Oct. 26, 1943. A. WAGNER 2,332,767

AUTOMATIC RADIO STATION SELECTOR

Filed Feb. 18, 1942 5 Sheets-Sheet 1

Fig. 1.

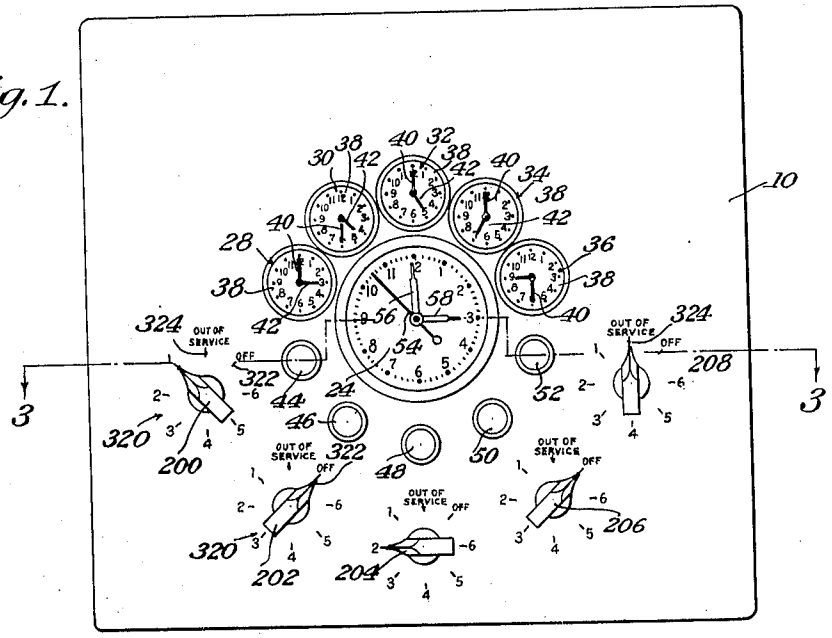
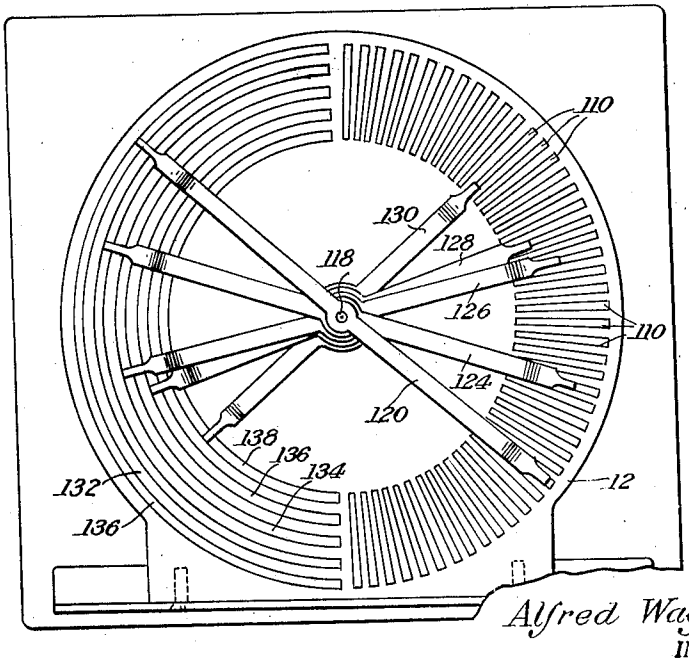


Fig. 2.



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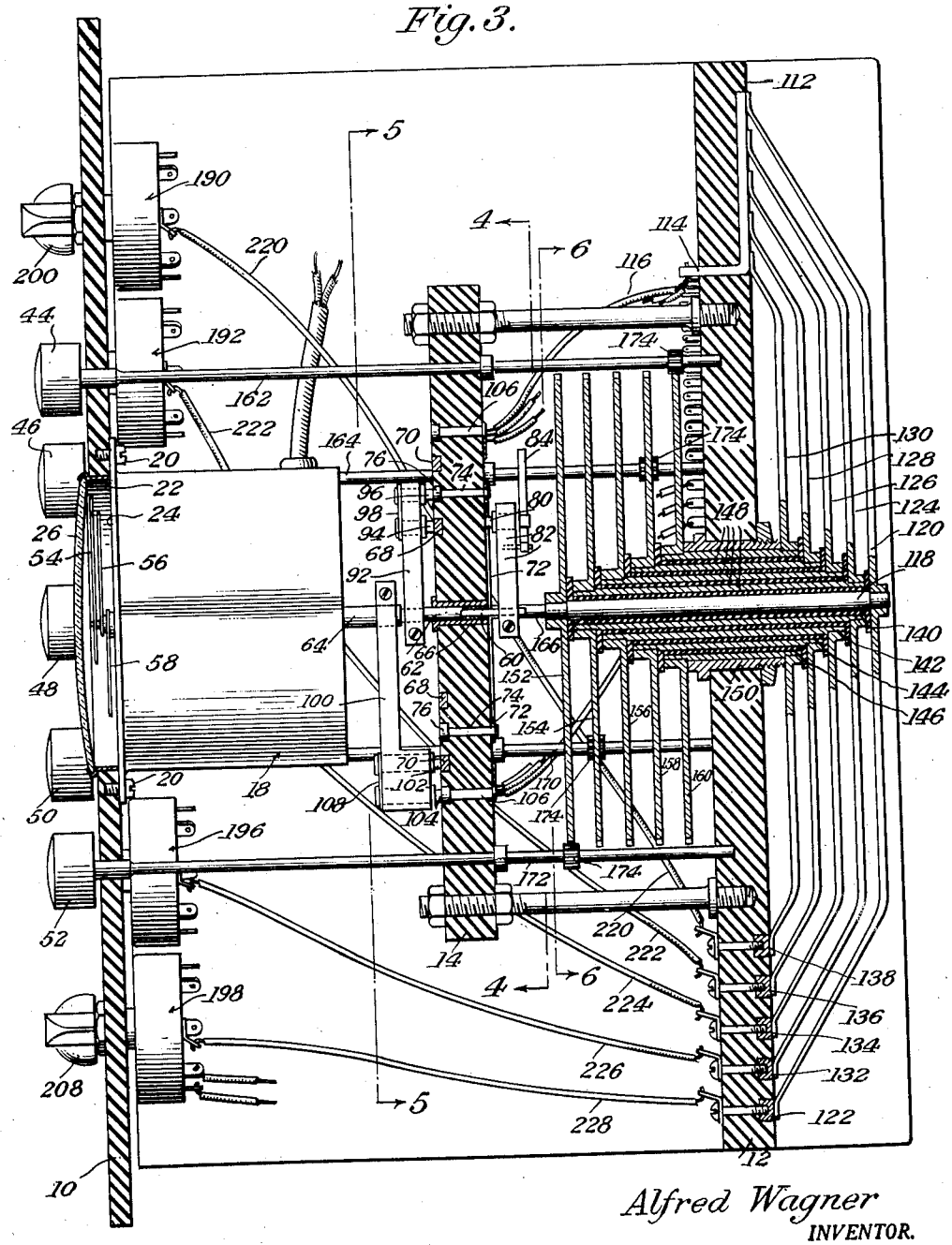
AUTOMATIC RADIO STATION SELECTOR

Filed Feb. 18, 1942 5 Sheets-Sheet 2

Fig. 3.



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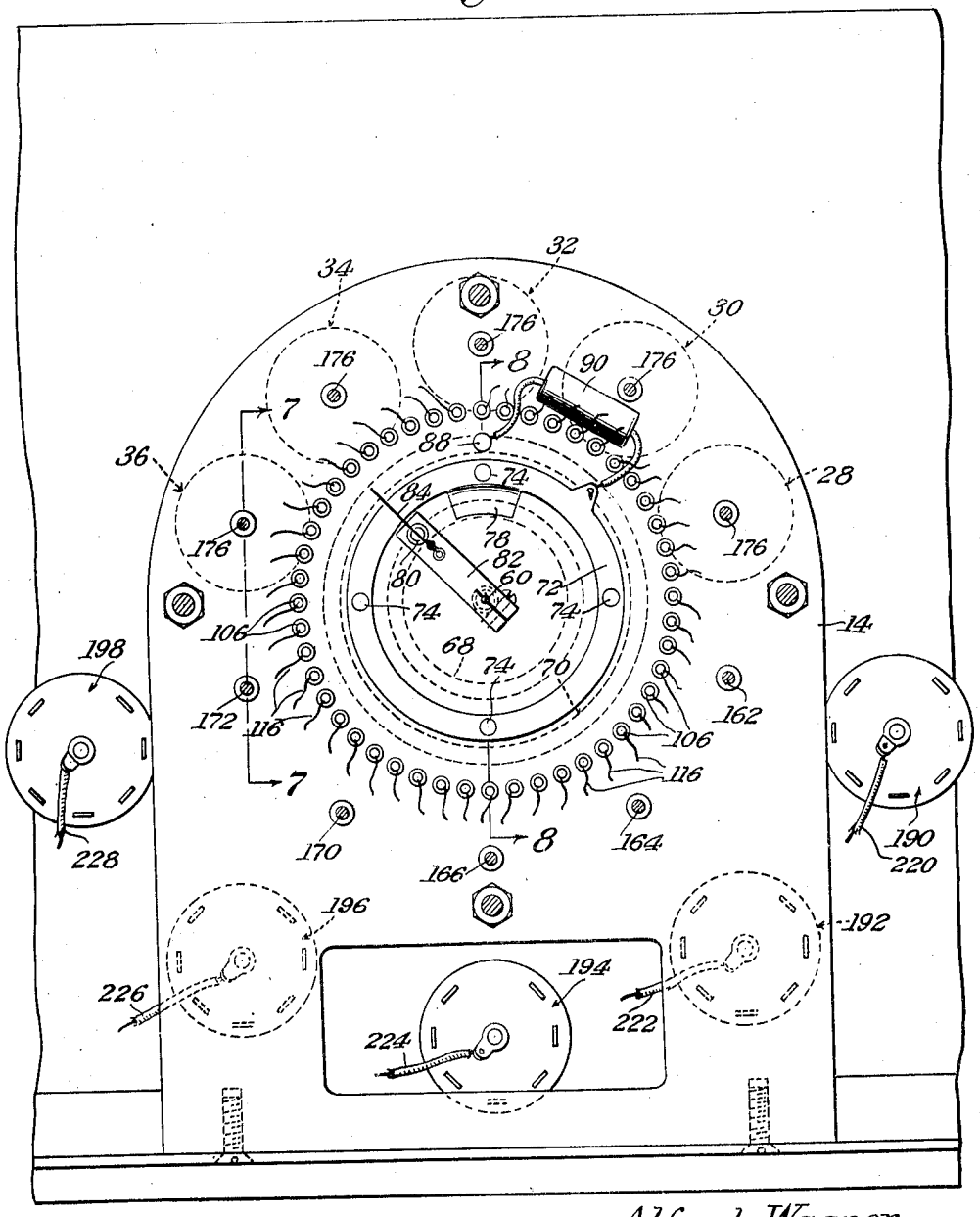
AUTOMATIC RADIO STATION SELECTOR

Filed Feb. 18, 1942 5 Sheets-Sheet 3

Fig. 4.



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Oct. 26, 1943. A. WAGNER 2,332,767

AUTOMATIC RADIO STATION SELECTOR

Filed Feb. 18, 1942 5 Sheets-Sheet 4

Fig.5.

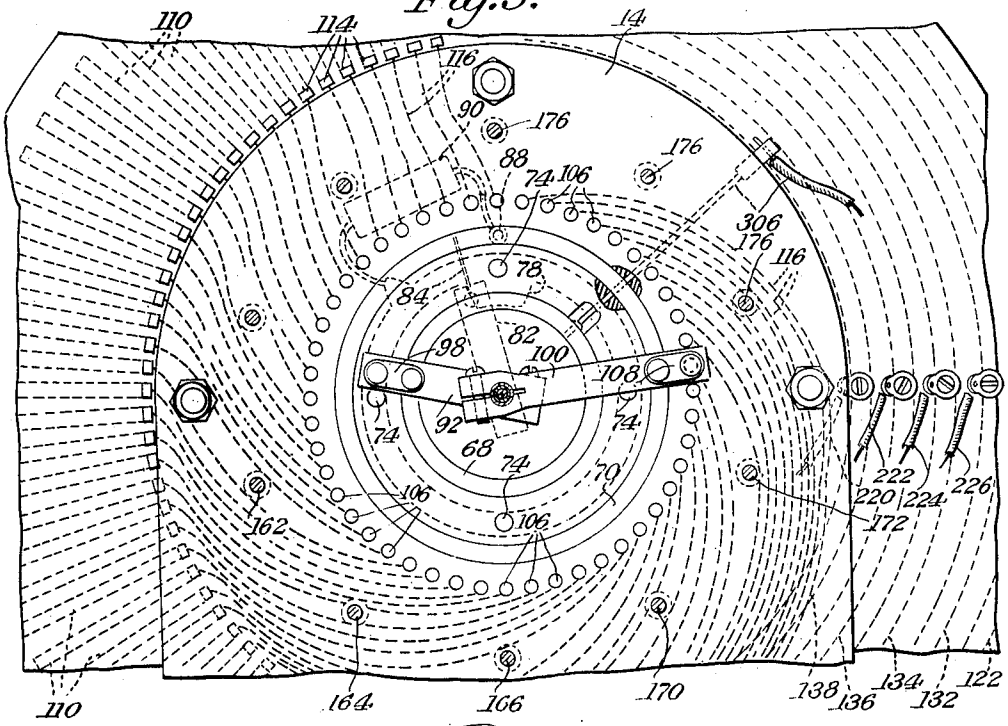
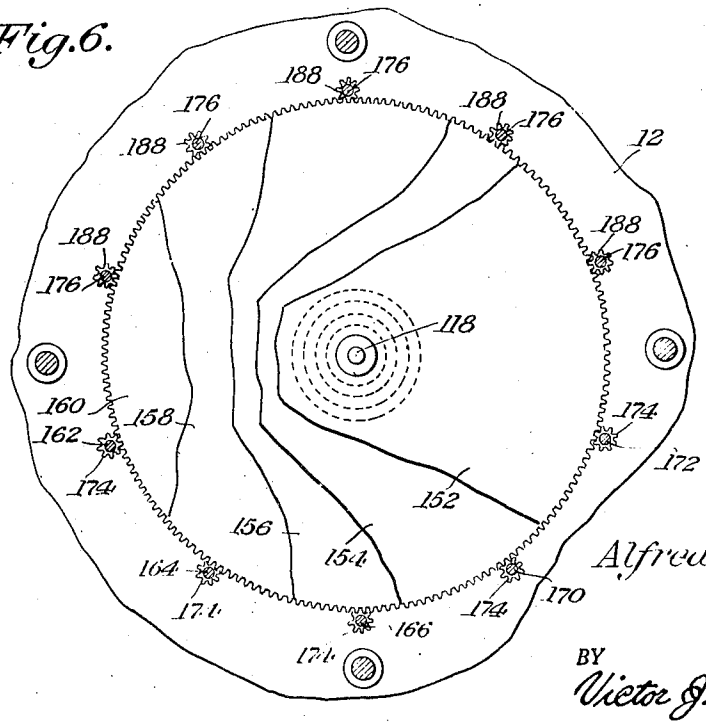


Fig.6.



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Oct. 26, 1943. A. WAGNER 2,332,767

AUTOMATIC RADIO STATION SELECTOR

Filed Feb. 18, 1942 5 Sheets-Sheet 5

Fig. 7.

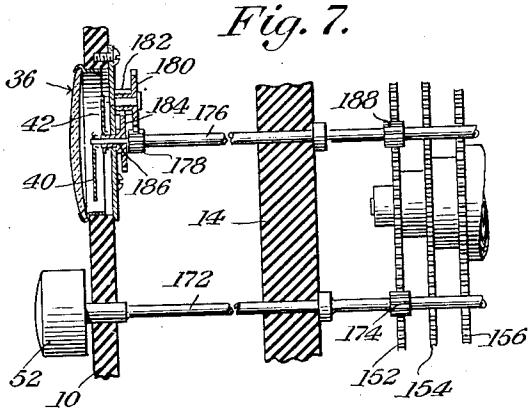


Fig. 8.

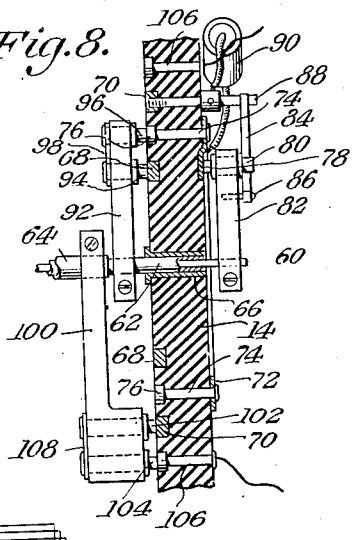
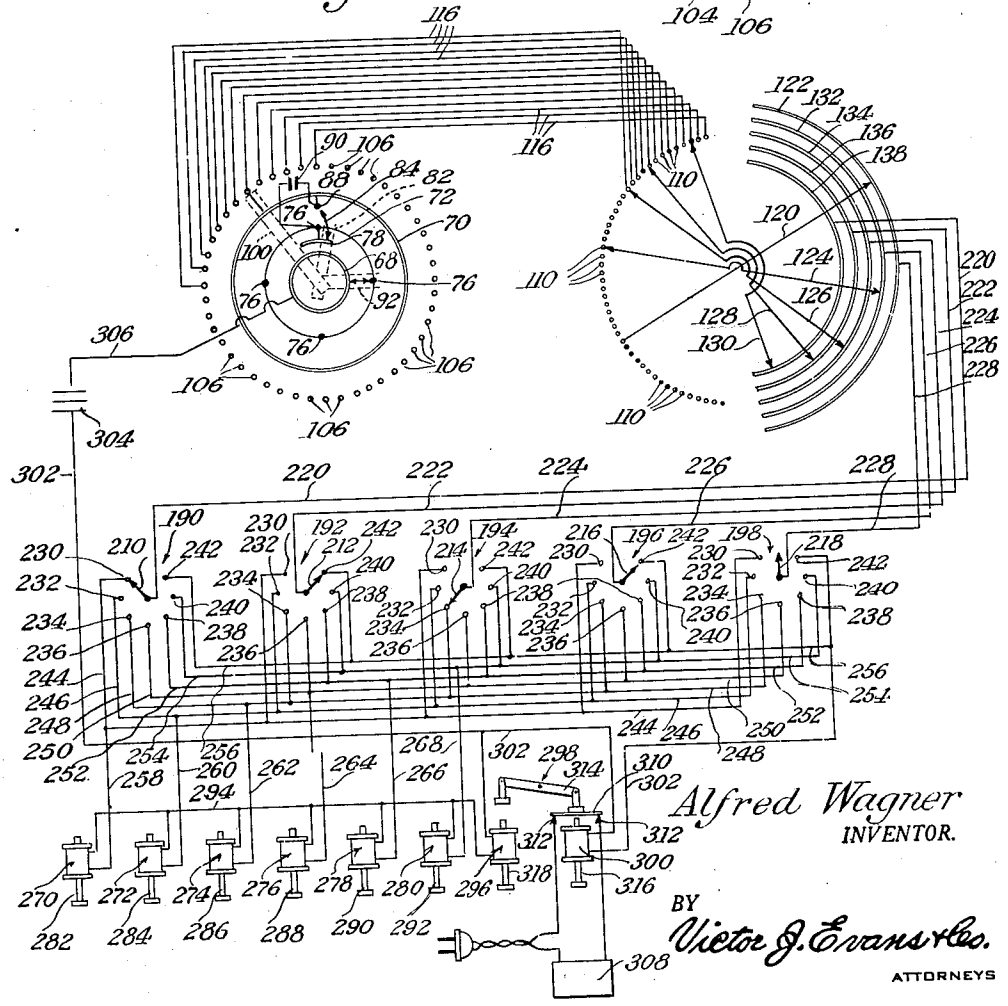


Fig. 9.



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Patented Oct. 26, 1943 2,332,767

UNITED STATES PATENT OFFICE

2,332,767

AUTOMATIC RADIO STATION SELECTOR

Alfred Wagner, Captain Cook, Territory of Hawaii

Application February 18, 1942, Serial No. 431,427

6 Claims. (Cl. 250—20)

My invention relates generally to radio receiving sets, and has among its objects and advantages the provision of an improved automatic radio receiver control for tuning the receiver on or off, and tuning in and out a plurality of radio stations consecutively, with all operations predetermined and carried out by a timing mechanism in fifteen minute periods in conjunction with selector switches. While the control includes an electric circuit, the system is so designed that at no time is the circuit energized except at those times when the receiver is being turned on or off and when changing stations.

In the accompanying drawings,

Figure 1 is a face view of the control panel;

Figure 2 is an elevational view of a selected switch structure;

Figure 3 is an enlarged sectional view taken along the line 3—3 of Figure 1;

Figure 4 is a view taken along the line 4—4 of Figure 3;

Figure 5 is a view taken along the line 5—5 of Figure 3;

Figure 6 is a view taken along the line 6—6 of Figure 3;

Figure 7 is a sectional view taken along the line 7—7 of Figure 4;

Figure 8 is a sectional view taken along the line 8—8 of Figure 4; and

Figure 9 is a diagrammatic view of the electric circuit in conjunction with solenoids for operating the push buttons of the receiver.

In the embodiments selected for illustration, I make use of a face panel 10, a rear wall 12 and an intermediate wall 14. The panel 10 and the walls 12 and 14 are of insulative material. An electric clock 18 is secured to the panel 10 by screws 20, and the panel is provided with an opening 22 for exposing the clock face 24 having a lens 26 extending thereacross. The clock 18 is old and well known and need not be described in detail further.

In Figure 1, time set indicators 28, 30, 32, 34 and 36 are mounted on the panel 10. Each time set indicator 28 through 36 includes a clock face 38, a minute hand 40 and an hour hand 42. Knobs 44, 46, 48, 50 and 52 are provided for respectively adjusting the time set indicators 28 through 36.

The clock 18 includes the usual second hand 54, minute hand 56 and hour hand 58 respectively connected with shafts 60, 62 and 64. Shafts 62 and 64 are tubular, with the shaft 60 rotatable inside the shaft 62 and the latter rotatable inside the shaft 64. Thus the shaft 60 makes one revolution per minute, the shaft 62 one revolution per hour and the shaft 64 one revolution in twelve hours. A bearing sleeve 66 is provided in the wall 14 for rotatably supporting the shaft 62.

Mounted in one side of the wall 14 are two collector rings 68 and 70. Upon the opposite face of the wall 14 is mounted a collector ring 72. All the collector rings 68, 70 and 72 are concentrically positioned with respect to the axis of the bearing sleeve 66. Four rivets or conductors 74 secure the collector ring 72 to the wall 14 and pass through the wall to provide contacts 76 terminating flush with the wall 14. Contacts 76 are spaced 90° apart and are arranged concentrically about the axis of the bearing sleeve 66. The collector ring 72 is provided with a contact 78 lying flush with the adjacent face of the wall 14 and is engageable by a contact 80 at one end of an arm 82 having its other end secured to the shaft 60. The arm 82 makes one revolution per minute, and the contact 78 is relatively short, as illustrated in Figure 4. In Figures 4 and 8, the contact 80 is split at its non-engaging end for the reception of a flexible conductor 84 having one end connected with a pin 86 attached to the arm 82 and its other end arranged to engage a pin 88 extending through the wall 14 and threaded into the collector ring 70. The flexible conductor 84 electrically connects the contact 80 with the pin 88 once during each revolution of the arm 82, and the contact is flexed as it engages the pin while the contact 80 is in engagement with the contact 78 on the collector ring 72. This circuit is broken speedily as the flexible contact passes the pin. A condenser 90 is connected across the collector ring 72 and the contact 88 to dampen the arcing.

To the shaft 62 is secured an arm 92 which makes one revolution per hour. This arm is provided with brushes 94 and 96, the brush 94 engaging the collector ring 68 while the brush 96 successively engages the contacts 76. Since the arm 92 makes one revolution per hour, the brush 96 engages a different contact at each 15 minute interval. Brushes 94 and 96 are electrically bridged, as at 98 in Figure 8.

One end of an arm 100 is fixedly secured to the shaft 64. To the opposite end of the arm 100 are secured brushes 102 and 104. The brush 102 is in engagement with the collector ring 70 while the brush 100 is arranged to successively engage forty-eight terminals 106. The terminals 106 are equally spaced concentrically above the axis of the bearing sleeve 66. A bridge 108 electrically connects the brushes 102 and 104. Since the arm 100 makes one revolution in twelve hours, the brush 104 successively engages the terminals 106 at fifteen minute intervals. Accordingly, once during each fifteen minute interval, the brush 96 engages one contact 76 and the brush 104 engages one terminal 106 during engagement between the resilient contact 84 and the pin 88.

Forty-eight contacts 110 are mounted on the wall 12 flush with the face 112. Each contact 110 has a right angular end 114 extending through the wall 12 and connected with a wire 116 lugged to one of the terminals 106. Figure 9 illustrates some of the wires 116 respectively connecting con-

tacts 110 with contacts 106. The remaining wires 116 have been omitted for the sake of clearness. Contacts 110 are arranged in radial formation concentrically about a shaft 118. To one end of the shaft 118 is fixedly secured an arm 120 having one end selectively engageable with the contacts 110 and its other end engaging a contact 122 curved concentrically about the axis of the shaft 118. Arms 124, 126, 128, and 130 are also selectively engageable with the contacts 110 and respectively engage contacts 132, 134, 136 and 138, which contacts are also concentrically arranged about the axis of the shaft 118 but of progressively smaller diameter. Arms 120, 124, 126, 128 and 130 are respectively of progressively shorter lengths, but the contacts 110 are of sufficient length to have engagement with all the arms. However, the arms 120, 124, 126, 128 and 130 can have engagement with their respective contacts 122, 132, 134, 136 and 138 only.

Arms 124 through 130 are respectively fixedly connected with sleeves 140, 142, 144 and 146. All the sleeves 140 through 146 and the shaft 118 are insulated one from the other, as at 148. The sleeve 146 is rotatably supported in a bearing sleeve 150 extending through the wall 12. To the shaft 118 and the sleeves 140 through 146 are respectively fixedly secured gears 152, 154, 156, 158 and 160. Gears 152 through 160 are also insulated apart one from the other.

The shaft 118 and the sleeves 140 through 146 may be independently rotated through rotation of the respective gears 152 through 160. Shafts 162, 164, 166, 170 and 172 are rotatably journalled in the walls 10, 12 and 14, these shafts being respectively connected with the knobs 44 through 52. Pinions 174 are secured to the shafts 162 through 172 for respective meshing engagement with the gears 152 through 160. Thus the gears may be rotated through manipulation of the knobs 44 through 52.

Time set indicators 28 through 36 are identical in construction and operation so that the description of one will apply to all. Figure 7 illustrates the specific construction of the time set indicator 36. A shaft 176 is rotatably journalled in the walls 12 and 14 and is provided with a pinion 178 meshing with a gear 180 having a pinion 182 meshing with a gear 184 to which is fixedly secured the hour hand 42. Gear 184 is rotatably mounted on the extension 186 of the shaft 176, and the minute hand 40 is fixedly secured to the extension 186. Figure 7 illustrates the shaft 176 as being provided with a pinion 188 meshing with the gear 152. Thus rotation of the knob 52 turns the gear 152 and rotates the shaft 176 for actuating the minute and hour hands 40 and 42 respectively. In the same manner, rotation of the knob 46 turns the gear 154 for actuating the minute and hour hands of the time set indicator 30; rotation of the knob 48 turns the gear 156 for imparting rotation to the hour and minute hands of the time set indicator 32; rotation of the knob 50 turns the gear 158 for imparting rotation to the hour and minute hands of the time set indicator 34; and rotation of the knob 52 turns the gear 160 for imparting rotation to the hour and minute hands of the time set indicator 36.

Selector switches 190, 192, 194, 196 and 198 are mounted on the panel 10, which selector switches are respectively provided with pointer knobs 200, 202, 204, 206 and 208, see Figure 1. Figure 9 illustrates the circuit arrangement of the selector switches 190 through 198. These switches are provided with switch elements 210, 212, 214, 216 and 218 respectively connected with wires 220, 222, 224, 226 and 228. Wires 220 through 228 are respectively connected with the curved contacts 138, 136, 134, 132 and 122.

Each selector switch 190 through 198 is provided with a series of contacts 230, 232, 234, 236, 238, 240 and 242. The contacts 230 through 242 and the selector switches 190 through 198 are respectively electrically connected with the wires 244, 246, 248, 250, 252, 254 and 256. Wires 258, 260, 262, 264, 266 and 268 respectively connect the wires 244 through 254 with solenoids 270, 272, 274, 276, 278 and 280. These solenoids are respectively provided with push button actuating cores 282, 284, 286, 288, 290 and 292.

The solenoids 270 through 280 are connected with a wire 294 connected with a solenoid 296 of a radial off and on switch 293. Off and on switch 298 includes a second solenoid 300 having a wire 303 electrically connected with all the contacts 242 of the respective selector switches 190 through 198. Both solenoids 296 and 300 are electrically connected with a wire 302 connected with a source of current 304 having a wire 306 electrically connected with the collector ring 68.

The radio receiver 308 is turned off and on by the switch 298. This switch includes a bridge element 310 arranged to electrically connect contacts 312 when in the position of Figure 9. The bridge element 310 is connected with one end of a lever 314, and the bridge element is moved away from the contact 312 through the medium of a core 316 associated with the solenoid 300. When the radio receiver circuit is broken, current may again be supplied to the radio receiver circuit through energization of the solenoid 296, which brings its core 318 into engagement with the opposite end of the lever 314 for moving the bridge element 310 into engagement with the contacts 312. Solenoid 296 is connected in series with the solenoids 270 through 280.

Each selector switch 190 through 198 has its contacts 230 through 240 electrically connected with the solenoids 270 through 280, respectively. The knobs 44 through 52 are respectively operatively connected with the time set indicators 28 through 36, while the pointer knobs 200 through 208 are respectively associated with the knobs 44 through 52. Thus the pointer knobs 200 through 208 are operatively associated with the respective time set indicators 28 through 36 so that the respective pointer knobs may be set in accordance to selected time intervals. A dial face 320 is provided for each of the pointer knobs 200 through 208, each dial face including six positions respectively numbered one through six in accordance with the six solenoids 270 through 280. Each dial face 320 is also provided with an off position 322. Pointer knobs adjusted to the positions 322 bring their respective switch elements 210 through 216 of Figure 9 into engagement with the contacts 242, under which conditions the solenoid 300 is energized at predetermined fifteen minute intervals for moving the bridge element 310 out of engagement with the contact 312. Each dial 320 also includes an out of service position 324.

From the foregoing description, it will be seen that the brushes 102 and 104 carried by the arm 100 electrically connect the collector ring 70 with one terminal 106 at each fifteen minute interval. This is also true with respect to the brushes 94 and 96 and the collector ring 68 and the four contacts 74, these contacts being electrically con-

nected with the collector ring **72**, the latter being momentarily electrically connected with the collector ring **70** by reason of the resilient conductor **84** and the end **88**.

Movement of any one of the arms **120** through **130** from one contact **110** to the next adjacent contact **110** represents a time interval of fifteen minutes. Thus the arms **120** through **130** may be preset through manipulation of the respective knobs **44** through **52** which, in turn, indicate the respective time intervals of such setting by reason of the time setting indicators **28** through **36**, respectively.

Figure 1 illustrates the time set indicators **28** through **36** as respectively reading 3, 4:30, 5, 7 and 8:30 o'clock. Under such settings, the arms **120** through **130** are respectively positioned in accordance with Figure 2, the uppermost contact **110** representing 12 o'clock.

Each of the knobs **200** through **208** may be set to energize any one of the six solenoids **270** through **280**. In Figure 9, the switch element **210** engages the contact **320** of the selector switch **190**, which closes the circuit through the solenoid **270** at the hour to which the time set indicator **28** may be adjusted. Since the solenoid **296** is in series with all the solenoids **270** through **280** energization of the respective solenoids **270** through **280** causes energization of the solenoid **296**, so that the switch **298** will always be moved to a closed position whenever any one of the solenoids **270** through **280** is energized. The switch element **212** of the selector switch **192** is in engagement with its terminal **242** so that the circuit will be closed through the solenoid **300** at the end of the fifteen minute interval for moving the switch **298** to its open position. Thus the push buttons (not shown) of the radio receiver may be automatically actuated at predetermined fifteen minute intervals. Such push buttons are old and well known in the art.

Without further elaboration, the foregoing will so fully illustrate my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. An apparatus of the character described comprising a plurality of station selecting solenoids; a plurality of selector switches each having first contacts respectively electrically connected with said station selecting solenoids and a movable switch element selectively engageable with all the contacts in its respective selector switch; second contacts respectively electrically connected with said switch elements; companion contacts; rotary conductor arms each continuously engageable with one of said second contacts and selectively engageable with said companion contacts; terminals each electrically connected with one of said companion contacts; first, second and third collector rings; third and fourth contacts electrically connected with said second collector ring; a fifth contact electrically connected with said third collector ring; first, second and third clock rotated shafts; a first arm secured to said first shaft having a sixth contact engaging said fourth contact at predetermined intervals and having a conductor element concurrently engageable with said fifth contact; a second arm fixed to said second shaft provided with bridged seventh and eighth contacts, said seventh contact continuously engaging said first collector ring and said eighth contact successively engaging said terminals at predetermined time intervals and at moments when said conductor element is in engagement with said fifth contact; a third arm fixed to said third shaft provided with bridged ninth and tenth contacts, said ninth contact continuously engaging said third collector ring and said tenth contact successively engaging said terminals concurrently with engagement between said eighth and successive third contacts; and an electrical connection between said first collector ring and the respective station selecting solenoids to energize the respective solenoids in accordance with the positions of said switch elements with respect to said first contacts.

2. The invention described in claim 1 wherein time set indicators are provided, an adjusting means for each of said rotary conductor arms, and an operating connection between each adjusting means and one of said time set indicators to actuate the latter for indicating the time position of its respective rotary conductor arm.

3. The invention described in claim 1 wherein each selector switch is provided with an off contact engageable by the switch element thereof, a radio receiver circuit control switch having a first solenoid connected in series with said station selecting solenoids and a second solenoid electrically connected with said first collector ring and with the respective switch elements, said radio receiver circuit control switch including contacts and a movable bridge element for electrically connecting the contacts to close the circuit through the radio receiver, and means actuated by said first and second solenoids to move said bridge element into engagement with said last-mentioned contacts when any one of said station selecting solenoids is energized and for moving the bridging element away from the contacts at a predetermined time interval when one of said switch elements is in engagement with its respective off contact.

4. The invention described in claim 1 wherein time set indicators are provided, gear means connected with the respective conductor arms for adjusting the latter relatively to said companion contacts, and geared connections between the respective gear means and the time set indicators for adjusting the latter to indicate the respective time positions of the conductor arms.

5. The invention described in claim 1 wherein said conductor arms are mounted for rotation about a common axis, said companion contacts being arranged in curved alignment about said common axis and said second contacts curving about said common axis, said second contacts being spaced radially with respect to said common axis and said conductor arms being progressively variable lengths to engage their respective second contacts, said companion contacts being of sufficient radial lengths to be engageable by all the conductor arms, time set indicators, adjusting means for the respective conductor arms, and operating connections between the respective adjusting means and the time set indicators to move the latter for indicating the time positions of their respective conductor arms.

6. The invention described in claim 1 wherein there are provided four third contacts with said second arm making one revolution per hour, said companion contacts and said terminals, each comprising forty-eight in number, said third arm making one revolution in twelve hours, and said first arm making one revolution per minute.

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