

June 18, 1940.

A. JOHNSON

2,205,170

RADIO CONTROL SYSTEM

Filed Oct. 26, 1938

2 Sheets-Sheet 1

Fig. 1.

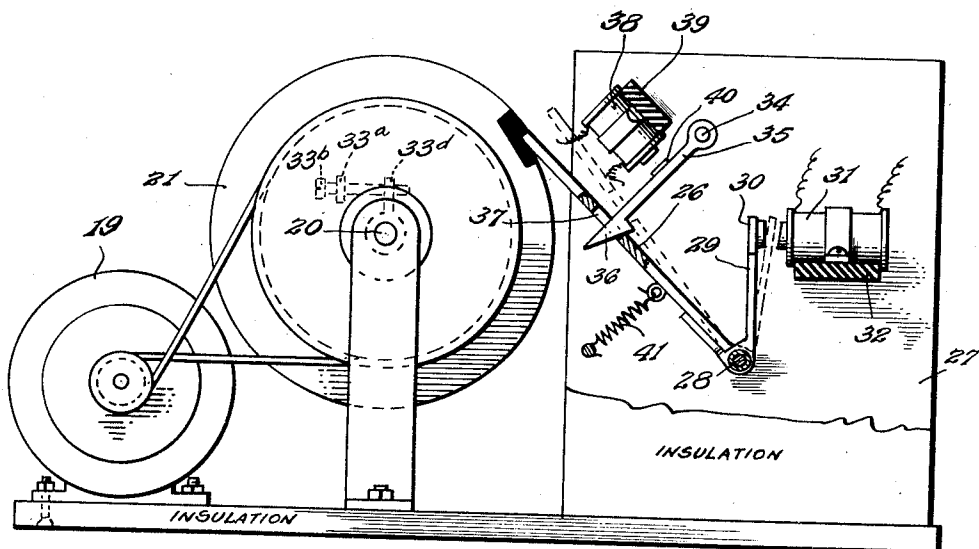
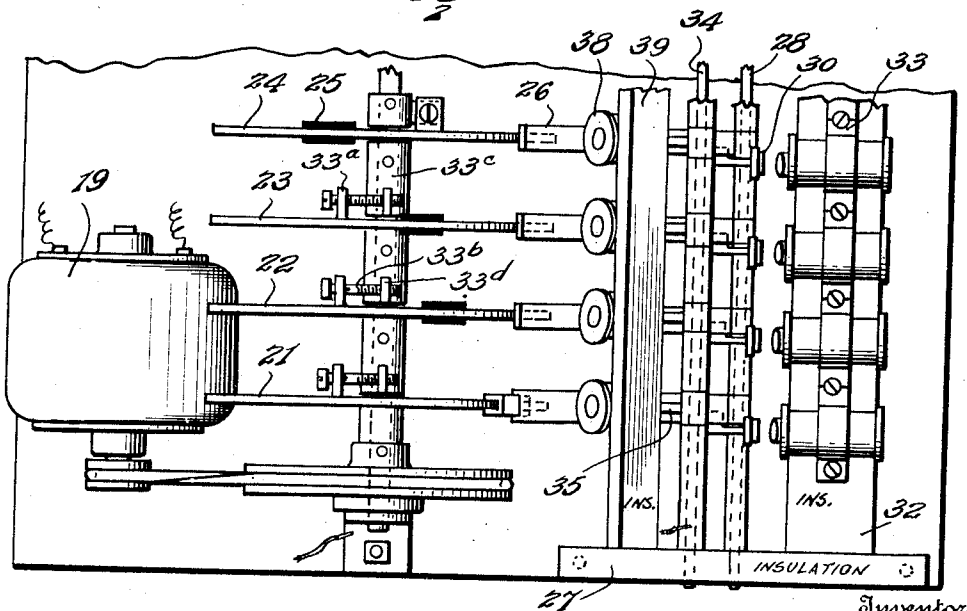


Fig. 2.



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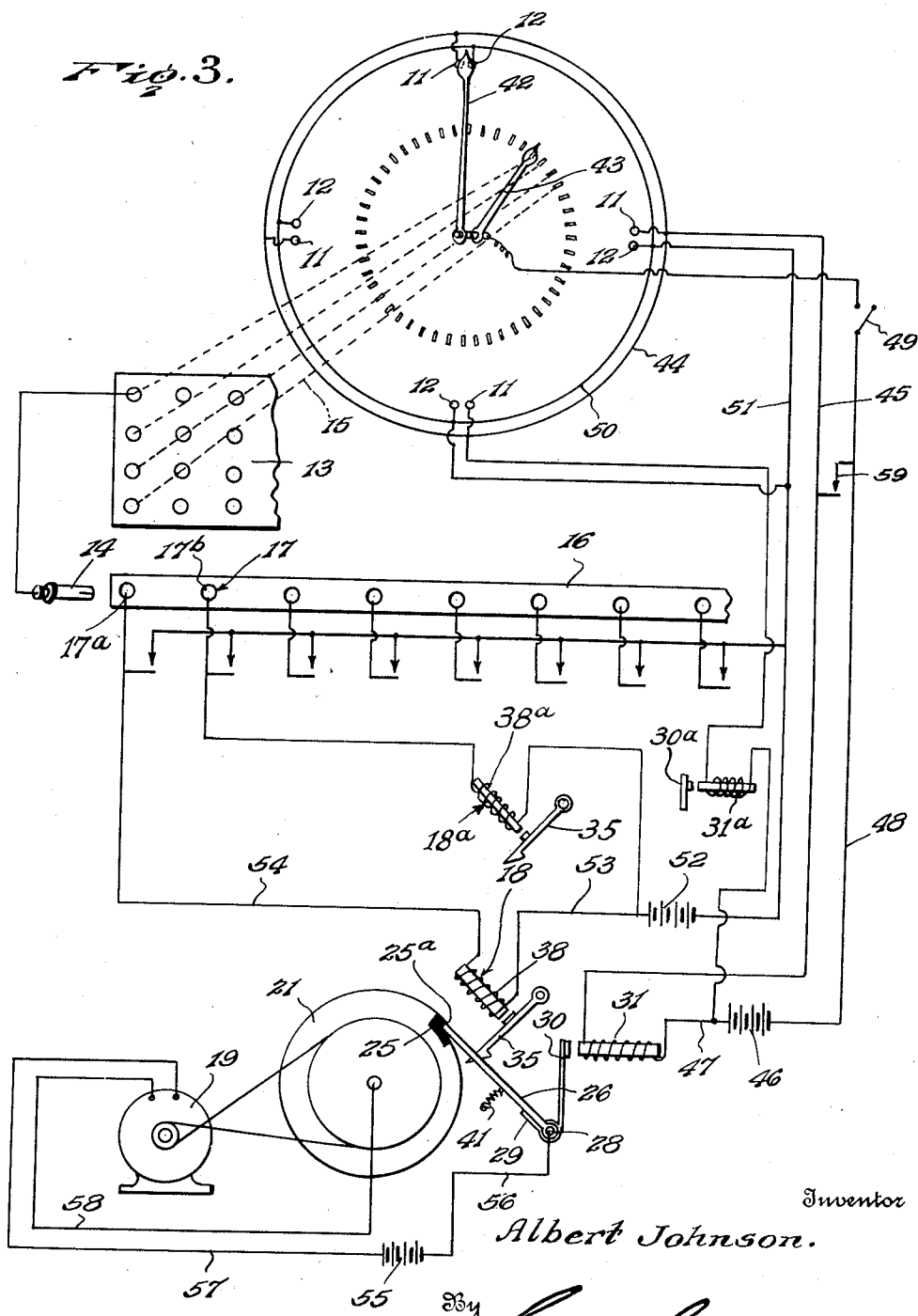
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2 Sheets-Sheet 2

Fig. 3.



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RADIO CONTROL SYSTEM

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4 Claims. (Cl. 250—40)

This invention relates to an improved automatic control system for radio receiving sets.

The invention seeks, as one of its objects, to provide a system of this character which will be automatic for controlling operation of a radio receiving set for any predetermined period of time within a given time interval so that desired radio programs may be automatically changed at the proper time.

Another object of the invention is to provide an automatic control system which will be simple in construction and operation so that it will be capable of being set and reset with facility.

As a still further object, the invention contemplates an automatic control system wherein provision is made to permit operation of an electrically operated tuning mechanism employed either in connection with or independently of the time control mechanism of the system.

The invention has for another object to provide a system of this character wherein the tuning means employed will efficiently rotate the tuning devices so that a station for which the time control mechanism is set, will be properly tuned in.

Other objects of the invention will become apparent as the description thereof proceeds.

Referring now more particularly to the drawings forming a part of my application:

Figure 1 is a front elevation, partially diagrammatic, of a portion of the time control mechanism employed.

Figure 2 is a side elevation of the electrically operated tuning mechanism, the view being partly broken away and shown in section.

Figure 3 is a fragmentary top plan view of the tuning mechanism, and

Figure 4 is a diagrammatic view of the entire system.

Referring now to the drawings in more detail, wherein similar numerals of reference will be seen to designate like parts throughout the various views, the numeral 1 indicates a conventional radio receiving set cabinet which carries therein a suitable radio chassis which may be of any desired type. The cabinet has a top wall 2 and a front wall 3. Preferably mounted on the top wall 2 of the cabinet is a clock 4 which may be of the mechanical or of the electric variety and of any desired design. The clock has a face 5 on which are positioned the usual numbers representing the hours of the day. Mounted on the faces of the clock 4 and arranged in a circumferential series are spaced contact elements 6. It is desired to call attention to the fact that there is a contact element for each fifteen minutes of a twelve hour

period. On the face 5 of the clock 4, there are also pairs of contacts 7, 8, 9 and 10, as best seen in Figures 1 and 4 of the drawings. Each of the pairs of contacts comprises contact members 11 and 12. Moreover, the pairs of contacts 7, 8, 9 and 10 are arranged in equally spaced positions about the face 5. That is to say, the pair of contacts 7 is located at "12" on the clock face, the pair 8 is located at "3", the pair 9 is located at "6", and the pair 10 is located at "9". The purpose for these contacts as well as the contact members 6 will be described shortly.

Mounted on the front wall 3 of the cabinet 1 is a control board 13. The control board has mounted thereon a plurality of plugs 14 which are arranged in twelve parallel vertical rows with four plugs in each row. That is to say, there is a plug for fifteen minutes of each hour of the day and there are, of course, twelve hours in the day. As shown in Figure 1, the control board 13 has indicia thereon for indicating a given time period for each plug. The plugs 14 are each electrically connected with corresponding contact elements 6 on the face of the clock 5 by means of conductors 15, shown in dotted lines.

As shown in Figure 4 of the drawings, there is located beneath the control board 13 a station selector strip 16 which has mounted thereon open circuit jack switches 17. Each of the jack switches 17 will be electrically connected with tuning and station selecting mechanism, shown generally at 18, in a manner to be described in more detail hereinafter. The mechanism 18 includes, as best shown in Figure 2, an electric motor 19 which is rotatably connected with the condenser shaft 20 of the receiving set. On the shaft 20, in addition to the usual condenser rotor units, are loosely mounted a plurality of spaced disks 21, 22, 23 and 24 which have mounted in their circumferences at points therealong insulating blocks 25 which define stops 25^a. Attention is directed to the fact that, while but four disks are shown on the shaft 20 in Figure 3 of the drawings, any desired number of disks may be used, depending upon the number of station settings to be selected on the radio tuning unit. A disk 20, a cooperating control lever 26, and magnetic operating means, presently to be described, are necessary for each definite station setting of the condenser shaft. The control levers 26 are preferably rectangular in shape and are mounted in a suitable frame 27 which is disposed in parallel spaced relation to the shaft 20 of the tuning unit. The control levers 26 are swingingly mounted on a shaft 28 which extends through the

frame 27 and is journaled in each end thereof. A raising lever 29 is carried by each control lever, being swingingly mounted on the shaft 28, and has an armature 30 which is adapted to be attracted by magnets 31 and 31^a upon energization thereof. The magnet 31 is carried on an insulating strip 32 which extends longitudinally of the frame 27. It is desired to call attention to the fact that one relatively large magnet 31 may be employed, in which case a single armature would be effective for raising all of the control levers simultaneously, or a plurality of magnets may be used, as shown in Fig. 3 of the drawings. Where a plurality of magnets are employed, they will all be held in place on the strip 32 by a strap 33. Separate armatures 30 and 30^a will be provided for each of the magnets 31, where a plurality are employed.

In order to permit adjustment of the disks on the shaft 20, appropriate structure for the purpose is employed. More specifically, lugs 33a are formed on each of the cams and have bolts 33b screwed therethrough. The disks are loosely mounted on the shaft, but sleeves 33c are fitted about said shaft and have tongues 33d which extend radially and receive therethrough the ends of the bolts 33b. It will be understood that the disks may be readily adjusted.

Mounted in the frame 27 above the rod 28 is a latch rod 34. The latch rod 34 carries a plurality of latches 35 which are normally obliquely downwardly disposed. The latches have heads 36 which engage through slots 37 disposed medially of the lengths of the control levers 26, a latch 35, with head 36 thereon, being provided for each control lever. A plurality of magnets 38, two of said magnets being shown at 38 and 38^a are mounted on an insulating strip 39 which is supported at the upper forward corner of the frame. The magnets 38 and 38^a, as will be seen, are supported obliquely with respect to the vertical and at substantially right angles to the length of the latches 35, and have pole pieces which are engageable with armatures 40 carried on the latches 35. Light springs 41 normally urge the levers 26 toward their respective disks on the shaft 20.

The main stem of the clock 4 has a minute hand 42 which overlies the face 5. The minute hand is of conventional construction, with the exception that its outer end portion is selectively and progressively engageable with the contacts 11 and 12 of the pairs of contacts 7, 8, 9 and 10. On the main stem of the clock 4 there is also mounted the hour hand 43, the free end portion of which is selectively engageable with the contact members 6 on the face of the clock. If desired, the hands 42 and 43 may have wiping shoes thereon for facilitating the making of the electric circuit with the various contacts.

It is now desired to discuss the wiring diagram in more detail. A conductor 44 connects each of the contacts 11 of the pairs of contacts 7, 8, 9 and 10, with each other, while a conductor 45 connects the conductor 44 with one terminal of the magnets 31. The other corresponding terminals of the magnets 31 are joined together and are connected to one terminal of a battery 46 by a conductor 47. A conductor 48 connects the other terminal of the battery 46 with the main stem and with the corresponding inner ends of the hands 42 and 43 of the clock. A switch 49 is interposed in this conductor 48 and the purpose thereof will be described in more detail hereinafter. A conductor 50 connects each of the con-

tacts 12 of the pairs of contacts 7, 8, 9 and 10, with each other, and a conductor 51 connects the conductor 50 with one terminal of a battery 52. The other terminal of the battery is connected to one terminal of each of the magnets 38 and 38^a by a conductor 53. The other terminal of the magnets 38 and 38^a is connected to one of the jack switches 17 by a conductor 54. It should be understood that each of the jack switches 17 is electrically connected with one of the magnets 38 so that closing of each switch will effect the energization of the magnet 38 connected therewith. The jack switches 17 are selectively engageable by the plugs 14 of the board 13. In other words, each jack switch, when closed by one of the plugs 14, will effect the selection of a radio station by the tuning unit in a manner now to be described more fully.

Let it be presumed that the plug 14 is withdrawn from the board 13 and inserted in one of the jack switches 17 which will be designated as 17^a. The circuit will then be closed from the board to one of the jack switches. In order for the circuit to be completed, however, it is necessary that the hands 42 and 43 of the clock be positioned to designate one o'clock. When this position takes place, the circuit will be closed through the conductor 51 to one terminal of the battery 52, thence through the conductor 53, through the magnet 38, through the conductor 54, back to the jack switch 17^a, through the plug 14, and through the conductor 15 which joins the plug with one of the elements 6 and through the hand 43 and through the hand 42 and finally through the conductor 50 and, of course, back to the conductor 51 to the battery 52. The magnet 38 will thus be energized and the latch 35 released for releasing the control lever 26 so that said lever will engage the stop 25^a of the insulating block 25 of the disk which controls the setting of the condenser shaft 20. The condenser shaft will be stopped at the desired setting for the station which was plugged in by insertion of the plug 14 into the jack switch 17^a. When the circuit is completed and the control lever 26 is pulled toward the disk, the circuit to the motor 19 will be completed in the following manner: A battery 55 has one terminal thereof connected with one end of the control lever 26 by a terminal 56. The other terminal of the battery is connected with the motor by means of a conductor 57. A conductor 58 connects the other terminal of the motor with the shaft 20 and the disks which are fixed thereon. When a disk controlling movement of the condenser shaft 20 to a given setting is on said setting, the circuit will be broken by the insulating block 25. Should the end of the control lever be resting on the disk having to do with setting the condenser shaft to conform to the station selected on the board 16, the motor will be started and the cam will be rotated until the setting is again reached.

It will now be understood that the radio receiver will be operative for bringing in the program from the station to which it has been tuned. Assuming that the program is of fifteen minutes length, when the minute hand 42 traverses one-fourth of the face of the clock, consuming fifteen minutes time, the end thereof will engage the contact 11 of the pair of contacts 8. When this takes place, the circuit will be completed from one terminal of the battery 46 through the conductor 48 through the switch 49, assuming it is closed, to the main stem of the clock, thence through the hand 42, the contact 11, the con-

ductor 45, the magnet 31 and the conductor 47, back to the opposite terminal of the battery 46. It should be understood that, if the plug 14 is inserted in the jack 17^b, the magnet 38^a will be energized instead of the magnet 38. The magnet 31^a will also be energized in the same manner as the magnet 31 for shifting the armature 30^a in the same manner that the armature 30 is shifted. Suitable conductors connect the magnets 31^a and 38^a in the circuit with the plug 14 and board 15, as well as with the clock face contacts. The magnet 31 will be energized for swinging the contact lever, or levers, upwardly from behind the stops 25^a, when the disks will be free to rotate. Moreover, the heads 36 of the latches 35 will engage in the slots 37 and will retain the control levers in uppermost position. The radio may or may not remain tuned to the same station as desired.

Should it be desired, however, to change the tuning of the radio receiver so that another station will be received, it is only necessary to remove the plug 14 and insert it in another one of the jack switches 17, as, for example, 17^b. As heretofore stated, the jack switch 17^b, as well as all of the other jack switches 17 are each connected with their own associated magnet 38. Therefore, when the circuit is completed by the plug 14 through the jack switch 17^b, the circuit will then be again closed through the magnet 38 when the same will be energized for releasing the latch 35 and permitting the control lever 26 to fall against the disk, as, for example, the disk 22 on the shaft 20. The circuit to the motor 19 will again be completed, as heretofore stated, and the condenser shaft will be rotated until the control lever associated therewith engages the insulating block 25 and breaks the circuit to the motor, when the new station, controlled by the switch 17^b will be brought into proper tuning resonance. It should be understood that the plug 14 which is engaged in the switch 17^b will have to be with one which covers a time period from quarter after one to one thirty in order for the circuit to be completed through the clock structure. It should also be understood that the plugs are each connected with one of the elements 6. Therefore, before the circuit can be completed, it is necessary that the plug which is connected to the element under the hour hand be inserted in the jack switch 17.

If desired, a multiple plug may be employed in connection with the jack switches 17 so that any number of plugs may be utilized at one time, for covering an interval of the number of hours.

If it is desired to allow the radio receiver to remain tuned to the same station indefinitely, the switch 49 may be opened. A switch 59 is connected between the terminals 45 and 48 and is operable for release of the control levers from the disks simultaneously.

While I have shown a number of sets of batteries, it should be understood that a supply of alternating or direct current may be used in lieu thereof.

It is thought that the construction and operation of my improved system will now be thoroughly understood.

Having thus described the invention, what is claimed as new is:

1. In a radio control system, a radio tuning unit including a condenser shaft having disks thereon, a motor operative for rotating the disks to predetermined settings whereby pre-selected stations will be tuned to resonance, control levers

engageable with the disks for retaining said disks in station selecting position, electro-magnetic means for disengaging the levers from the disks at the expiration of a predetermined period whereby the condenser shaft and disks will be allowed to rotate, a station selector jack switch, an electro-magnet, circuit connections between the magnet, switch and a current source, and a latch normally retaining one of the control levers out of engagement with its associated disk and being operable by the magnet for releasing said control lever to engage and limit said disk associated therewith to a station receiving setting.

2. In a radio control system, a clock having a face provided with an annular series of contacts, each spaced from the other a distance equivalent to that traveled by the hour hand in a predetermined time interval, pairs of contacts carried on the clock face and being spaced apart on said face a distance equivalent to that traveled by the minute hand of the clock in a predetermined time interval, said hands being selectively engageable with the contacts, a control board, a series of plugs on the control board, one of said plugs being provided for each contact of said series of contacts, a station selector strip having station selector jack switches thereon, said jack switches being engageable selectively by certain of the plugs, a tuning unit including electro-magnet means connected with the pairs of contacts and a power source, a motor, a tuning condenser shaft, disks on the shaft, insulating blocks on the disks, control levers, a plurality of latches associated with the control levers, electro-magnets for each of the latches, circuit connections between each of the last-mentioned magnets and each of the selector switches, circuit connections between the motor, the control levers, the cams and a power source, and circuit connections between the last-mentioned magnets, said selector switches, certain of the contacts of the pairs of contacts and a power source, certain of said plugs being engageable in certain of said selector jack switches for energizing certain of said last-mentioned magnets for closing the circuit to the motor and rotating one of said disks to a position for tuning in a radio station, said insulating block on said disk breaking the circuit and stopping the motor, said contacts on the clock face cooperating with the hands and the first-mentioned magnet means for retaining the disk in set position for a predetermined time.

3. In a radio control system, a tuning unit including a motor, a condenser shaft, means rotatably connecting the motor with the condenser shaft, disks on the shaft, insulating blocks on the disks, a frame adjacent the shaft, a rod in the frame, a plurality of control levers swingingly mounted on the rod, one of said levers being associated with each disk and said levers being engageable with the disks, lifting arms on the rod and associated with the levers, said lifting arms having armatures, electro-magnets, means mounting the magnets in the frame in associated relation to the armatures, a second rod carried by the frame, latches on the rod and engageable with the control levers for retaining said levers out of engagement with the disks, a second set of magnets in the frame, and means mounting said last-mentioned magnets in the frame, said last-mentioned magnets being selectively energizable for shifting the latches and releasing the control levers for retaining the disks in a set position.

4. In a radio control system, a clock having a face, a group of contacts on the face, an hour hand on the clock and sequentially engageable with the contacts, spaced pairs of contacts on the clock face, a minute hand on the clock and sequentially engageable with the contacts of the pairs of contacts, a control board having plugs electrically connected with the contacts of the first group of contacts, station selector jack switches selectively engageable by the plugs for selecting a station to be heard, a radio tuning unit, means for automatically setting the tuning unit to the frequency of the station to be heard, said means including a magnet, a control lever, an armature operatively connecting the control lever with the magnet, and circuit connections between the magnet, a power source, one of the contacts of each pair of contacts and the minute

hand, a second magnet, a latch operatively associated therewith and with the control lever, and circuit connections between the second magnet, the jack switches, a source of power and the other of the contacts of the pairs of contacts, said clock hands and contacts controlling current flow to the magnets whereby the second magnet will be operative for shifting the latch for releasing the control lever for retaining the tuning unit in a predetermined position throughout a predetermined time interval for keeping a selected station tuned to resonance during said interval, said first mentioned magnet shifting the armature and control lever for permitting shifting of the tuning unit when it is desired to select a station.

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