

June 10, 1941.

E. BRUGGER

2,244,658

CONTROLLING MECHANISM FOR RADIO SETS

Filed June 23, 1937

3 Sheets-Sheet 2

Fig. 4.

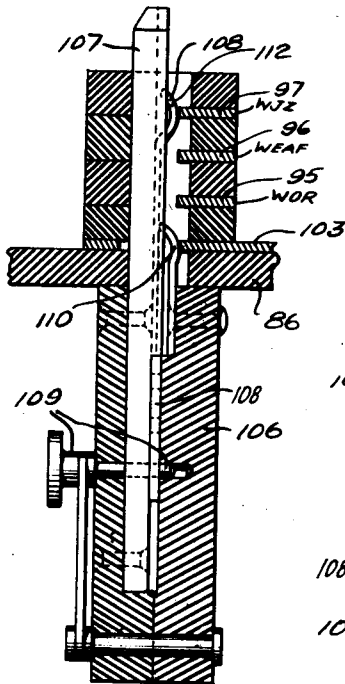


Fig. 5.

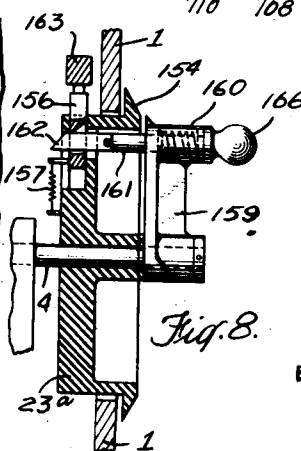
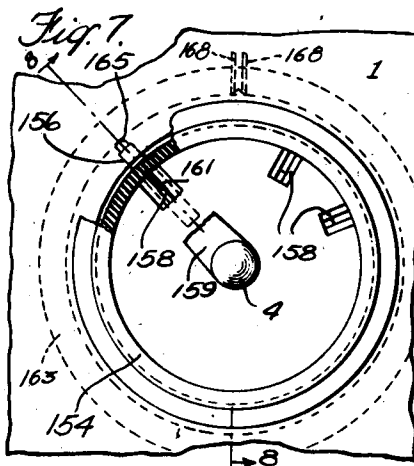
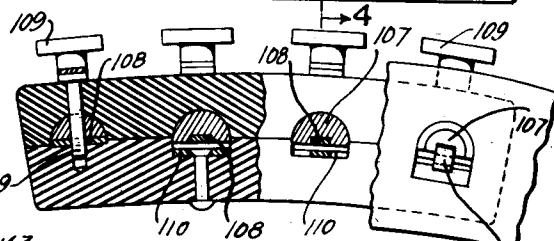
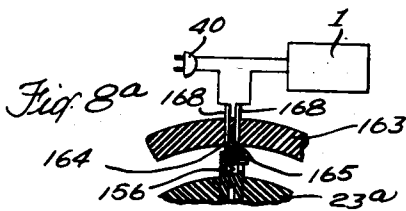
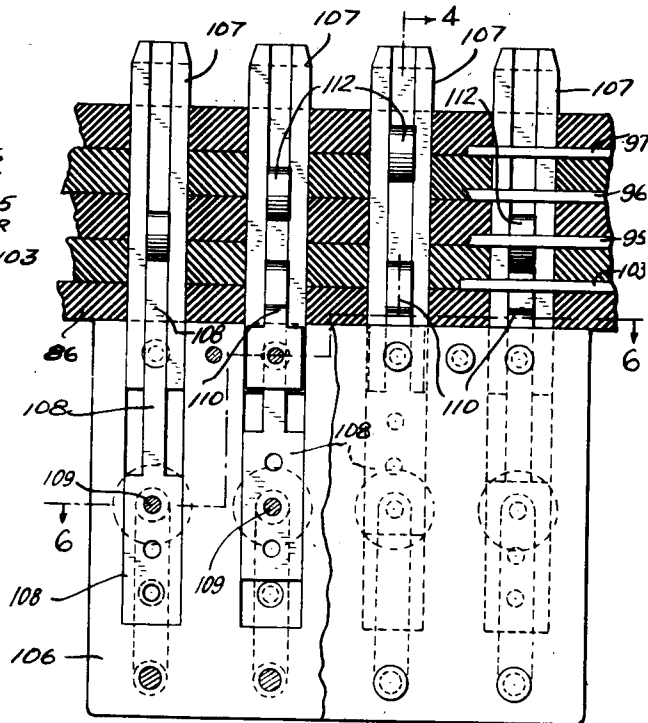


Fig. 6.

Fig. 8.

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June 10, 1941.

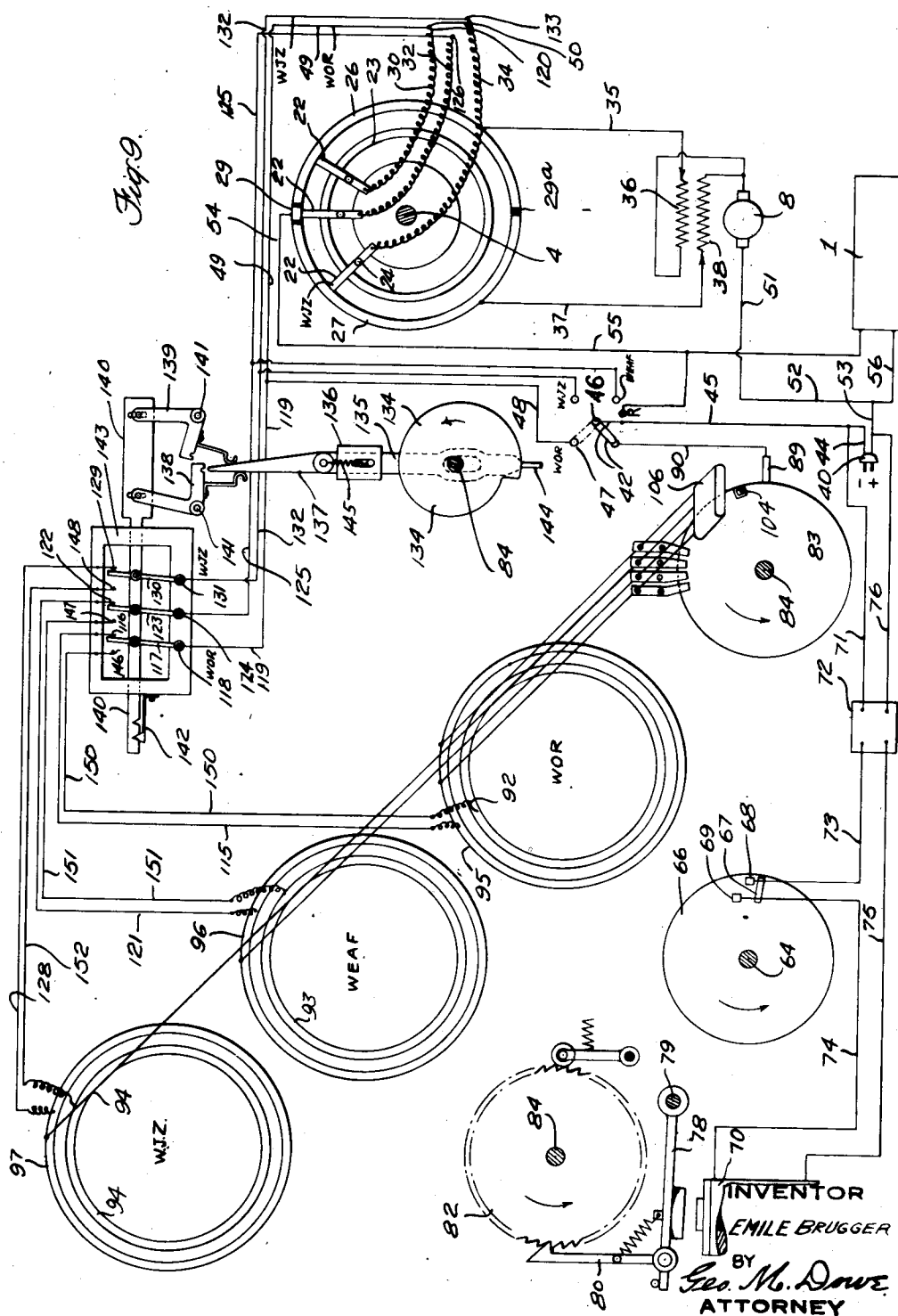
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,244,658

CONTROLLING MECHANISM FOR RADIO SETS

Emile Brugger, Valley Stream, N. Y.

Application June 23, 1937, Serial No. 149,813

1 Claim. (Cl. 175-301)

This invention relates to controlling mechanism for a radio set and is an improvement on my application Serial No. 61,295 filed January 29, 1936, which has since matured into Patent #2,106,715 dated Feb. 1, 1938.

Many of the features disclosed in said application such as the ability automatically to select any one of a plurality of stations throughout the period of twenty-four hours with provisions for determining the time during which any particular station shall be received are included herein.

The present invention, however, has for its principal object the greater flexibility of control in the selecting of stations.

With this general object in view, a feature of the invention resides in the provision of a plurality of normally ineffective station selectors carried by or movable with the tuning mechanism of a radio set with provisions for rendering any station selector effective and at the same time moving the tuning mechanism to select a station in accordance with a station selector which has been rendered effective.

A further feature of the invention resides in the provision of one or more devices of unitary structure which for convenience of nomenclature, I designate determinators, which determinator or determinators when plugged into the panel board of the radio set are adapted to cooperate with station selecting members and time unit devices with provision for rendering the control of a determinator ineffective and directly controlling the effectiveness of any station selector by manually settable means.

A further feature of the invention relates to a determinator which may be plugged into the panel board of a radio set, which determinator is of unitary structure but carrying a part or parts which may be adjusted so that when said determinator is plugged into the panel board the adjustment of a part or parts carried thereby will determine whether the determinator cooperates with one or another of a plurality of station selecting members. Said determinator may carry a plurality of elements each of which may be independently adjustable to cooperate with different station selecting members in any order depending upon the adjustment of each adjustable part of each element. As for example a determinator may carry four elements each of which has an adjustable part, each of which may be adjusted to cooperate with any one of a plurality of station selecting members, each element determining how long a particular station shall be received.

Still another feature of the invention relates manual means for quickly preselecting any one of a plurality of stations and automatically rendering effective the circuit for the radio set.

Further features will become apparent from the following detailed description and claim when taken in connection with the accompanying drawings in which:

Figure 1 is a front view of a portion of the panel board of a radio set with portions of the panel board broken away.

Figure 2 is a section on the line 2-2 of Figure 1.

Figure 3 is a section on the line 3-3 of Figure 1.

Figure 4 is a section on the line 4-4 of Figure 5.

Figure 5 is a part elevational and a part sectional view of a determinator having four elements carried thereby and showing the determinator plug into the panel board.

Figure 6 is a section on the line 6-6 of Figure 5.

Figure 7 is a detail showing some modification of the construction of the panel board to provide for manual selection of a station and manual movement of the tuning mechanism.

Figure 8 is a section on the line 8-8 of Figure 7.

Figure 8a is a part section and part diagrammatic view of parts of Figure 8.

Figure 9 is a diagrammatic assembly view showing the arrangement of the electrical circuits and details of mechanism.

Referring to the drawings in detail, 1 indicates the panel board of a radio set, said set as shown in Figure 9, also being designated as a whole by the same reference character. Just inside of the panel board is shown one element 2 of the usual condenser which with the stationary element 3 thereof, constitutes the usual tuning mechanism. The movable member 2 of the condenser is mounted on a shaft 4 to which is attached the usual dial 5.

An electric motor 6 is provided with a shaft carrying a worm 7 which engages a worm wheel 8 secured to a shaft 9, supported at one end by an up-standing bracket 10 and at the other end by bearing 11. A friction clutch 12 enables the motor to drive the shaft 4 but permits hand setting of said shaft independently of the motor drive. The motor is reversible, adapting it for use where the condenser is limited to an arc of about 180°, although the invention is

not limited to a condenser of this limited range of movement.

To enable the motor to position the condenser to select different stations, it is necessary to control the movement of the shaft 4 by the motor and this is brought about through the medium of a plurality of station selectors or brushes 22 carried by a member 23 secured to the shaft 4, Figures 2 and 9.

In the present embodiment, for purpose of illustration only, three station selectors 22 are shown, each one appropriate to a station. It is obvious, however, that others may be provided. The station selectors 22 are adjustable circumferentially of the member 23 by means of screws 24 engaging in a circumferential slot in the member 23. The selectors 22 are of electrical conducting material and are adapted to engage either a conducting segment 26 or a similar segment 27. These segments are suitably supported in a frame 28 and are separated by a gap, in the center of which is a small conducting segment 29 which is insulated from the segments 26 and 27. Each segment extends through an arc a little less than 180° and their ends remote from the conducting segment are separated by a small segment 29a of nonconducting material. Connected to the selectors 22 are respective electric conductors 30, 32 and 34, Figures 1 and 9. These conductors are in the form of coiled wire and so wound that the coils may expand and contract as the member 23 is rotated in one direction or another. From the segment 26 a conducting wire 35 leads to the field 36 of the motor. A similar wire 37 is connected to the segment 27 and leads to the other field 38 of the motor.

The current for supplying the motor and the operating circuit for the radio set may be derived from any suitable source and as shown in Figure 9, the usual plug 40 is provided.

In one form of my invention, a circuit is closed through any one of the station selectors 22 through the medium of a timing mechanism and a determinator. This mechanism is used for automatic selection of a station at a predetermined time. This automatic selection is similar to that of my aforesaid application and will be described later in greater detail.

As stated, one of the features of the present invention resides in the provision of means whereby the automatic control through the timing mechanism and a determinator is rendered ineffective and manual control of station selecting brought about. For this purpose, referring to Figure 1 there is provided a lever 42 which in normal position forms part of the circuit between the determinator and timing mechanism whereby said mechanisms are effective to control station selection. The lever 42 may, however, be moved from its normal position shown in Figures 1 and 9, to any one of four other positions. When moved to any one of three of these positions it directly closes the motor circuit through one or another of the station selectors 22.

To illustrate the operation of the mechanism thus far described and assuming that the lever 42 has been moved from its normal position shown in full lines in Figure 9 to the dotted position in said figure, then current from the minus side of the line at the plug 40 will pass along the conductors 44 and 45 to the terminal 46, thence by reason of the position of lever 42, it will pass to the terminal 47; along conductors 48 and 49

to terminal 50, thence through wire 30 to the station selector 22 which in the particular illustration corresponds, for instance, to station WOR. The current will then pass through the selector 22 to the segment 26, through the conductor 35 to the field 36 of the motor 8, thence through conductors 51, 52 and 53 to the plus side of the line. It is to be noted that at this time there is no current supplied to the radio set. However, when the motor begins to operate, the member 23 is rotated in an anti-clockwise direction until the brush or station selector 22 corresponding to WOR reaches the gap between the segments 26 and 27. At this time the motor circuit will immediately be broken and the motor and the parts driven thereby will stop. The tuning mechanism has then been positioned to select the particular station, in this case WOR. At this time the operating circuit for the radio set is established. This is brought about by means of a conductor 54 which is connected to the small conducting segment 29 thereby establishing a current through conductor 54, conductor 55 to the radio set, current passing from said set through conductor 56 to conductor 53 and thus to the plus side of the line.

The station thus selected by the lever 42 will continue to play as long as the said lever is connected with the particular station, namely WOR.

At any time said lever may be shifted from WOR to any other station, as for instance to selector 22 corresponding to WJZ or WEA. When so shifted, the circuit through the radio set is immediately broken and a circuit established through the station selector 22 corresponding to WJZ or WEA. If for instance station WJZ has been selected the member 23 must be rotated in a clockwise direction and it will be noticed at this time that the WJZ selector engages the segment 27. The current then passes through conductor 37 to the field 38 of the motor which acts to reverse the direction of movement of the same and thereby to cause the member 23 to rotate in a clockwise direction. This will result in the selector for WJZ being moved to the position shown in Figure 9 as there occupied by the selector WEA. When WJZ is in such position, the motor circuit is broken as previously described and the operating circuit for the radio set established.

While the control of station selecting through the timing mechanism and one or more determinators is in general similar to that shown in my application above referred to, some changes have been made to simplify the construction and in order that the present disclosure may be complete, the mechanism for automatic control will now be described.

Referring to Figure 2 there is provided at the left-hand portion thereof a timing mechanism, such as an electric clock, and constituting a constant speed motor, diagrammatically shown at 60. On the shaft 61 of this motor which makes one rotation in fifteen minutes, is a friction clutch, one member of this clutch 62 being connected to the shaft 61 while the other member 63, is connected to a shaft 64 suitably supported in the casing. At its outer end the shaft 64 carries a knob 65 which may be turned independently of the constant speed motor by reason of the friction clutch. The shaft 64 carries a disc 66 having an electrically conducting lug 67, Figure 9, which at each rotation of the shaft 64 and its carried disc 66 bridges electric ter-

minals 68 and 69 to thereby energize electro-magnet 70.

The current for this magnet passes from the minus side of the line, Figure 9 through conductor 71 and through a transformer or resistance 72 to conductor 73, thence through the lug 67 to conductor 74. The return circuit from the electro-magnet is completed through conductors 75 and 76.

With the mechanism just described, the circuit through the electro-magnet 70 is closed once every fifteen minutes and when closed actuates an armature 78 pivoted at 79. At its left hand end the armature 78 carries a pawl 80 which engages the teeth of a ratchet wheel 82 secured to a shaft 84 suitably supported in the casing of the radio set.

A plate 86 is secured to the panel board just back of an opening 87 therein, said plate being provided with two circular series of holes, Figure 1, into which any one or more determinators may be inserted.

Secured to the shaft 84 just inside of the plate 86 is a cup 83, the upper portion of which as viewed in Figure 3, carries a disc 88 having on its periphery an electrically conducting ring 85 which is constantly engaged by a spring pressed brush 89 to which is connected an electric conductor 90 which in turn connects with the lever 42. When said lever is in the normal position shown in full lines in Figure 9, current will be supplied to the brush 89 and thence to the ring 85.

Arranged about the periphery of the disc 88 are two series of members in the form of rings, the inner series consisting of the rings 92, 93 and 94 and the outer series, of rings 95, 96, and 97. These rings are of electrically conducting material but are separated from each other and from the plate 86 by insulating rings 98. The rings 92 to 97 constitute a station selecting mechanism and there are as many rings in each series as there are stations to be selected. As in my previous application the inner series of rings enable the selection of stations during the P. M. period, while the outer set or series of rings correspond to the A. M. period. All of the rings are secured together and to the plate 86 and are stationary.

Each of the insulating rings 98 is provided with perforations as indicated in Figure 3, the perforations of the inner series being continuous and registering with a similar series of perforations 100, Figure 1, in the plate 86. The perforations of the outer series are arranged in groups of four and register with corresponding groups of perforations 102, in the plate 86. Between the plate 86 and the adjacent insulating ring 98, Figure 3 are a series of time unit devices 103 (see also Figure 1). Each of these time unit devices has two holes registering with the perforations respectively in the insulating rings and the plate 86. There are as many of these time unit devices as there are time unit intervals. In the present embodiment, since the time unit interval chosen is one-quarter of an hour, forty-eight time unit devices are provided.

For convenience in description, the rings 92 and 95 are shown as appropriated to station WOR, the rings 93 and 96 to WEAJ and the rings 94 and 97 to WJZ.

A spring pressed electrically conducting contact pin 104 carried by the cup 83 makes contact with one or another of the time unit devices 103 as the cup and disc 88 are advanced step

by step by the pawl 80 under control of the timing mechanism.

In this connection, it is pointed out that the contact pin 104 remains in contact with a time unit device during a definite time interval. In the present embodiment this is fifteen minutes. When, however, the electro-magnet 70, Figures 3 and 9, is energized, the cup 83 and its carried contact pin 104 make a step of movement so that the contact pin passes from engagement with one time unit device into contact with the next adjacent time unit device.

The selecting rings 92 and 95 are electrically connected through switching mechanism, which will be later described, to the appropriate station selector 22. If, therefore a particular time unit device with which the pin 104 is in contact, is bridged with a particular station selecting ring or member, the station selector 22 appropriated to that particular station will be included in the circuit and hence cause the motor to become energized and the selection of a particular station brought about. The bridging of one or more time unit devices with one or more station selecting rings is brought about by means of determinators which may be plugged into the plate 86 of the panel board and determine the selection of a particular station.

The determinators of the present invention differ in construction from those disclosed in my prior application already referred to and that construction will now be described.

Each determinator consists of a handle portion 106, of insulating material, Figures 4 and 5, and one or more elements. Each element comprises a stationary part 107 and an adjustable part 108, the adjustable part being slidable longitudinally of the part 107 as clearly shown in Figures 4 and 5 and is electrically conducting. The lower portion of each part 108 is provided with three holes any one of which may be brought into register with a hole in the part 107 and a spring pressed plunger 109 holds the part 108 in any one of its adjusted positions. Each element of each determinator carries a contact 110 secured to the handle portion 106 and each part 108 of each element carries a contact 112 which may engage different station selecting rings according to the adjustment of the part 108 longitudinally of the part 107.

In my prior application above referred to, each element of the determinators has a definite contour enabling it to cooperate with a time unit device and with one or another station selecting ring. It was therefore necessary to provide not only determinators having a different number of elements to control the time interval but it was also necessary to provide a different determinator for each station.

In the present embodiment of my invention with determinators having adjustable elements, the same determinator may select any station and the necessary number is thereby reduced. Of course in order that a set-up may be made for the entire twenty-four hours of the day and night, it may be desirable to duplicate some determinators, but this is a matter of convenience rather than necessity.

Referring again to Figures 4 and 5, it will be noted that the determinator there shown carries four elements and referring particularly to Figure 5, the element at the left has its part 108 adjusted for the station WOR, the next element to the right being adjusted for WEAJ, the third for WJZ and the fourth for WOR. When a determinator of this character is positioned as

shown in Figure 5, station WOR will be received for fifteen minutes, WEAf and WJZ for the succeeding two intervals of fifteen minutes and WOR again received during the last fifteen minutes of any particular hour chosen. The contacts 110 always engage a time unit device 103 but the particular station selecting ring which is contacted by the contact 112 is determined by the adjustment of the part 108 of each element.

As long as the contact pin 104 is in contact with a particular time unit device, which time unit device is at the moment in electrical contact with a station selecting ring, a circuit will be established to one or another of the station selectors 22. Just as soon, however, as the pin 104 passes to a time unit device which is not bridged to a station selecting ring, by an element of a determinator, the circuit is broken, as will be more definitely set forth hereinafter.

Referring to Figure 1 the inner or P. M. series of holes in the plate 86 are continuous and equally spaced from each other, the outer series of holes corresponding to A. M., however, are arranged in groups of four, but the arc passing through the center of said group of holes is struck from the same radius as the adjacent group of holes corresponding to P. M. This enables a determinator having four elements to be placed in any group of A. M. holes or in any four adjacent P. M. holes.

The face of the cup 83 adjacent the plate 86 is inscribed with a series of fifteen minute time intervals running through twelve hours which are visible through a sight opening 114 provided in the plate 86. A knob 113 on shaft 84 serves the purpose of setting the cup in case the clock should stop. The knob 65 also serves to set the disc 66.

Assuming that a determinator having four elements such as shown in Figure 5 has been plugged into a group of holes 102 in the panel board, and that lever 42 is in full line position shown in Figure 9, the current then passes from the minus side of the line through lead 44 to terminal 46, through lever 42 to conductor 90 and brush 89 to ring 85 whence it is conducted through wire 115a to contact pin 104 thence through the time unit device 103 which is at the moment in contact with said pin, thence by means of contact 110, Figure 4, and electrically conducting part 108 to contact 112 to any one of the station selecting rings depending upon the adjustment of the particular element of the determinator. In Figure 5 as already stated, the left hand element is adjusted for the station WOR and therefore said element will conduct the current to the ring 95. Referring now to Figure 9, the current will pass from the ring 95 along wire 115 to terminal 116 through switch arm 117 to terminal 118, thence along wire 119 to terminal 120 which is connected to the station selector 22 by means of wire 30. Current will then be supplied to the motor, the member 23 will begin to rotate and position the tuning mechanism to select the station WOR. As soon as this station has been selected the motor circuit will be broken and the operating circuit for the radio set established as has already been described. Referring again to Figure 5, the second element from the left has been adjusted to station WEAf and hence a circuit will be closed to the selecting ring 96 as soon as the pin 104 passes into contact with the time unit device 103 with which the contact 110 of the element adjusted for WEAf makes contact. From the ring 96 corresponding to WEAf, 75

Figure 9, current passes along the wire 121 to terminal 122 thence through switch arm 123 to terminal 124 and by means of wire 125 it passes to terminal 126 thence along wire 32 to the station selector 22 corresponding to WEAf. Referring again to Figure 5, the third element from the left has its part 107 adjusted for station WJZ and the current at the proper time will pass to conducting ring 97 thence along wire 128 to terminal 129, switch arm 130, to terminal 131 and thence by means of the wire 132 to terminal 133 which is connected to the WJZ station selector 22 by means of wire 34.

It is to be noted that the switch arms 117, 123 and 130 are in such position that they are connected to the terminals of wires 115, 121 and 128 which wires in turn are connected to the outer rings 95, 96 and 97 respectively, which rings are the A. M. rings.

In order that the control exercised by the determinator may automatically be switched from A. M. to P. M., means are provided for moving the switch arms 117, 123 and 130 when the time indications visible through the slot 114 pass from A. M. to P. M. or from P. M. to A. M.

For this purpose the shaft 84, Figures 2 and 9, carries a cam 134 which controls movement of a slide 135 slotted to engage the shaft 84 and guided in a sleeve 136. A spring 145 normally tends to move the slide upwardly as shown in Figure 9. Pivoted to the slide is an arm 137 the upper end of which may engage a notch in a bell crank lever 138 or 139 depending upon the position of the slide 140 to which the bell cranks 138 and 139 are loosely pivoted. These bell cranks are suitably supported by stationary pivots 141. The switch arms 117, 123 and 130 are pivoted to the slide 140, the left hand end of which is provided with two notches with either of which a spring 142 may engage. In the position of the parts shown in Figure 9, the left hand notch is in engagement with the spring 142. The switch arms 117, 123 and 130 are pivoted at their lower ends to a frame 143. When the shaft 84 has been rotated to such a position that the end 144 of the slide 135 drops off the high part of the cam 134 the spring 145 acts to move the slide 135 upwardly and its end engages the notch in the bell crank 138 and moves the slide 140 to the left thereby moving the switch arms 117, 123 and 130 so that the contacts 116, 122 and 129 are broken and contacts 146, 147 and 148 established. Contact 146 is connected by wire 150 to the inner station selecting ring 92 corresponding to WOR. The contact 147 is connected by means of wire 151 to the inner station selecting ring 93 corresponding to WEAf and the contact 148 is connected by means of wire 152 to the inner station selecting ring 94 corresponding to WJZ. In this connection it is to be noted that the shaft 84 makes one rotation each twelve hours and the drop in the cam 134 is so positioned that the slide 135 is permitted to move under influence of its spring just as the numeral 12 passes the sight opening 114, Figure 1.

With the switching mechanism above described, the control which a determinator exercises on station selecting is thus automatically changed from A. M. to P. M. or from P. M. to A. M. and the user of the radio set may thus set up a program which may be received at various times during the twenty-four hours depending upon the position of the several determinators used and the adjustment of the elements of each determinator.

During automatic station selection under control of the determinators, the lever 42, Figures 1 and 9, is in the position shown in full lines in Figure 9 which may be considered its normal position.

At any time, however, this lever may be moved from its normal position to any one of three other positions (the present disclosure having for purposes of illustration, only three stations) and when so moved the circuit leading to the brush 89 is broken and automatic control of station selection by the determinators is suspended and direct control of the member 23 is brought about. The operation of the motor to move the tuning mechanism to the particular station selected by lever 42 has been already fully described. When lever 42 is moved to a fourth position, marked R, in Fig. 1, the circuit to the radio set is directly closed as illustrated in Figure 9 and station selecting may be brought about in the usual way by turning the knob 6.

In the modification of the invention shown in Figures 7, 8 and 8a, the movement of the tuning mechanism and the rendering of a station selector effective are both manually controlled. In this modified form of the invention the shaft 4 carrying the tuning mechanism is extended a short distance beyond the panel board as shown in Figure 8 and the member 23a carrying the station selectors is somewhat modified. This member is somewhat cup-shaped and may carry a dial 154 having the usual arbitrary graduations for station selection. The station selectors 156 are carried by the member 23a but are somewhat differently constructed from the selectors 22. Each selector is movable radially in a slot in the member 23a and is normally urged to inoperative position by a spring 157 as clearly shown in Figure 8. The member 23a is also provided with several apertures, 158, one for each station. Loose on the shaft 4 is an arm 159 having a housing 160 at its outer end for carrying a spring pressed plunger 161. The plunger is bevelled on its inner face at 162 and when the plunger is in operative position as shown in Figure 8, the bevel face 162 engages a corresponding bevel face on a station selector 156 such movement acting to cam the station selector to operative position. Surrounding the station selectors is a control ring 163 having a notch 164 at one portion of its inner periphery, which notch is adapted to be entered by a spring pressed detent 165 carried by each of the station selectors 156. When the detent enters this notch the tuning mechanism is positioned at the station desired. The operation to select a particular station will be understood from a consideration of Figures 7, 8 and 8a and consists in first pulling out the knob 166. This disengages the end of the plunger from the station selector 156 with which it was previously engaged. The arm 159 is then moved to position its plunger opposite another slot 158 corresponding to the new station desired. The knob 166 is then released and a spring within the housing 160 causes the

plunger to be moved to the left as shown in Figure 8 and its cam end 162 moves the station selector radially. The arm 159 is then rotated and with it the member 23a and the shaft 4 until the station selector which has been protruded engages in the notch 164. This acts as a check or locating device for the parts which have been moved by the lever 159, including the tuning mechanism, which is then in position to tune in the station selected. This movement also results in establishing the operating circuit for the radio set and the manner in which this is accomplished is illustrated in Figure 8a. Two leads 168 pass through the ring 163 adjacent the notch 164 and are bridged by the detent 165 which is of electrical conducting material.

After the knob 166 is pulled out and the plunger 161 disengaged from a station selector 156, the spring 157 immediately moves the selector to inoperative position thereby breaking the circuit through the radio set. The arm 159 may then be moved to a position where the plunger 161 cannot enter any of the apertures 158 and the radio set is of course inoperative during this time. It is of course obvious that suitable designations may be placed adjacent the apertures 158 and these may designate different stations either by name, number or any other symbol.

The arm 159 moves the tuning mechanism in either direction, directly to a position to select a station.

Whether the tuning mechanism is under control of the manual settable arm 159 or as in the construction first described, under control of the motor either through the determinators or through the lever 42 it is to be noted that I have provided a member such as 23 to 23a which is movable with the tuning mechanism. I have also provided normal ineffective station selectors carried by said member which control the movement thereof to tune in a station. Any station selector may be rendered effective in three ways.

With the modified form shown in Figures 7, 8, and 8a, by the plunger 161 controlled by the knob 166, the selection is entirely manual. A selector may also be rendered effective by causing it to be included in an electric circuit with the motor through a determinator and the timing mechanism. A third method is brought about through the direct positioning of the lever 42.

When a selector has been rendered effective in any of the ways described the member 23 or 23a is moved to position the tuning mechanism in accordance with the selector rendered effective.

What I claim is:

In a radio receiving set having tuning mechanism and a panel board, in combination, a plurality of station selecting members, a determinator of unitary structure, and means carried thereby to cooperate simultaneously with a plurality of station selecting members.

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