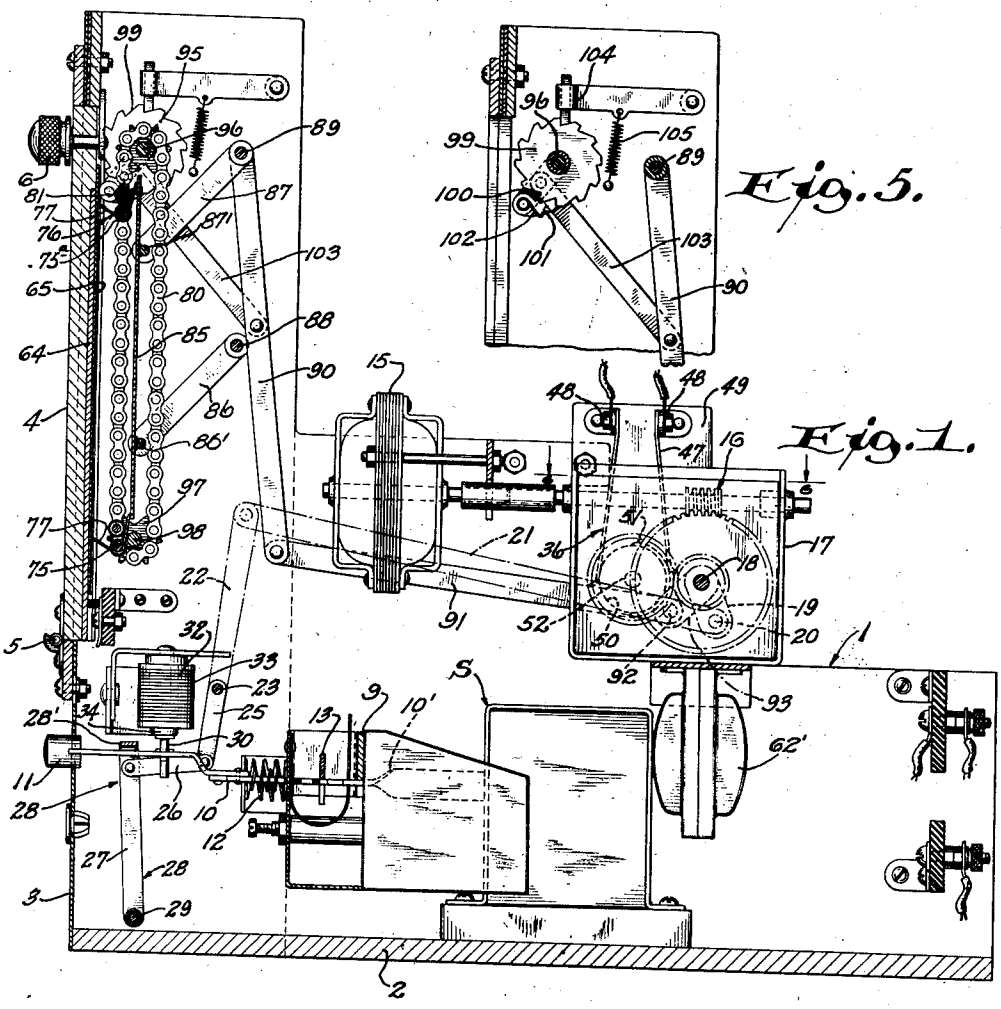


Fig. 1.

Fig. 5.

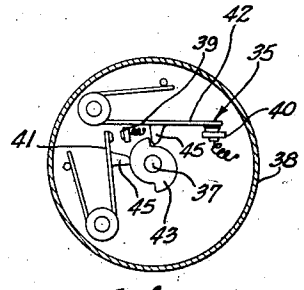


Fig. 8.

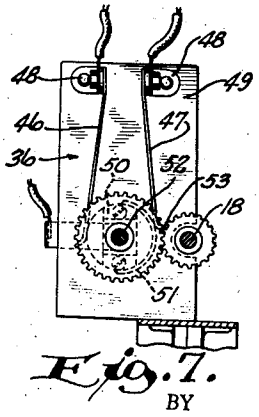


Fig. 7.

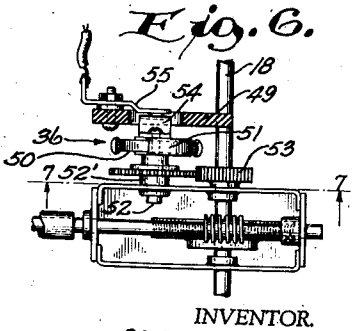


Fig. 6.

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CONTROL DEVICE FOR RADIO RECEIVERS

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Fig. 2.

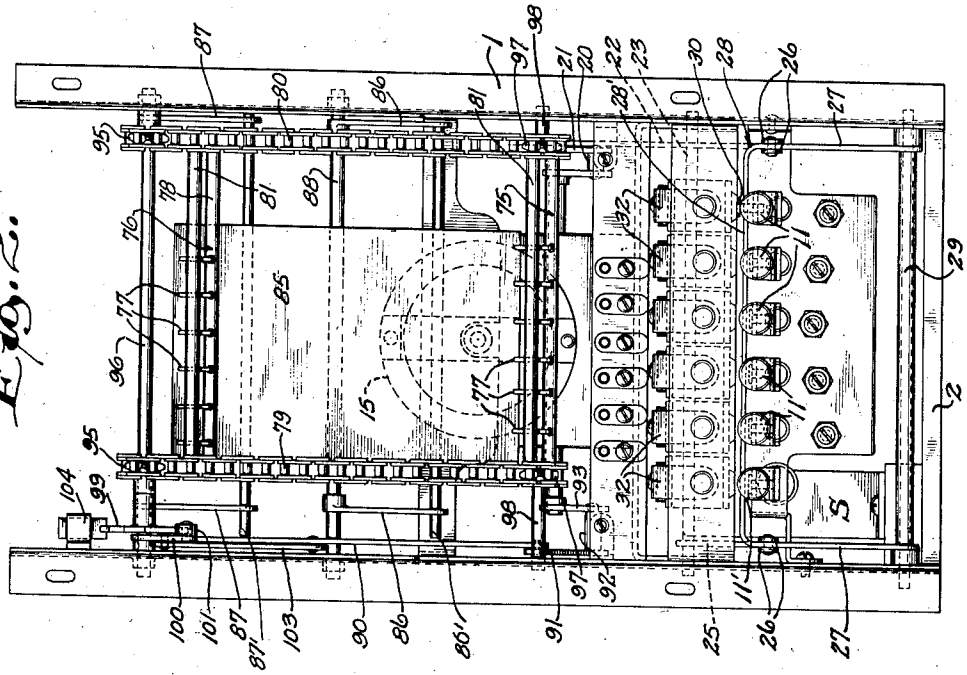
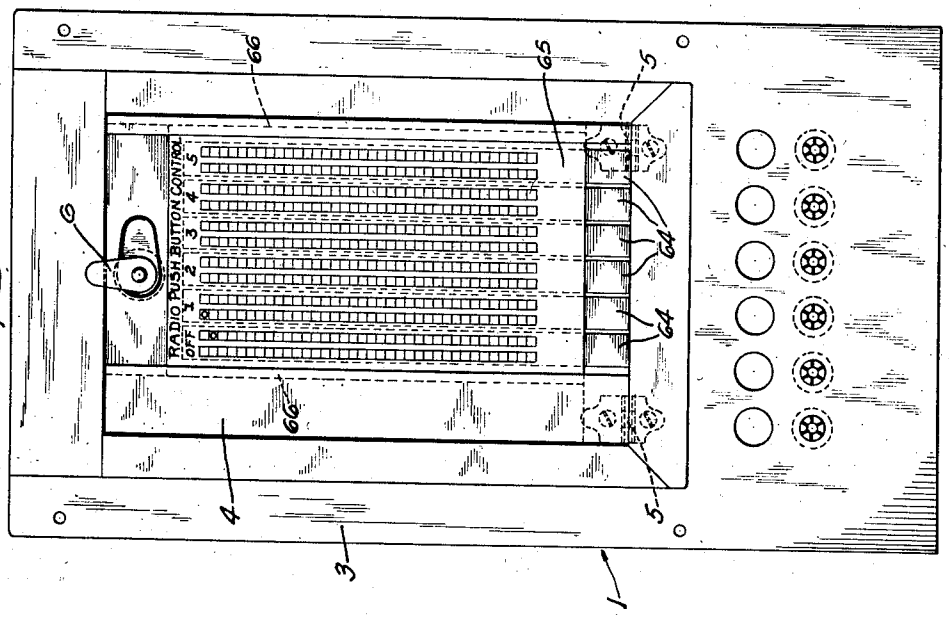


Fig. 3.



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Fig. 4.

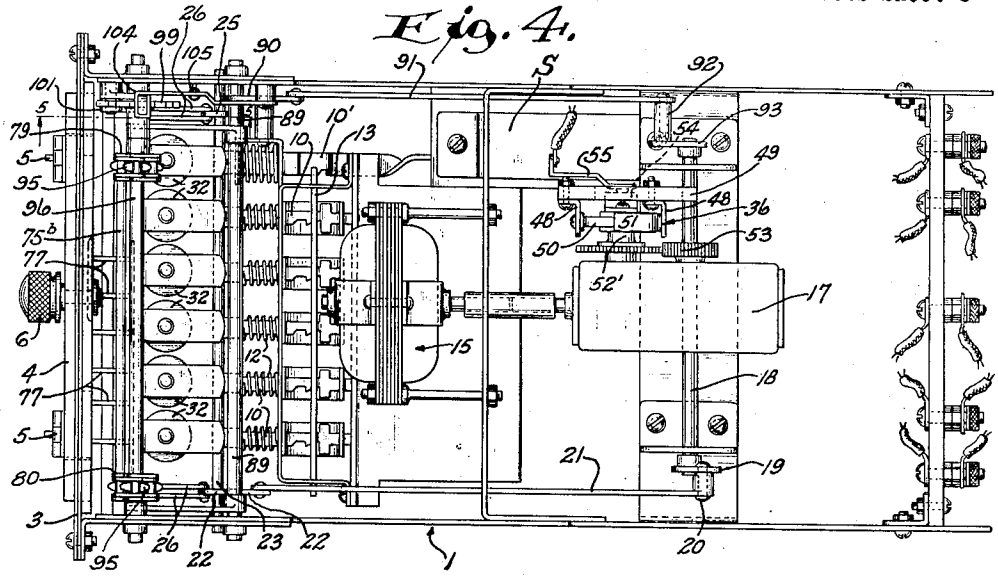
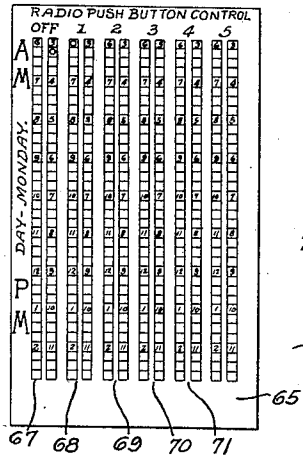


Fig. 9.



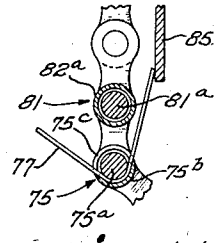
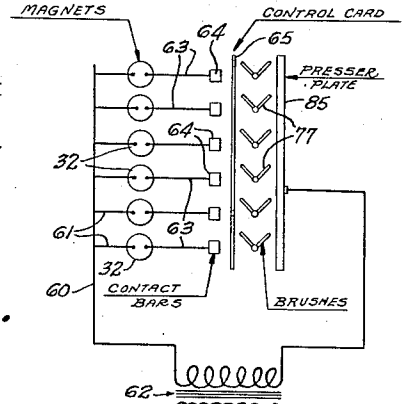


Fig. 11.



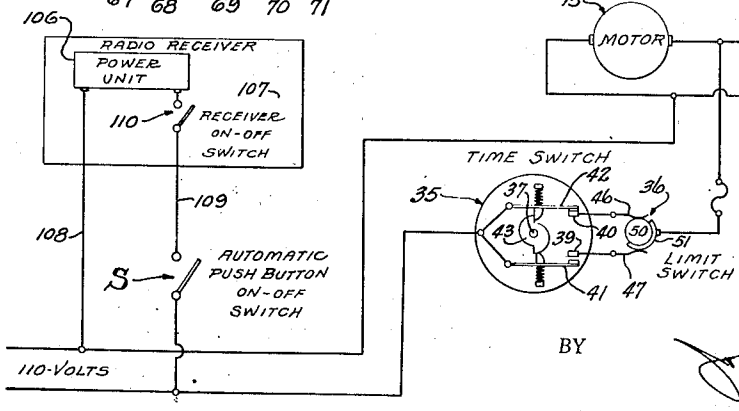


Fig. 10.

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UNITED STATES PATENT OFFICE

2,367,363

CONTROL DEVICE FOR RADIO RECEIVERS

Joseph Matt, Milwaukee, Wis., assignor of one-third to Frank Sonneborn, Jr., Sheboygan, and one-third to Henry Schimkat, Milwaukee, Wis.

Application September 26, 1941, Serial No. 412,414

9 Claims. (Cl. 250—20)

This invention relates to an improvement in control devices for radio receivers of the character which makes it convenient and practical to pre-select the broadcasting stations to be received over a current period of time and to predetermine the time when and the period over which the selected stations are to be received.

An object of the invention is to provide a control device of this character which is simple, compact, and closely organized in construction, which is reliable and efficient in operation, and which requires only ordinary intelligence and a very minimum of manipulation to obtain the maximum of its performance.

In utilizing the device no mechanical manipulations are required. It is only necessary for the user to select the programs which are to be heard and then to punch a controlling card to select the stations to be received and the times when and periods over which they are to be heard.

In carrying out the present invention, use is preferably made of the conventional push button radio receiver control equipped with an "on" and "off" switch ordinarily embodied in such a control. These so-called push button controls comprise generally a resonance varying device capable of selecting a certain signal frequency or a broadcasting station and ordinarily employing a plurality of independently operable push rods which function as wave length selectors. Combined with the push rods is a latching device which serves to hold any manipulated or actuated push rod in operative position until some other one of the group is manipulated.

The present invention provides an electric motor as a source of power for actuating the push rods, the electric motor being operatively interconnected with the operating mechanism for the rods. Usually it is convenient to provide a common actuator for the push rods, the actuator being driven from the motor by suitable motion transmission means. To provide for the selective actuation of the rods a clutch is interposed between each wave length selector and the common actuator, the clutches being normally disengaged and being shifted into engaged or operative position by individual electro-magnets, one such magnet being provided for each clutch.

The energization of the magnets is controlled by a novel type of switching arrangement, which generally includes a circuit for the magnets, with one terminal of each coil of each magnet connected to the one side of the circuit, and the other terminal of each coil of each magnet connected to a fixed contact which may conveniently comprise an elongated contact bar. The contact bars are insulated from each other and are supported adjacent cooperably movable contacts. The movable contacts may be advantageously constituted as brushes having fingers designed for direct contact engagement with the contact bars. The brushes are mounted on an endless carrier in the form of a pair of endless sprocket chains. Interposed between the brushes and the fixed contact bars is an insulating control card which is punched to regulate the electrical contact made between the brushes and the contact bars. The brushes are connected to the opposite side of the circuit from that to which the stationary contact bars are connected.

The electrical motor is utilized not only for driving the actuator of the wave length selectors, but is also employed to advance the endless carrier for the brushes with a step-by-step motion. For this purpose the circuit of the motor has incorporated therein two switches, one a time control switch which periodically opens and closes in such fashion as to initiate the operating cycle of the motor. The other switch incorporated in the motor circuit is a limit switch which functions to terminate each operating cycle of the motor and yet establishes electrical connections in the motor circuit which provide for its completion upon the subsequent closing of the time control switch. With this arrangement the motor operates at predetermined intervals, for example, every fifteen minutes, but, of course, a broadcasting station is tuned in only at the time the controlling card has been punched to effect a selection.

In order to save the control cards from undue wear and tear, the device is constructed so that when the mechanism is idling, the brushes are out of wiping contact with the cards, but for every period at which a selection is or may be made, the brushes are pressed for a short interval into direct engagement with the card, and, consequently also, into direct contact engagement with their cooperable contact bars if the control card is punched to provide for such engagement. For accomplishing this purpose a presser plate is combined with the brushes, and is shiftable into and out of engagement therewith. For shifting the presser into and out of engagement with the brushes suitable motion transmission means is provided between the presser plate and the armature shaft of the motor.

Other objects and advantages reside in certain novel features of the construction, arrangement, and combination of parts which will be

hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this specification, and in which:

Figure 1 is a view partly in side elevation and partly in longitudinal, vertical cross section, showing an automatic time controlled tuning mechanism for radio receivers embodying the present invention;

Figure 2 is a view in front elevation of the device shown in Figure 1, the enclosing structure provided at the front being omitted in Figure 2 for the sake of illustration;

Figure 3 is a view in elevation of the inside of the enclosing structure applied to the front of the device;

Figure 4 is a view in top plan of the machine as shown in Figure 1, parts being omitted for the sake of illustration;

Figure 5 is a fragmentary view in longitudinal vertical cross section taken on line 5—5 of Figure 4 and illustrating elements of the mechanism employed to advance with a step-by-step motion the endless carrier for the brushes of the selector switch mechanism;

Figure 6 is a fragmentary view in horizontal cross section, taken on line 6—6 of Figure 1;

Figure 7 is a fragmentary view in vertical cross section taken on line 7—7 of Figure 6 and illustrating the motor controlled limit switch which terminates each operating cycle of the motors;

Figure 8 is a detail view, partly in section and partly in elevation, illustrating the time controlled switch employed to initiate each operating cycle of the motor;

Figure 9 is a detail view in elevation of the insulating control card which is adapted to be punched to regulate or select the radio stations to be received and the time at which they are to be received;

Figure 10 is a diagrammatic view of the electrical circuits employed in the device; and

Figure 11 is a detail sectional view on an enlarged scale illustrating the construction of movable brush-like contacts and their cooperable restraining or guide members.

Referring to the drawings, it will be seen that the device includes a suitable housing or casing, designated generally at 1. This housing may be of any suitable construction or the device may be built into a cabinet of a radio receiver. As illustrated, the housing 1 includes a base 2 on which the various elements of the device are supported. The front 3 of the housing is preferably equipped with a removable panel or door 4 which may be hingedly supported as at 5 on the front wall of the housing and releasably secured in closed position by a manually operable latch or fastener 6.

The present invention proposes to employ any standard or conventional station selector for radio receiving sets. The construction illustrated is the so-called push button tuning arrangement which incorporates some suitable resonance varying device capable of selecting a certain signal frequency or a certain broadcasting station and ordinarily employing a plurality of independently operable push rods 10 equipped with push buttons 11 slidably supported on the device 9. The push rods 10 are biased to idle position by springs 12, and when any push button is pressed to move its push rod to operative position, it is releasably secured in such position by means of a latch 13 which functions, however, to release the push rod so held when any other one of the group is moved to operative position. Combined with the station selector in the usual way, or in any appropriate manner, is an "on" and "off" switch S which is controlled by a push rod 10' similar to the push rods 10 and the like the latter equipped with a push button 11' at its outer end.

The present invention provides an electric motor 15 as a source of power for actuating the push rods. The armature shaft of the motor is operatively connected to and drives suitable reduction gearing 16 incorporated in the gear box 17. When the motor is running this gearing 16 drives a driven shaft 18 at an appropriate slow speed.

One end of the shaft 18 is equipped with a crank 19 having a crank pin 20 pivotally connected to one end of a link 21. The opposite end of the link 21 is pivotally connected to the upper end of a crank arm 22 fixed to and extending upwardly from a shaft 23 supported for rocking movement in suitable bearings provided therefor on the housing. Downwardly extending crank arms 25 are fixed to the shaft 23 and are each pivotally connected to one end of a double link 26, the opposite end of each double link being connected to one leg 27 of an actuating bail 28. The bail 28 has the lower ends of its legs 27 pivotally supported on a shaft 29 and is designed and arranged so that its body portion 28' overlies all of the push rods whereby the bail 28 is adapted to serve as a common actuator for the entire group of push rods 10 and 10'.

To provide for the selective actuation of the push rods 10 and 10' from the actuator 28, a clutch is interposed between each push rod and the actuator. Each said clutch may conveniently take the form of a headed clutch pin 30, the shank of the pin being slidably fitted in an opening provided in the push rod. If desired, the opening may be countersunk and the pin appropriately beveled so that the top surface of its head lies flush with the top surface of the push rod when in disengaged position. By resorting to this structure the heads of the pins may be disposed closer to the poles of their control magnets. The pins are made of metal having appropriate magnetic permeability and are biased by their weight to disengaged position. An individual electro-magnet 32 is provided for each clutch pin 30. Each magnet 32 includes as usual a winding or coils 33 and a core 34, and, of course, a suitable mounting bracket or frame. When the coil of any one of the magnets is energized the magnetic flux pulls the clutch pin 30 associated with the magnet upwardly so that it is in position to be engaged by the body portion 28' of the bail-like actuator 28. Consequently, the actuator will function to press the push rod whose pin 30 it engages inwardly and move it to its operative position wherein the resonance varying device selects a certain signal frequency or broadcasting station. Upon de-energization of such magnet 32 its clutch pin 30 drops down to a position below the body portion 28' of the actuator 28 so that the actuator is then ineffective to transmit any motion to the push rod.

The motor 15 is periodically operated. Each operating cycle of the motor 15 is initiated by a time controlled switch, designated generally at 35. A motor controlled limit switch, designated generally at 36, is employed to terminate each operating cycle of the motor 15.

The time controlled switch 35 may be actuated by a minute hand 37 of any suitable type of clock, diagrammatically illustrated at 38. The switch 35 includes two fixed contacts, one

designated at 39 and the other at 40. Movable contacts, designated at 41 and 42, cooperate with the fixed contacts 39 and 40, respectively. These movable contacts are biased by suitable springs to engage their fixed contacts, and they are moved to disengaged position by means of a double cam 43 fixed to the minute hand arbor 37 and wiping against cam follower lugs 44 and 45 provided on the movable contacts 41 and 42, respectively.

The motor controlled switch is shown in Figures 6 and 7 and includes a pair of fixed contacts 46 and 47 which may be of the spring blade type. Each of said contacts 46 and 47 has one end fixed to a binding post 48 carried on an insulating panel 49. The lower ends of the contacts 46 and 47 bear against the periphery of a rotary disc 50 constituted of insulating material and having a conducting segment 51 on its periphery and extending for substantially one-half of the circumferential extent thereof. The disc 50 is fixed to a short shaft 52 rotatably mounted in a bearing 52' carried by the gear box 17. The shaft 51 is driven by reduction gearing 53 from the driven shaft 18 of the reduction bearing 16. The segment 51 is provided with an extension 54 of electrical conductive material which extends across the outside face thereof and is in rotative engagement with a conducting blade 55 which is carried by the insulating panel 49 and is connected to one side of the circuit. The arrangement is such in the device illustrated in the drawings that the motor circuit is closed by the time controlled switch 35 at fifteen minute intervals. The motor then starts to run and continues to run until it has completed its operating cycle. At the completion of this operating cycle the limit switch breaks the motor circuit and terminates the action.

A circuit is provided for the electric magnets 32. One terminal of each coil of each of the magnets is connected by a conductor 60 and its branches 61 to one terminal of a step-down transformer 62. The other terminal of the step-down transformer is electrically connected to presser plate 85 to be hereinafter more fully described. The opposite terminal of each coil of each electro-magnet 32 is connected by a wire 63 to an elongated contact bar 64. There is one such contact bar 64 for each magnet 32. These contact bars 64 may be conveniently supported in parallel spaced relation on the door 4. While they are closely adjacent they are separated sufficiently to be insulated from each other. The control card, designated generally at 65, is supported against these contact bars, and if desired the door 4 may have suitable grooves or slots 66 therein to receive and hold the control card 65 in place against the contact bars. The control card 65 has one surface provided with parallel double rows 67, 68, 69, 70, 71, and 72 of graduations and figures. One of these rows, namely the row 67, is to control the turning off of the receiver. The other rows are designed to respectively select a certain broadcasting station or a certain signal frequency. The card may also be employed to display an advertising matter. As illustrated, each double row of figures and graduations represent fifteen minute intervals of an eighteen hour day. Any of these intervals designated on the card 65 may be punched to preselect the turning off of the radio or the turning on of it at any selected time for any selected station which the card is designed to control.

Movable brush-like contacts, designated generally at 75 and 76, are provided to cooperate with the control card 65 and the fixed contacts 64. The contacts 75 and 76 are of identical construction and each includes a rod 75_a extending transversely between and pivotally interconnected with links of sprocket chains 78 and 79, the end portions of the rods 75_a replacing four connecting pins of the sprocket chains. A sleeve 75_b loosely encircles each rod 75_a and is formed with transversely spaced arcuate slots 75_c. Each of these contacts 75 and 76 also includes a row of resilient contact fingers 77 of approximately V shape. Each contact finger 77 has its bight portion confined between its rod 75_a and its sleeve 75_b and has its end portions projecting outwardly through a slot 75_c as clearly shown in Figure 11. Restraining or guide members 81 are combined with the contacts 75 and 76 and each includes a rod 81_a carried by the sprocket chains in the same manner as the rods 75_a and a sleeve 81_b loosely surrounding each rod 81_a and disposed between the end portions of the contact fingers 77. The chains 79 and 80 are supported a slight distance away from the control card 65 and the contact fingers 77 are so dimensioned and positioned that normally they are out of engagement with the control card. During each operating cycle of the motor these contact fingers are pressed against the control card 65, and, when the card is punched, into conductive engagement with the contact bars 64. For this purpose a presser plate 85 is cooperatively related to the contact fingers 75 and 76. The plate 85 is supported by a parallel link arrangement so as to be shiftable into and out of engagement with the contact fingers 75 and 76. The parallel link arrangement includes lower links 86 and upper links 87. The lower links are freely pivoted on a pivot shaft 88. The upper links 87 are fixed to a rock shaft 89. The lower ends of the links 86 and 87 are pivotally interconnected with the projecting ends of shafts 86' and 87', respectively, the intermediate portions of the shafts 86' and 87' being fixed to the rear face of the presser plate 85. A crank arm 90 is fixed to the rock shaft 89 and has its lower end connected to a link 91, the opposite end of the link 91 being connected to a crank pin 92 projecting laterally from a crank arm 93 fixed to the driven shaft 18.

The endless sprocket chains 79 and 80 constitute an endless carrier for the movable contacts or brushes 75 and 76. As illustrated in Figures 1, 2, and 4 these sprocket chains 79 and 80 are trained about driving sprockets 95 fixed on the drive shaft 96 and about idler sprockets 97 fixed on the idler shaft 98. A ratchet wheel 99 is fixed to the drive shaft 96. A pawl carrying lever 100 is freely pivoted on the drive shaft 96 to one side of the ratchet wheel 99. A pawl or detent 101 is pivoted on the outer end of the pawl carrying lever 100 and is biased by spring 102 into engagement with the ratchet wheel 95. A link 103 interconnects the crank arm 90 and the pawl carrying lever 100, the link having one end pivotally interconnected with an intermediate portion of the crank arm 90 and having its other end pivotally interconnected with an intermediate portion of the pawl carrying lever 100. Retrograde motion of the ratchet wheel 95 is prevented by detent 104 pivoted on the housing and biased by spring 105 into engagement with the teeth of the ratchet wheel 95.

By having two sets of brushes or movable contacts 75 and 76 it is practical to use a small size controlling card 65 and yet have a range of selection over an eighteen hour day, the fingers 77 of the brushes 75 coacting with one member of each double row while the fingers 77 of brushes 76 are positioned to contact with the other. The brushes or movable contacts 75 and 76 are successively operable. More specifically, when the contact 75 is disposed between the presser plate 85 and the control card 65 it is the operating or controlling contact, and at such time the contact 76 is disposed to the rear of the presser plate 85 and is idling. After the fingers 77 of the contacts 75 have traversed their rows of the control card 65, the situation is reversed, in that the contact 76 becomes the controlling contact and the contact 75 passes to the rear of the plate 85 and idles.

As illustrated in Figure 10, the power unit 106 of the radio receiver 107 is connected across a 110 volt line by means of a conductor 108 and a conductor 109, the automatic push button "on" and "off" switch S being incorporated in the conductor 109 and being in series with the conventional receiver "on" and "off" switch 110.

With the construction of the character described, the user of the receiver may pre-select the radio programs for eighteen hours of any given day simply by punching the controlling card 65 at the proper place. When the controlling card is inserted in its receiving slots in the door or panel 4 of the device, it is interposed between the movable contact fingers 77 and their cooperable contacting bars 64. Then when the mechanism constituting the present invention is plugged in or electrically connected to a source of current, the motor 15 will be periodically actuated. In the design illustrated, the motor 15 is actuated every fifteen minutes. When the motor 15 runs it rotates the shaft 18. This causes crank pin 92 to act through link 91, crank arm 90, rock shaft 89 and parallel links 87 and 86 to advance the presser plate 85 toward the contacting fingers 75 and 76 and press them against the controlling card 65. The sprocket chains 79 and 80 flex sufficiently to permit this action. If the portion of the card which the fingers engage is punched, then one of the fingers will engage one of the contact bars 64 so as to energize one of the magnets 32, thereby engaging its clutch 30 or pulling it up to position where it is adapted to be engaged by the body portion 28' of the actuator 28. The motor also functions through crank pin 20, link 21, crank arm 22, shaft 23, crank arm 25, and links 26 to oscillate the actuator 28 at this time, thereby providing for the pressing of a push bar from idle to operative position and consequently selecting a certain broadcasting station or a certain signal frequency or turning off the receiver, depending on how card 65 is punched. Moreover, the pawl 101 is clicked back over a tooth of the ratchet wheel 95 so as to be ready to advance the endless carrier at the proper time. As the motor continues to run, the presser plate 85 is withdrawn from engagement with the movable contact fingers 77 so that the magnet 32 that has been energized is deenergized, thereby permitting the clutch pin of its push rod to drop back to disengaged position. And as the presser plate 85 moves rearwardly away from the contact fingers the pawl 101 coacts with the ratchet wheel 95 to impart a partial turn to drive shaft 96 and thereby advance the endless carrier another step. When the motor has completed these functions, the motor-driven limit switch 36 breaks the motor circuit and terminates the cycle although the switch 36 is repositioned for the next cycle.

While I have shown and described one construction in which the invention may be advantageously embodied, it is to be understood that the construction shown has been selected merely for the purpose of illustration or example, and that various changes in the size, shape, and arrangement of the parts may be made without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. An automatic time controlled tuning mechanism for radio receivers comprising a resonance varying device including a plurality of independently operable wave length selectors, a common actuator for said selectors, a clutch between each selector and said actuator, each clutch being biased to disengaged position, an individual electro-magnet for each clutch, each of said magnets acting when energized to engage the clutch with said actuator, an electric motor, motion transmission mechanism between said motor and said actuator, a circuit for said motor, a time controlled switch incorporated in said circuit and acting to periodically close the same and initiate an operating cycle of said motor, a motor controlled limit switch also incorporated in said circuit and operable to open the same and terminate each operating cycle of said motor, a circuit for said electromagnets, each coil of each magnet having one terminal connected to one side of the circuit, individual elongated contact bars connected to the opposite terminal of the coil of each of said magnets, said contact bars being insulated from each other, an endless carrier supported adjacent said contact bars, means actuated by the motor for advancing the carrier with a step-by-step motion, a series of contact brushes mounted on the carrier, connected to the opposite side of said last-named circuit from that to which said contact bars are connected, and engageable with the contact bars, and an insulating card interposed between the brushes and the bars and adapted to be punched to preselect the magnets to be energized and the time at which they are to be energized whereby to pre-select the radio stations to be tuned in over a definite period of time.

2. An automatic time controlled tuning mechanism for radio receivers comprising a resonance varying device having a plurality of independently operable wave length selectors, each of said selectors acting when moved to operative position to select a certain broadcasting station, actuating means for said selectors, an electric motor for driving said actuating means, a circuit for said motor, a time controlled switch incorporated in said motor circuit for periodically closing the same to initiate each operating cycle for the motor, a motor actuated limit switch incorporated in said circuit and acting to open the circuit and terminate each operating cycle of the motor and to provide for a subsequent closing of the circuit when the time controlled switch again closes, electrically controlled means for selectively establishing a driving connection between said actuating means and one of said wave length selectors, and card controlled switch mechanism for regulating the energization and de-energization of said electrically controlled means.

3. An automatic time controlled tuning mech-

anism for radio receivers comprising a resonance varying device including a plurality of independently operable wave length selectors, operating mechanism for selectively moving the selectors from an idle to an operative position, an electric motor, motion transmission means between said motor and said operating mechanism, a circuit for said motor, a time controlled switch incorporated in said circuit to periodically close the same and initiate an operating cycle of said motor, a motor controlled limit switch also incorporated in said circuit and operable to open the same to terminate a cycle of said motor while providing for the subsequent closing of said circuit when the time controlled switch again closes and card controlled switch mechanism for regulating the action of said operating mechanism.

4. An automatic time controlled tuning mechanism for radio receivers comprising tuning means including a plurality of independently operable tuning elements, each tuning element functioning when moved from idle to operative positions to select a broadcasting station of a certain frequency, an actuator for said tuning elements, a clutch between each element and said actuator, each clutch being biased to disengaged position, an individual electric magnet for each clutch, each of said magnets acting when energized to engage its clutch with the actuator, a circuit for said magnets, switch mechanism for regulating the energization and de-energization of the magnets including fixed contacts, movable contacts, and an insulating card interposed between the movable contacts and the fixed contacts and adapted to be punched to provide for the engagement of the movable contacts with the fixed contacts, an electric motor, driving means for said movable contacts actuated from the motor, a circuit for the motor, a time controlled switch incorporated in said circuit to periodically close the motor circuit to initiate an operating cycle of the motor, and a motor-driven limit switch also incorporated in the motor circuit and functioning to terminate each operating cycle of the motor.

5. An automatic time controlled tuning mechanism for radio receivers comprising resonance varying devices including a plurality of independently operable wave length selectors, a common actuator for said selectors, a clutch between each selector and said actuator, each clutch being biased to disengaged position, an individual electro-magnet for each clutch, each of said magnets acting when energized to engage its clutch with said actuator, an electric motor, motion transmission mechanism between said motor and said actuator, a circuit for said motor, a time controlled switch incorporated in said circuit to periodically close the same and initiate an operating cycle of the motor, a motor controlled limit switch also incorporated in said circuit and functioning to terminate each operating cycle of the motor, a circuit for said electro-magnets, each coil of each magnet having one terminal connected to one side of the last mentioned circuit, an elongated contact connected to the opposite terminal of each of said coils, said contacts being insulated from each other, an endless carrier supported adjacent said contacts, means driven by the electric motor for advancing the carrier with step-by-step motion, a series of contact brushes mounted on the carrier in cooperative relation to said fixed contacts, an insulating card interposed between the brushes and the contacts adapted to be punched to preselect the magnets to be energized and the time of their energization, and a presser plate actuated by the motor and cooperable with the brushes for connecting them to the opposite side of the last named circuit from that to which said elongated contacts are connected and for pressing them toward the elongated contacts during each operating cycle of the motor.

6. An automatic time controlled tuning mechanism for radio receivers comprising a resonance varying device including a plurality of independently operable wave length selectors, an independently operable "on" and "off" switch, operating mechanism for selectively moving the selectors from an idle to an operative position and for moving the "on" and "off" switch to an "off" position, an electric motor, motion transmission means between said motor and said operating mechanism, a circuit for said motor, a time controlled switch incorporated in said circuit to periodically close the same and initiate an operating cycle of said motor, a motor controlled limit switch also incorporated in said circuit and operable to open the same to terminate the cycle of said motor but providing for the subsequent closing of said circuit when the time controlled switch again closes, and card controlled switch mechanism for regulating the action of said operating mechanism.

7. An automatic time controlled tuning mechanism for radio receivers comprising a resonance varying device including a plurality of independently operable wave length selectors, operating mechanism for selectively moving the selectors from an idle to an operative position, an electric motor, motion transmission means between said motor and said operating mechanism, a circuit for the motor, means incorporated in the circuit to periodically close the same and initiate an operating cycle of said motor and also to open the same to terminate a cycle of operation of the motor while providing for its subsequent closing at the time the control switch again closes, and card controlled switch mechanism for regulating the action of said operating mechanism and including fixed contacts, movable contacts, an insulating card interposed between the movable contacts and the fixed contacts and adapted to be punched to provide for the engagement of the movable contacts with the fixed contacts at predetermined times, and means actuated by the motor for advancing the movable contacts with a step-by-step motion during each operating cycle of the motor.

8. An automatic time controlled tuning mechanism for radio receivers comprising a plurality of independently operable tuning elements, each tuning element functioning when moved from idle to operative position to select a certain broadcasting station, operating mechanism for selectively moving the tuning elements from an idle to an operative position, electro-magnets operable to select the tuning elements to be actuated by said operating mechanism, an electric motor, motion transmission means establishing a driving connection between said motor and said operating mechanism, a circuit for said motor, means incorporated in said circuit to periodically close the same and initiate an operating cycle of said motor, and also acting to break the motor circuit upon the completion of each operating cycle of the motor, a circuit for said electro-magnets, card controlled switch mechanism incorporated in said last mentioned circuit and including an

individual elongated fixed contact for each magnet, each of said contacts and its magnet being connected to one side of said last named circuit, said contacts being insulated from each other, an endless carrier supported adjacent said contacts, means driven by the electric motor for advancing the carrier in a step-by-step motion, a series of contact brushes mounted on the carrier and disposed adjacent to but spaced from said fixed contacts, an insulating card interposed between the brushes and the fixed contacts and adapted to be punched to pre-select the magnets to be energized and the time of their energization, and a presser plate of conductive material, actuated by said motor during each operating cycle thereof, to engage said brushes whereby to electrically connect them to the opposite side of the last-named circuit from that to which said elongated contacts are connected and to press them toward said elongated contacts during each operating cycle of the motor.

9. An automatic time controlled tuning mechanism for radio receivers comprising tuning means including a plurality of independently operable tuning control elements, each tuning control element functioning when moved from idle to operative position to select a broadcasting station of a certain frequency, an actuator for said tuning control elements, a clutch between each element and said actuator, each clutch being biased to disengaged position, an individual electro-magnet for each clutch, each of said magnets acting when energized to engage its clutch with the actuator, switch mechanism controlling the energization and deenergization of said magnets and a punched card coacting with the switch mechanism to open and close the same.

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