Aug. 25, 1936. D. L. GRUBB 2,051,845

SYSTEM FOR SELECTIVE RADIO RECEPTION

Filed Dec. 9, 1932 2 Sheets-Sheet 1

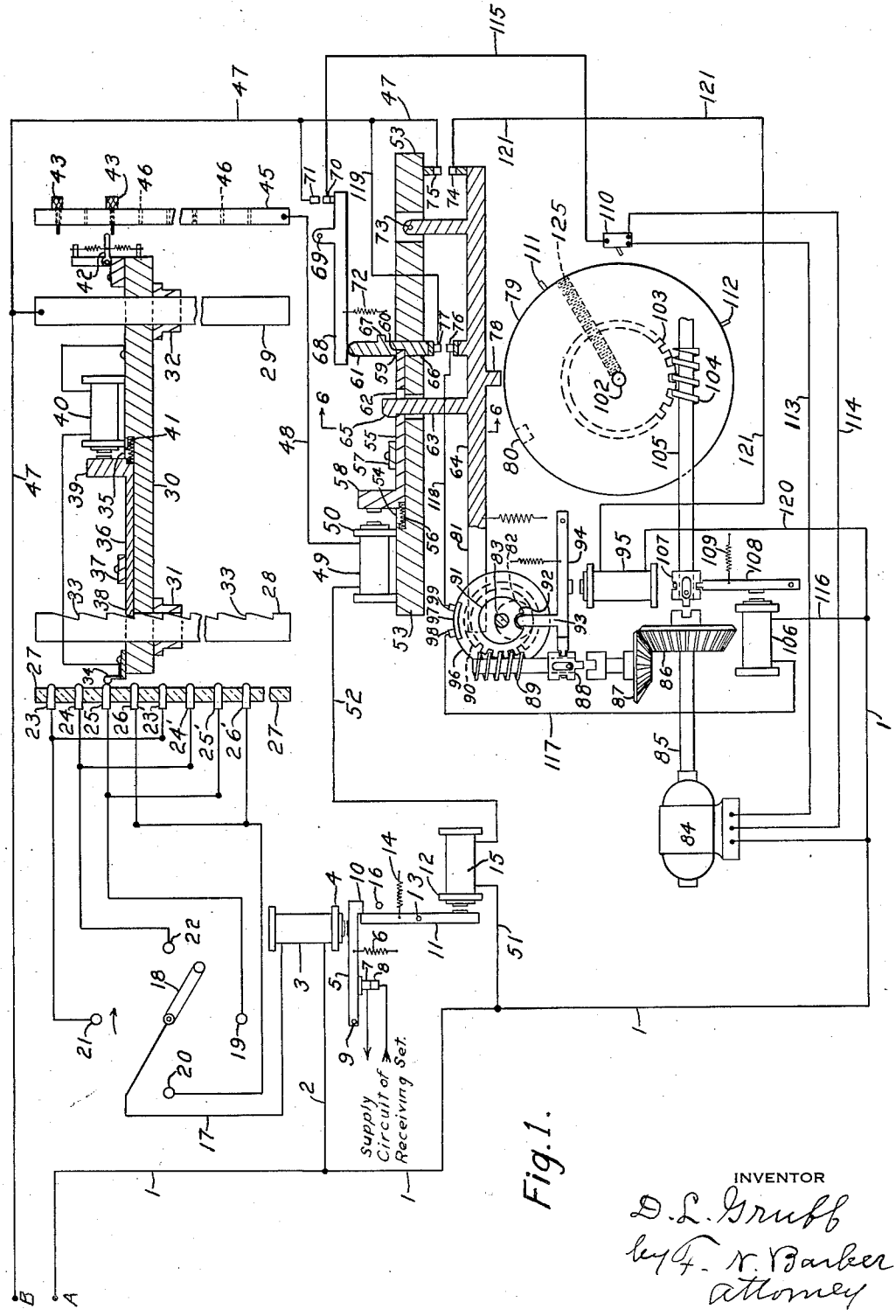


Fig. 1.

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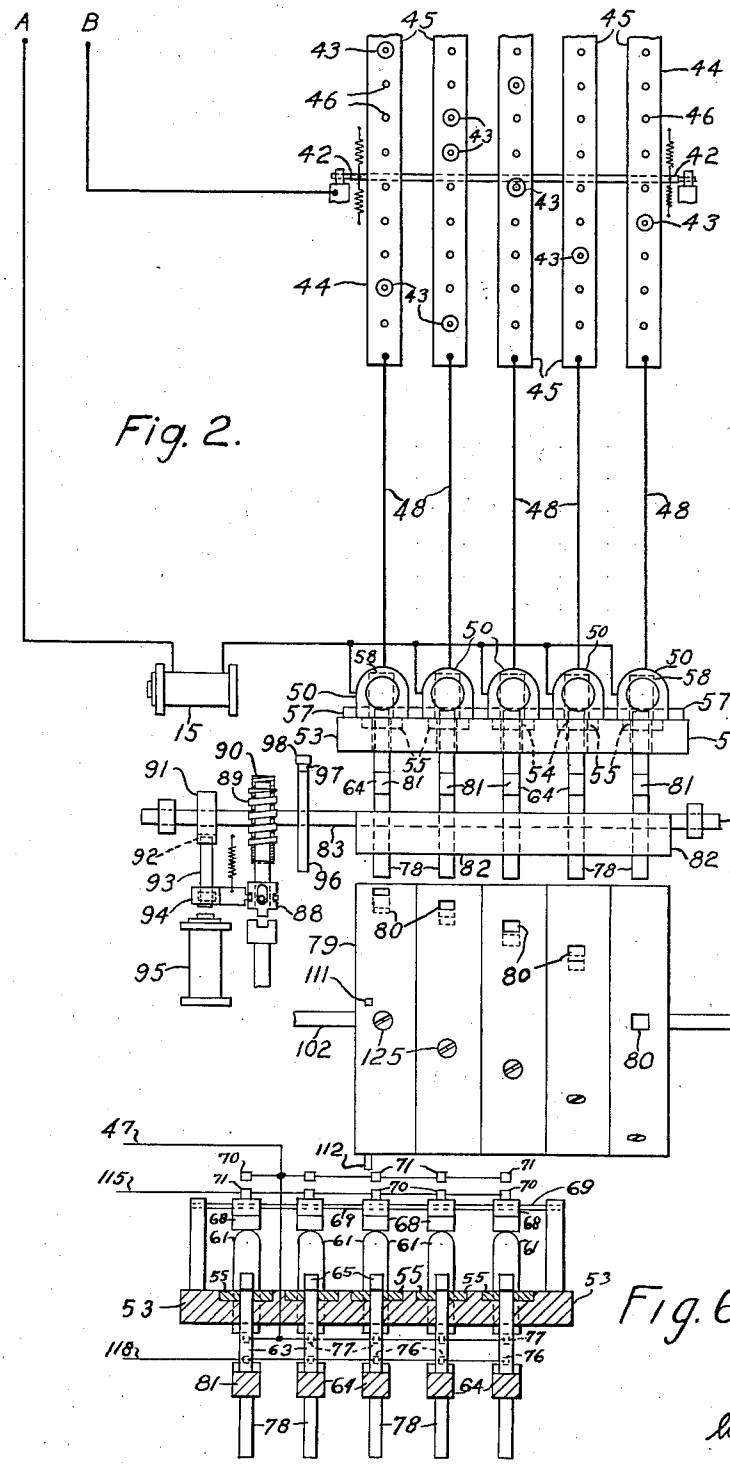


Fig. 2.

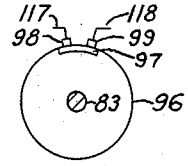


Fig. 3.

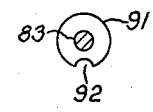


Fig. 4.

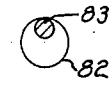


Fig. 5.

Fig. 6.

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2,051,845

SYSTEM FOR SELECTIVE RADIO RECEPTION

David L. Grubb, Bellevue, Pa.

Application December 9, 1932, Serial No. 646,363

13 Claims. (Cl. 250—20)

My invention relates to tuning systems and particularly to predetermined mechanical selective tuning systems for radio receiving sets.

The object of my invention generally stated, is the provision of a tuning system that is simple in operation and readily installed in existing radio sets.

A more specific object of my invention is to provide for the establishment of the reception of specific broadcasting stations at a specific hour of the day without hand manipulation of ordinary tuning dials.

Another object of my invention is to provide simple and illustrative panels arranged to receive contact plugs or pins which when inserted in a panel represents the predetermined time of reception of the broadcasting station which that panel represents.

Another object of my invention is to provide a contact arrangement that will discontinue reception during the time that the system is inoperative.

Other objects of the invention will, in part, be obvious and will, in part, appear hereinafter.

The accompanying drawings which disclose my invention show the mechanical elements in elevation, some parts of which are in section and broken away and the electrical system diagrammatically arranged. Fig. 1 represents the system in connection with some of the mechanical parts. Fig. 2 represents a portion of the system in conjunction with the plurality of mechanical parts not illustrated in Fig. 1, and one method of connecting the mechanical system to the radio tuning devices contained in an ordinary radio receiving set. Fig. 3 is a side elevation of a contact disc. Fig. 4 is a side elevation of one of the cams in my invention. Fig. 5 is a side elevation of another cam. Fig. 6 is a section on the line 6—6 on Fig. 1.

Referring to Fig. 1, A and B represent the source of electrical energy for supplying the system. Current travels from the source A through the conductors 1 and 2 to the coil 3 of the radio set control magnet 4.

When the magnet 4 becomes energized it attracts the armature 5 against the tension of the spring 6, opening the contacts 7 and 8 and disconnecting the supply circuit for the radio receiving set.

The armature 5 is pivoted at one end 9. The pendent lug 10 on the other end of the armature 5 is arranged to mechanically engage the armature 11 of the magnet 12 which is pivoted intermediate of its ends at 13. The spring 14 holds one end of the armature 11 against the pendent member 10 of the armature 5, the other end of the armature being in position to be attracted by the magnet 12 when its coil 15 is energized.

After the coil 3 of the magnet 4 has been energized and the armature 5 has been picked up, the pendent lug 10 will release the armature 11 causing it to strike the pin 16 in which position it will stay until the coil 15 of the magnet 12 is energized and draws the armature 11 to its normal position as shown. The magnet 4 is energized momentarily and when the armature 5 is released it will drop, causing the bottom surface of the pendent member 10 to engage with the top end of the armature 11 and preventing the contacts 7 and 8 from coming into electrical engagement until the magnet 12 is energized and pulls the armature 11 past the shoulder of the pendent member.

The current flowing from the source A passes through the coil 3, the conductor 17 and the contacting member 18 when it is in contact with one of the four contacts 19, 20, 21 and 22. The contactor 18 is rotatably mounted on a minute hand shaft of a clock or time piece which causes it to come in contact with one of the four contacts at the end of every fifteen minute period.

I have chosen periods of fifteen minutes in length because broadcasting stations use that as the shortest period for their programs. Such method of timing is well known in several arts and its application has developed many flexible timing devices, most of which could be used in this invention.

The current passing through the contactor 18 to one of the four contacts 19, 20, 21 and 22, will flow through their corresponding conductors to the contacts 23, 24, 25, and 26 mounted in the contact carrying bar 27 which is made of suitable insulating material. The contacts 23, 24, 25, and 26 are in multiple with several sets of contacts (only 23', 24', 25', and 26' being additionally shown), each set of which represents one hour period of fifteen minute intervals. The number of multiple sets of contacts representing the total continuous period over which the system will be automatically controlled may be any convenient number of hours of a day.

The guide rods or bars 28 and 29 have slidably mounted thereon the carriage 30 which carries the collars 31 and 32. The latter, fitting snugly on the bar 29, acts as sliding electrical contacts for the carriage 30. The bar 28 contains notches or steps 33 on the side facing the bar 29, which steps are equally spaced, being of the same

height as the distance between the contacts on the bar 27. The contactor 34 is mounted on a suitable insulated block on one end of the carriage so as to engage each of the contacts in the contacting strip 27 at successive intervals as the carriage descends step by step down the bars 28 and 29.

The carriage 30 is provided with a recess 35 to admit the sliding armature 36 which is held in place by a suitable means such as the plate 37. The end 38 of the armature acts as a pawl or detent for engaging the upper faces of the steps 33. The other end of the armature is provided with an armature lug 39 which is arranged to be acted upon by the magnetic flux of the magnet coil 40. A spring 41 is held in compression between the body of the carriage and the armature, forcing the latter away from the coil 40 and the detent 38 into a groove forming one of the steps 33.

The current flowing from A through the rotating contactor 18, the contacts 19 and 25, the sliding contactor 34 to the coil 40 returns through the sliding contact between the carriage 30 and the guide bar 29 to the conductor 47 and the return circuit B. The coil of the magnet 40 being energized attracts the armature 36 which compresses the spring 41 and withdraws the armature pawl 38 from the step 33 on which it rests, releasing the carriage and opening the circuit connection between the contactor 34 and the contact 25 which deenergizes the magnet 40, releasing the armature 36 and allowing the pawl 38 to engage in the next lower consecutive step 33. The sliding contactor 34 is then in engagement with the contact 26.

The horizontal selector contactor 42 is pivotally mounted on the end of the carriage and is held in its mid or horizontal position by two springs 42' and 42'' opposing each other. The contactor 42 momentarily engages certain contact pins 43 as the carriage descends from one step 33 to the next lower step. The contact pins 43 are removably mounted in the switchboard 44 which is a plurality of vertical metallic panels 45, as shown in Fig. 2 insulated from each other or spaced apart, each representing one of several broadcasting stations. Each panel contains a vertical series of holes 46 which are equally spaced from each other the same distance the steps 33 are separated from each other, successively. The contactor 42 extends the entire width of the switchboard 44 so that it will strike an inserted pin 43 in any one of the panels as the carriage 30 proceeds downwardly. Each of the panels 45 forms part of an electrical circuit. The conductors 48 electrically connect the panels separately to corresponding coils 49 of the selecting magnets 50, there being a separate coil and magnet for each station.

I will now describe the operation of my apparatus with reference to the tuning in of one station, and then explain how any of the other stations may be tuned in. Assume the parts are as in Figs. 1 and 2, where the contact 19 is connected through the contacts 25 and 34 to the coil 40 of the magnet 50, as shown in the upper part of Fig. 1. Assume that a station corresponding to the central panel 45 in Fig. 3 is to be tuned in.

As soon as the contactor 18 engages the contact 19, current in the winding 40 causes the armature 36 to move to the right and withdraw its detent 38 from the step 33 on which it rests. The carriage 30 drops, and as the current is cut off from the magnet as soon as the contactor 34 leaves the contact 25, the magnet 50 is deenergized and the armature 36 is forced by its spring 40 to move to the left and interlock with the next lower step 33, which is the fourth from the top of the guide bar 28. At this time the contactor is on the contact 26 which is in circuit with the timer contact 20. However, the contactor 42 has passed the contact pin 43 shown just below it in Figs. 1 and 2, it being assumed that the panel 45 in Fig. 1 is the middle panel in Fig. 2. When the carriage 30 dropped, the contactor 42 stopped just above and out of contact with the contact pin 43 in the right hand panel 45.

When the contactor 42 hit the contact pin 43 just below it in Figs. 1 and 2, current flowed from the source A through the conductors 1 and 51, the winding 15 of the magnet 12, the conductor 52, the winding 49 of the middle magnet 50 shown in Fig. 1 as connected to the middle panel 45 by the middle wire 48. From this panel, the one shown in Fig. 1, current flows through the contacts 42 and 43 as the former passes below the latter, and thence through the carriage 30, the guide bar 29 and the conductor 47 to the source B.

When the central magnet 50 is energized, the armature 55 thereof, which is slidable in a slot 54 in the fixed base 53, is drawn to the left in Fig. 1. The armature has on one end an armature lug 58 within the field of the electromagnet 50 so that the magnet when energized will draw the armature to the left against the tension of the spring 56. The opposite end 50 of the armature extends into the slot 60 in the vertical sliding member and locks the same in its upper position as shown in Fig. 1. The armature 55 is also provided with a slot 62 through which extends the upright member 63 of the selector bar 64. The member 63 has on its upper end a lug 65 forming a shoulder which engages over its cooperating armature 55 and supports its cooperating selector bar, as shown in Fig. 1, this bar being the central one. The free member 61 is vertically slidable through the hole 66 in the base 53 and is limited in its downward movement by the shoulder 67. The contact lever 68 supported at its free end by the member 61 is pivoted between its ends at 69 and the other end has attached thereto the contact 70 which engages the contact 71 when the shoulder 67 of the member 61 is forced by the spring 72 attached to the lever 68, to rest on the base member 53.

The selector bar 64 is pivoted at 73 to the base 53. The contact 74 mounted on one end of the selector bar is arranged to engage the contact 75 fixed to the under side of the base 53. The contact 77 on the member 61 is arranged to contact with the contact 76 on the selector bar, which is immediately below the member 61, when the pendent lug 78 on the selector bar rides on the selector drum 79 upon the release of the selector bar by the retraction of the armature 55 from beneath the lug 63 on the member 61. These contacts will open when the lug 78 drops in the recess 80 in the middle section of the drum 79. The other end of the selector bar 64 is arranged to be mechanically lifted or reset by the cam 82 which is turned by the shaft 83 operated by the motor 84 through the shaft 85, the beveled gears 86 and 87, the clutch 88, the worm 89, and the worm wheel 90 which is secured to the shaft 83. The cam 82 will upon operation reset the selector bar 64 for a subsequent operation after it has functioned.

The cam 91 shown in Figs. 2 and 4 contains the slot 92 and is made to receive the arm 93 of the armature 94 which also operates the clutch 88. The armature 94 is operated by the magnet coil 95. The cam 91 will bring the shaft 83 to rest after the clutch 88 is disengaged, the arm 93 riding around on the cam 91 and locking the same as it engages the slot 92.

The contact disc 96 shown in Figs. 2 and 3 is made of suitable non-conductive material and has imbedded in its periphery the metallic block 97 which is used to close the circuit between the contacts 98 and 99 as the disc revolves with the shaft 83.

The selector drum 79 is divided transversely into sections as shown in Fig. 2. Each section is adjustable about the shaft 102 by means of the set screws 125 and cooperates with its supplementary selector magnet 50 and selector bar 64, the magnets being electrically controlled through their individual panels 45 which represent different broadcasting stations.

The shaft 102 operates the tuning devices of the radio receiving set as is indicated by the variable condenser 100 of Fig. 2. The shaft 102 has attached thereto the gear 103 meshed with the worm gear 104 that is fixed to the shaft 105. The magnet coil 106 is arranged, as is to be presently explained, to operate the clutch 107 through the lever armature 108 that is held in its unenergized position by the spring 109.

The operation of the selector circuit is as follows: As the carriage 30 descends to the next consecutive step 33 the contactor 42 closes momentarily the circuit through the selector magnet 49 and the radio control reset magnet 15. When the selector magnet 49 becomes energized it draws the armature 55 to the left and releases the upright member 63, permitting the selector bar 64 to drop. The selector pendent lug 78 then supports the bar by resting on the drum. The armature 55 also unlocks and releases the member 61 which drops and closes the contacts 70, 71 and 76, 77.

The former contacts close the circuit of the motor whose direction of rotation is selected by reversing switch 110 operated by the pins 111 and 112 on the drum 79. From the source A the motor circuit is through the conductor 1, the motor 84, the conductor 113 or the conductor 114, the conductor 115, the contacts 70 and 71 to the conductor 47 and the return circuit B. The contacts 76, 77 close the circuit for operating the clutch 107 by allowing the current to flow from A through the conductors 1 and 116, the coil 106, the conductor 117, the contacts 98, 97, and 99, the conductor 118, the contacts 76, 77, and the conductors 119 and 47 to the return circuit B. When the magnet 106 becomes energized it closes the clutch 107, thereby allowing the motor to drive the selector drum 79.

As the drum revolves the selector lug 78 on the middle bar 64 rides thereon until it engages in the recess 80 in the middle section of the drum, whereupon the circuit of the magnet coil 106 is opened by the parting of the contacts 76 and 77 and the clutch 107 opens. The contacts 76 and 77 are still prevented from closing because the member 61 is held from dropping by the lug 67. The radio broadcasting station has now been selected and the drum is locked in the selected position.

When the lug 78 of the selector dropped into engagement with the slot 80 provided therefor, the contacts 74 and 75 closed and completed a circuit for controlling the selector bar resetting mechanism. Tracing the circuit, the current flows from A through the conductors 1 and 120, the coil 95, the conductor 121, the contacts 74, 75, and the conductor 47 to the return circuit B. The magnet coil 95 is energized by current in this circuit.

The magnet 95 operates the clutch 88 causing the motor to drive the shaft 83. The attraction of the armature 94 by the coil 95 disengages the locking member 93 from the recess or slot 92 in the cam 91, freeing the shaft 83 for rotation. As the shaft 83 revolves, the locking member 93 is held away from the cam 91 and the cam 82 lifts the selector bar to its normal position as shown on the drawing. As the selector bar is being raised, the contacts 74 and 75 open the circuit through the clutch coil 95 and release the armature 94. The locking member 93 of the armature 94 then rests upon the periphery of the cam 91 maintaining the clutch 88 in partial engagement and allowing the motor to continue to drive the shaft 83. As the selector bar continues to rise by the action of the cam 82, the member 61 operates the lever 68 and opens the contacts 70 and 71 in the motor circuit. The momentum of the rotor in the motor is sufficient to drive the resetting cam 82 back to its normal position where it is locked by the locking member 93 engaging the slot 92 of the cam 91, and at this time the clutch 88 becomes fully disengaged.

The apparatus is now reset for a subsequent selection that will occur at the end of the next fifteen minute period and the selection will be governed according to the positioning of the contact pins 43.

In order to prevent the clutch 107 from being engaged when the selector bars are being reset, the contactor disc 96 is arranged to keep the circuit through the magnet 106 open when the shaft 83 is rotating.

Nothing has been said about the resetting of the carriage 30 after the total period of its descent. It is evident that it could be reset by hand, a lever or a motor.

Although I have described the operation so far with reference to only a single station which is controlled by current through the middle panel 45, the middle conductor 48, the middle magnet 50, the middle selector bar 64, and the middle section of the drum 79, it will be readily understood that the tuning in of any of the other four stations will be effected in the same manner only a panel 45 corresponding to a selected station will have a pin 43 placed in the proper hole 46 to be engaged by the contactor 42 upon its release at the proper time. If the right hand panel is selected, the contactor 42 will at the proper time engage the pin 43 in that panel, causing current to flow through the right hand panel, the right hand conductor 48, and the coil of the right hand magnet 50. The armature of this magnet would then release the right hand selector bar 64 which would drop upon the right hand section of the drum 79 and would have its stop lug 78 engaged in the hole 80 in that section to stop it with the tuning device 100 adjusted to bring in the selected station. The tuning in of any other station will be readily understood without further description.

I claim:—

1. In a station selector for radio receivers, a time piece with a contactor having constant speed, contacts arranged to be engaged serially

by the contactor, a selector contactor arranged for step by step movement, a series of steps, releasable means for holding the contactor at each step, means controlled by current through the movable contactor and any of the said contacts for releasing the releasable means to permit the selector contactor to move to the next step, a switchboard containing a series of panels, one for each station, contact pins operatively positioned in selected panels and directly engaging the selector contactor at a predetermined time, tuning means for the said stations, and means controlled by current through each pin when engaged by the selector contactor for moving the tuning means to bring in the station corresponding to the pin so engaged.

2. In a station selector for radio receivers, a time piece with a contactor having constant speed, contacts arranged to be engaged serially by the contactor, a selector contactor arranged for step by step movement, a series of steps, an armature for holding and releasing the contactor at each step, an electromagnet controlled by current through the movable contactor and any of the said contacts for releasing the releasable means to permit the selector contactor to move to the next step, a switchboard containing a series of panels, one for each station, contact pins operatively positioned in selected panels and directly engaging the selector contactor at a predetermined time, a variable tuning condenser for selecting the stations in a radio receiver, and a plurality of electromagnets controlled by current through their corresponding panels and each pin inserted therein when engaged by the selector contactor for controlling the movement of the variable condenser to tune in the station corresponding to the pin so engaged.

3. In a station selector for radio receivers, a time piece with a contactor having constant speed, contacts arranged to be engaged serially by the contactor, a selector contactor arranged for step by step movement, a series of steps, an armature for holding and releasing the contactor at each step, an electromagnet controlled by current through the movable contactor and any of the said contacts for releasing the releasable means to permit the selector contactor to move to the next step, a switchboard containing a series of panels, one for each station, contact pins operatively positioned in selected panels and directly engaging the selector contactor at a predetermined time, a variable tuning condenser for selecting the stations in a radio receiver, and a plurality of armatures controlled by current through each pin when engaged by the selector contactor for controlling the movement of the variable condenser to bring in the station corresponding to the pin so engaged

4. In a station selector for radio receivers, a time piece with a contactor having constant speed, contacts arranged to be engaged serially by the contactor, a selector contactor arranged for step by step movement, a series of steps, an armature for holding and releasing the contactor at each step, an electromagnet controlled by current through the movable contactor and any of the said contacts for releasing the holding means to permit the selector contactor to move to the next step, a switchboard containing a series of panels, one for each station, contact pins operatively positioned in selected panels and directly engaging the selector contactor at a predetermined time, a variable tuning condenser for selecting the stations in a radio receiver, and a plurality of selector bars controlled by current through each pin when engaged by the selector contactor for checking the movement of the variable condenser to bring in the station corresponding to the pin so engaged.

5. In a station selector for radio receivers, a time piece with a contactor having constant speed, contacts arranged to be engaged serially by the contactor, a selector contactor arranged for step by step movement, a series of steps, an armature for holding and releasing the contactor at each step, an electromagnet controlled by current through the movable contactor and any of the said contacts for releasing the releasable means to permit the selector contactor to move to the next step, a switchboard containing a series of panels, one for each station, contact pins operatively positioned in selected panels and arranged to be engaged by the selector contactor at a predetermined time, a variable tuning condenser for selecting the stations in a radio receiver, and a rotary drum whose movement is initiated by current through each pin when engaged by the selector contactor for controlling the position of the variable condenser to tune in the station corresponding to the pin so engaged.

6. In a station selector for radio receivers, a time piece with a contactor having constant speed, contacts arranged to be engaged serially by the contactor, a selector contactor arranged for step by step movement, a series of steps, an armature for holding and releasing the contactor at each step, an electromagnet controlled by current through the movable contactor and any of the said contacts for releasing the releasable means to permit the selector contactor to move to the next step, a switchboard containing a series of panels, one for each station, contact pins operatively positioned in selected panels and arranged to be engaged by the selector contactor at a predetermined time, a variable tuning condenser for selecting the stations in a radio receiver, and an electromagnetic clutch whose movement is initiated by current through each pin when engaged by the selector contactor for controlling the movement of the variable condenser to tune in the station corresponding to the pin so engaged.

7. In a station selector for radio receivers, a time piece with a contactor having constant speed, contacts arranged to be engaged serially by the contactor, a selector contactor arranged for step by step movement, a series of steps, an armature for holding and releasing the contactor at each step, an electromagnet controlled by current through the movable contactor and any of the said contacts for releasing the releasable means to permit the selector contactor to move to the next step, a switchboard containing a series of panels, one for each station, contact pins operatively positioned in selected panels and directly engaging the selector contactor at a predetermined time, a variable tuning condenser for selecting the stations in a radio receiver, and a motor whose circuit is initially controlled by current through each pin when engaged by the selector contactor for moving the variable condenser to bring in the station corresponding to the pin so engaged.

8. In a station selector for radio receivers, a series of contacts, a time-controlled contact movable to engage the first contacts in a predetermined order, a carriage movable step by step under the control of said contacts as they are progressively closed, a contactor carried by the carriage, a panel corresponding to each station to

be selected, contact pins removably carried by the panels and selectively arranged to be engaged by the contactor at the proper times for receiving the selected stations, a rotary drum, means whereby a station is selected according to the positions of the drum, and means whereby the closing of any contact pin by the contactor stops the drum at the selected position.

9. In a station selector for radio receivers, a series of contacts, a time-controlled contact movable to engage the first contacts in a predetermined order, a carriage movable step by step under the control of said contacts as they are progressively closed, a contactor carried by the carriage, a panel corresponding to each station to be selected, contact pins removably carried by the panels and selectively arranged to be engaged by the contactor at the proper times for receiving the selected stations, a rotary drum, radio tuning means attached to the drum whereby a station is selected according to the position of the drum, and selector bars, any of which may engage and stop the drum at a selected position when the contactor closes with any contact pin.

10. In a station selector for radio receivers, a series of contacts, a time-controlled contact movable to engage the first contacts in a predetermined order, a carriage movable step by step under the control of said contacts as they are progressively closed, a contactor carried by the carriage, a panel corresponding to each station to be selected, contact pins removably carried by the panels and selectively arranged to be engaged by the contactor at the proper times for receiving the selected stations, a rotary drum, radio tuning means attached to the drum whereby a station is selected according to the position of the drum, selector bars, any of which may engage and stop the drum at the selected position by the closing of any contact pin by the contactor, and means whereby the operated selector bar may be reset to its normal position after the drum is stopped in the selected tuned position.

11. In a station selector for radio receivers, a series of contacts, a time-controlled contact movable to engage the first contacts in a predetermined order, a carriage movable step by step under the control of said contacts as they are progressively closed, a contactor carried by the carriage, a panel corresponding to each station to be selected, contact pins removably carried by the panels and selectively arranged to be engaged by the contactor at the proper times for receiving the selected stations, a rotary drum, radio tuning means attached to the drum whereby a station is selected according to the position of the drum, selector bars, any of which may engage and stop the drum at a selected position when the contactor closes with any contact pin, an electromagnetically operated clutch, and a rotary cam operated through the clutch for resetting the selector bar to its normal position after the drum is stopped in the selected position.

12. In a station selector for radio receivers, a control circuit for the receiver, a series of contacts, a time-controlled contact movable to engage the first contacts in a predetermined order, a carriage movable step by step under the control of said contacts as they are progressively closed, a contact carried by the carriage, a panel corresponding to each station to be selected, contact pins removably carried by the panels and selectively arranged to be engaged by the contactor at the proper times for receiving the selected stations, a rotary drum, radio tuning means attached to the drum whereby a station is selected according to the position of the drum, selector bars, any of which may engage and stop the drum at the selected position by the closing of any contact pin by the contactor, a rotary cam for resetting the selector bar to its normal position after the drum is stopped in the selected position, and means whereby the radio control circuit is opened when the movable contact engages one of the contacts.

13. In a station selector for radio receivers, a control circuit for the receivers, a series of contacts, a time-controlled contact movable to engage the first contacts in a predetermined order, a carriage movable step by step under the control of said contacts as they are progressively closed, a contact carried by the carriage, a panel corresponding to each station to be selected, contact pins removably carried by the panels and selectively arranged to be engaged by the contactor at the proper times for receiving the selected stations, a rotary drum, radio tuning means attached to the drum whereby a station is selected according to the position of the drum, selector bars, any of which may engage and stop the drum at the selected position by the closing of any contact pin by the contactor, a rotary cam for resetting the selector bar to its normal position after the drum is stopped in the selected position, an electromagnetically operated switch for opening the radio control circuit when the movable contact engages one of the contacts, and means whereby the radio control circuit will be established only after the closing of any contact pin by the contactor.

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