

Feb. 8, 1938.

J. H. DENISON

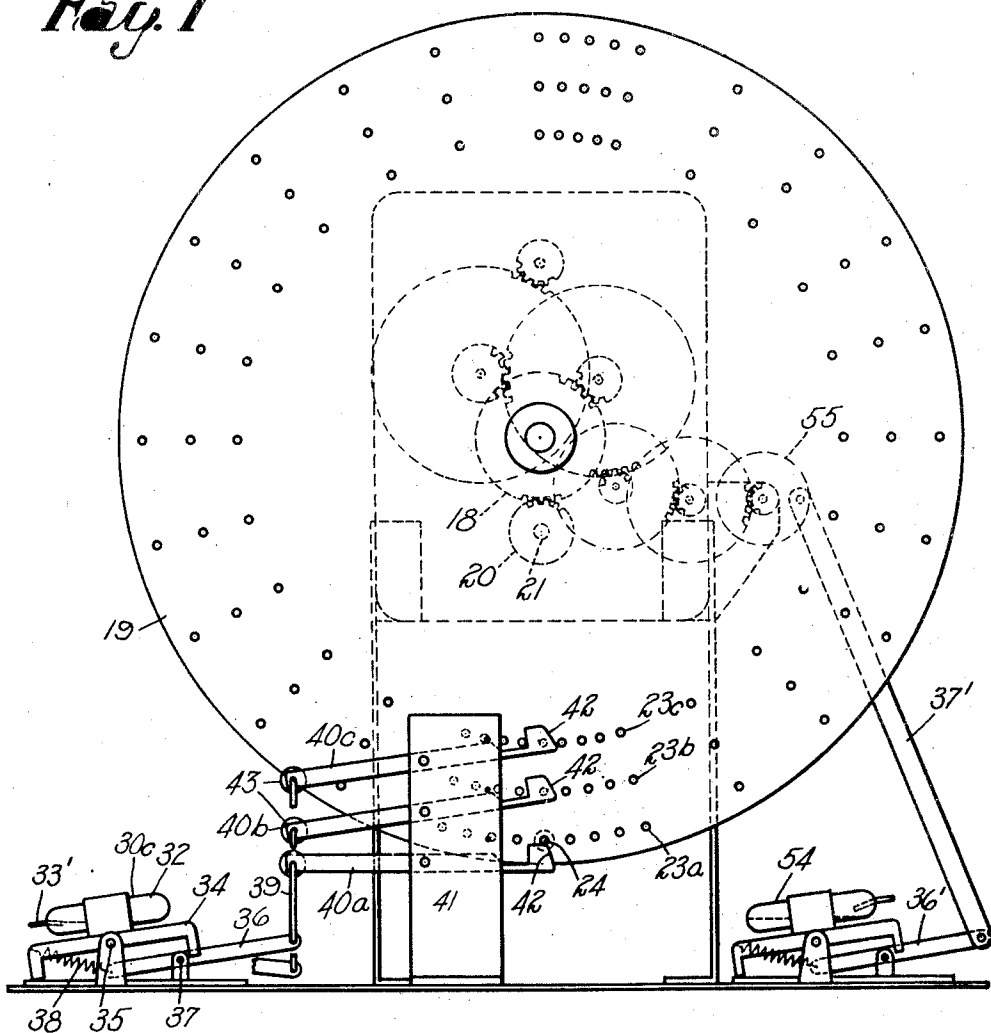
2,107,472

SELECTIVE CONTROL MECHANISM FOR RADIO SETS

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4 Sheets-Sheet 1

Fig. 1



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SELECTIVE CONTROL MECHANISM FOR RADIO SETS

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Fig. 2

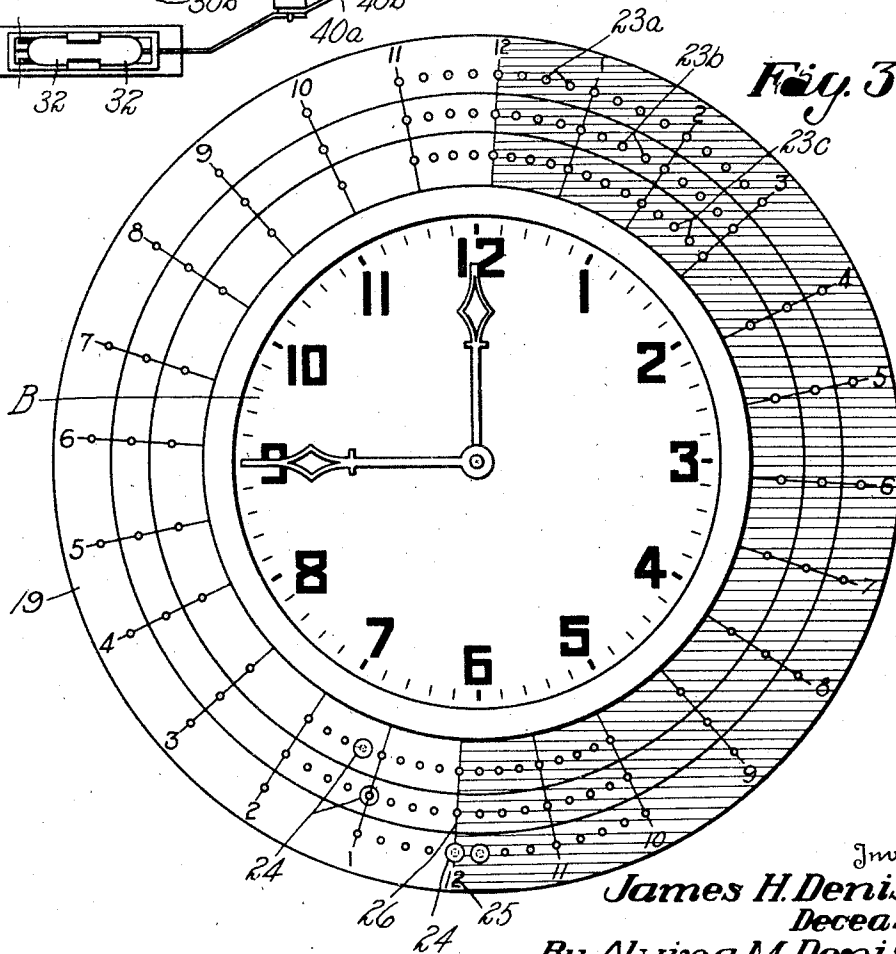
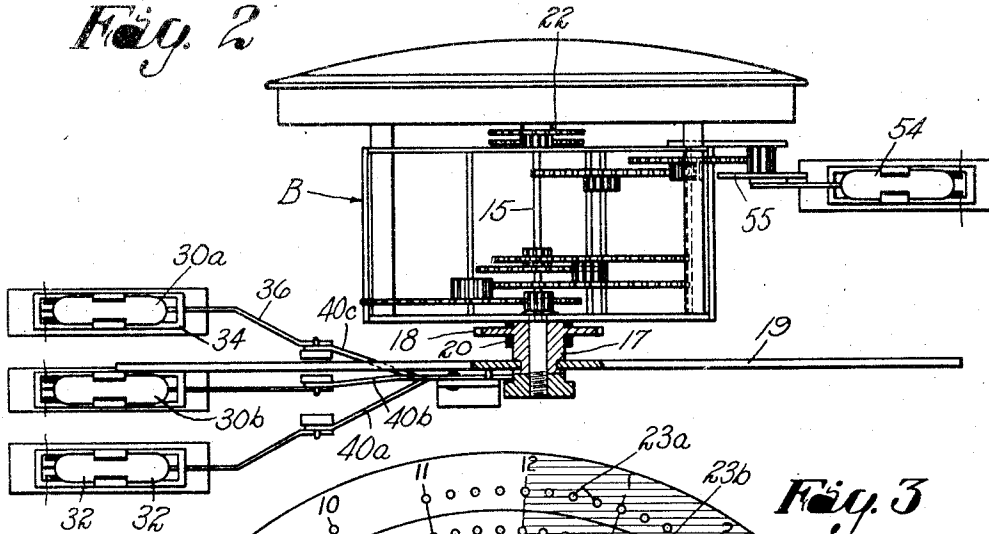


Fig. 3

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SELECTIVE CONTROL MECHANISM FOR RADIO SETS

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4 Sheets-Sheet 3

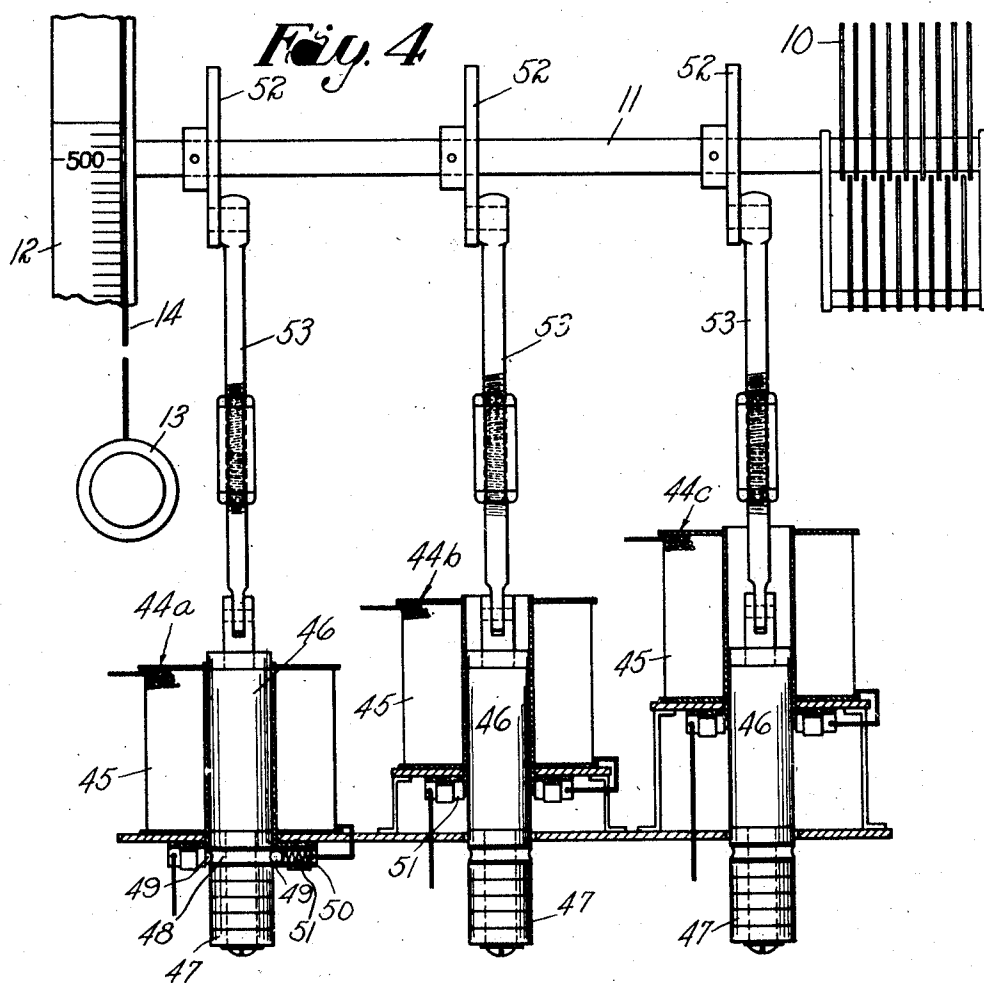
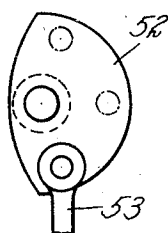


Fig. 5



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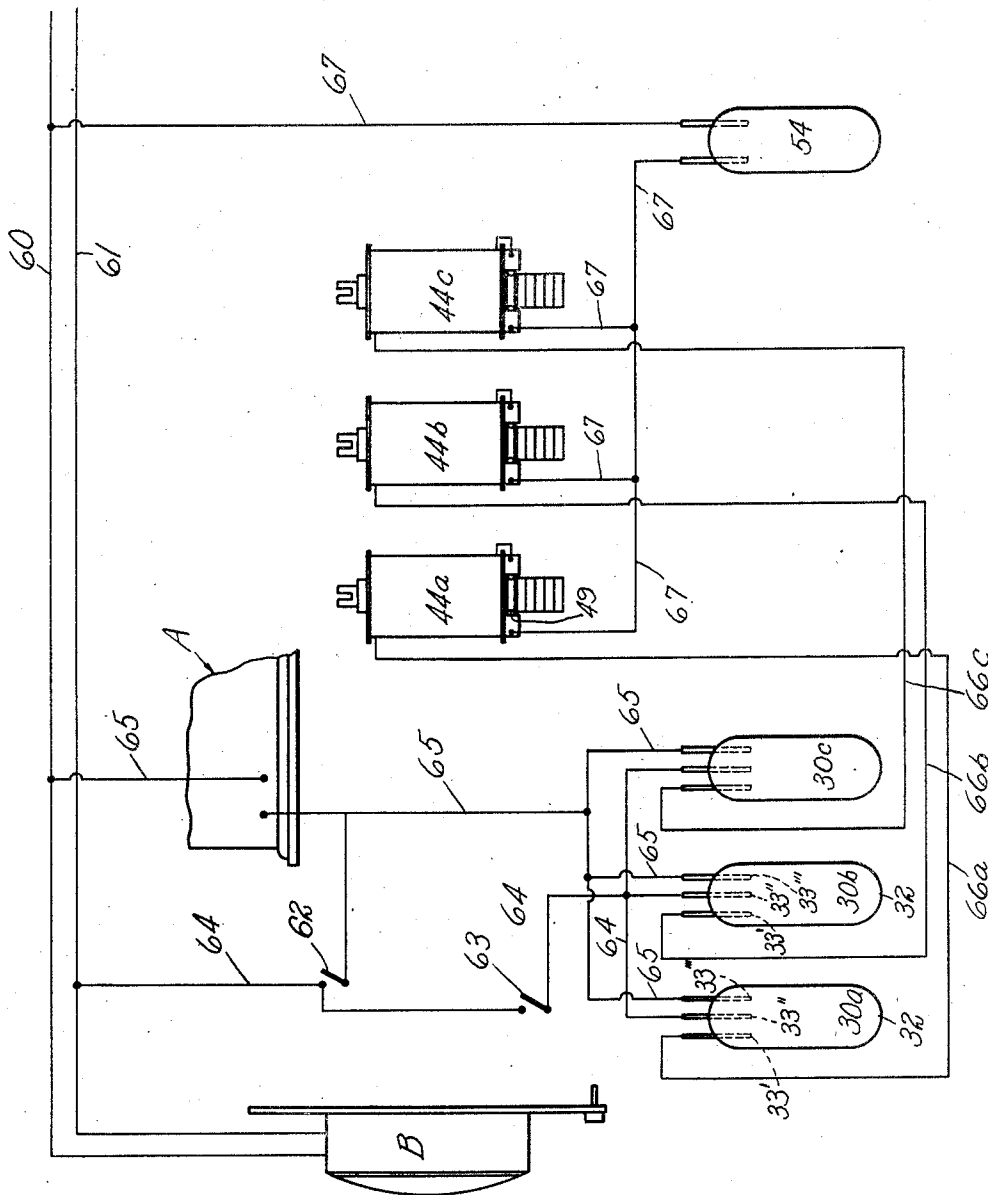
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SELECTIVE CONTROL MECHANISM FOR RADIO SETS

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,107,472

SELECTIVE CONTROL MECHANISM FOR
RADIO SETSJames H. Denison, deceased, late of Hartford,
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Application October 24, 1933, Serial No. 694,980

14 Claims. (Cl. 250—20)

This invention relates to means whereby radio sets may be selectively controlled in an automatic manner.

The aim of the present invention is to provide an improved and simplified arrangement by means of which receiving sets may be automatically dialed or tuned in to receive programmes from different transmitting stations at any predetermined or selected time of day and for a predetermined length of time. With this improved arrangement, the selective control mechanism may be very conveniently, quickly and easily set so that stations of a predetermined number may be selectively tuned in in the desired sequence or order, each desired programme being brought in at the desired time of day for a predetermined period of time.

A further aim of the invention is to provide radio sets with selective control mechanisms which may be rendered inoperative at will and which, when rendered inoperative, will in no way affect or interfere with manual operation of the tuning device with which the set is usually provided.

A still further aim of the invention is to provide, in combination with the selective control mechanism, means for throwing the current on and off of the receiving set at the desired time or times.

A further aim of the invention is to provide an improved selective control mechanism of the character described having various features of novelty and advantage and which is particularly characterized by its simplicity and compactness in construction and arrangement; by its economy in manufacture, assembly and installation; by the ease and facility with which it may be set, and by its reliability and accuracy in operation.

Other objects will be in part obvious, and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawings, wherein is shown, for illustrative purposes, one embodiment which the present invention may take,

Fig. 1 is a rear elevational view showing the time mechanism in dotted lines, the selector plate or control dial, and the associated switches;

Fig. 2 is a top plan view of what is shown in Fig. 1;

Fig. 3 is a front view of the clock and associated selector plate;

Fig. 4 is an enlarged view showing the operating means for the dial shaft;

Fig. 5 is a detail view of one of the arms for operating the dial shaft; and

Fig. 6 is a diagrammatic or schematic layout showing the wiring connections between the several instrumentalities.

Referring to the drawings in detail, A denotes generally a radio set which may be of any desired sort and, therefore, is shown only in part and more or less diagrammatically in the drawings. The set may have a tuning device in the form of a condenser 10 (see Fig. 4) associated with the usual dial shaft carrying a dial 12. The dial shaft may be manually set by means of the usual knob 13 associated with the dial through a flexible belt 14.

The device is provided with a suitable time instrumentality which is shown more or less conventionally in Fig. 6 as an electric clock B. A clock of any suitable type may be employed. In Fig. 2, the motor for the clock is omitted. The clock is shown as having an hour shaft 15. Mounted for rotation on a stud extending rearwardly from the back plate of the clock is a unit including a sleeve 17 which carries a gear 18 and a selector plate 19. The gear is connected up to the hour shaft 15 through gear 20, shaft 21, and gears 22 in such manner that the selector plate will be rotated once in twenty-four hours, for example. In the present instance, the driving connection between the hour shaft of the clock and selector plate is in the ratio of two to one, but obviously this ratio may be changed, if desired.

The selector plate is provided with a plurality of concentric rows of circles or openings 23a, 23b, 23c, which are adapted to selectively receive plugs or pins 24. The openings in each row may be suitably spaced apart, depending on the interval of time during which it is desirable that the programmes be played, in the present instance the spacing being such that there are four openings to each portion of the plate which represents an hour; that is to say, the openings are spaced apart so as to represent time intervals of fifteen minutes each. The selector plate or dial is provided with suitable numerals 25 and associated scale marks 26, the numerals running from one to twelve and representing the twenty-four hours of the day. By preference, one-half of the face of the selector plate is darker than the other half, as represented by shading in the drawings,

so as to differentiate the day period from the night period. Each circle or row of openings corresponds to a sending station. In the present instance, three rows of openings are illustrated so that the device is adapted to selectively tune in on three stations, but obviously the number of the rows may be varied as required.

Selectively associated with the rows of openings are suitable switch mechanisms which are here shown, for illustrative purposes, as being in the form of mercury switches 30a, 30b, 30c. Each switch comprises a tube 32 enclosing a globule of mercury adapted to close contact between three terminals 33', 33'', 33''' extending into one end of the tube. Each of these switches is carried by an individual rocker or holder 34, pivoted as at 35. Associated with each holder is a lever 36 pivoted as at 37 and connected at one end to the holder by means of a spring 38. The arrangement is such that when the left-hand end of the lever 36 is depressed, as shown in Fig. 1, the switch is on. When the lever 36 is rocked clockwise, the switch will be thrown into off position with a snap movement because of the spring 38. The several levers 36 are respectively connected by means of links 39 to operating levers 40a, 40b, and 40c. The pivots for these levers are indicated at 41. The operating levers are respectively associated with the pins or plugs carried by the circles of openings in the selector plate. In the present instance, as will be seen most clearly from Fig. 1, each operating lever has, at its free end, a cam portion 42 against which the pin or pins 24 of the associated row of openings is or are adapted to wipe upon rotation of the selector plate. The selector plate rotates in a counter-clockwise direction, referring to Fig. 3, and in a clockwise direction, referring to Fig. 1. The length of each cam portion 42 is substantially such that the stud or plug engaging the same will maintain the associated switch in closed position for a predetermined period of time, in the present instance, fifteen minutes. The operating levers 40a, 40b, and 40c are provided at their left-hand ends with counterweights 43 which normally urge the mercury switches into off position.

Respectively associated with the said mercury switches are electro-magnets 44a, 44b, and 44c which constitute means for operating or setting the tuning means; that is, for setting the dial shaft 11 and the condenser 10 to predetermined relative positions. Each electro-magnet has a solenoid or coil 45 and a steel core or armature 46, these parts being so arranged and constructed that when the coil is energized the core or armature will be moved to its neutral or central position, as indicated in connection with the electro-magnet 44a shown in Fig. 4. Carried on the lower end of each armature are brass washers 47 and an interposed insulating washer 48. The insulating washer is for the purpose of breaking the current so as to eliminate any noise which might result should the solenoid be energized while the set is in operation. Associated with each magnet so as to be operated thereby, is a switch which is in series with the coil. In the present instance, the closing member of the switch is either the steel core 46 or the washers 47, and the contact members are in the form of balls 49 behind which are springs 50. The springs and balls are located in suitable insulated tubes 51. It will be understood that when an electro-magnet is in the position indicated by magnet 44b in Fig. 4, and the mercury switch 30b associated with that solenoid is closed, the current will pass through the coil

45 and the switch comprising the core 46 and the contact members 49. The solenoid being energized, the core will move to its neutral position and in which position the insulating washer will be brought into registry or contact with the contact members 49 so that the current through the solenoid is broken. In the event that a solenoid should be above its neutral position, the washers 47 will close the circuit between the contact members 49 so that when the associated mercury switch is thrown on, the electro-magnet will be energized and the core will be drawn down to neutral position; that is, the position illustrated in connection with the left-hand electro-magnet 44a.

The armatures of the solenoids are respectively connected to the dial shaft 11 in such manner that the electro-magnets will turn the shaft to different predetermined relative positions. These connections may be of any suitable kind, but by way of illustration the shaft 11 may have secured to it disks or cranks 52, and between the crank and the respective armature are adjustable pitmans or links 53. The relative angular relations of the dial shaft are diagrammatically shown in Fig. 5. The arrangement shown in Fig. 4 provides a very simple, effective and economical construction. The cores of the electromagnets are differentially positioned with respect to the shaft, that is, they are positioned progressively at different distances from the shaft. The armatures are connected by suitable links directly to the cranks or arms 52.

In order to insure that the programme will be tuned in exactly at the desired time, say on the quarter hours, irrespective of slight inaccuracies in the cam surfaces 42 and the plugs, a master switch 54 is provided, and this switch is operated mechanically from the clock mechanism. This switch 54 is similar to the mercury switches previously described and needs no detailed description. The lever 36' is connected by a link 37' to an eccentric 55 which is driven through suitable gears associated with the clock mechanism.

The manner in which the several instrumentalities are electrically connected together is shown diagrammatically or schematically in Fig. 6. In this figure, the feed lines are designated by the numerals 60 and 61, and these lines lead to the clock B. 62 is a manually operable switch which, when closed, places the radio receiving set under manual control and out of automatic control. A similar switch 63 serves the purpose of placing the receiving set under automatic control, in which event the switch 62 is open. The switch 63 is included in a wire 64 leading from one of the lines, in the present instance the line 61, to the central contacts 33'' of the mercury switches 30a, 30b and 30c. The radio receiving set is included in a wire 65 which leads to the contacts 33''' of said switches. The terminals 33' of these switches are respectively connected to the coils of the respective electro-magnets by wires 66a, 66b, and 66c. The master switch 54 is in a wire 67 leading from the line 60 to the several contacts 49 of the solenoid operated switches.

The operation of the mechanism is briefly as follows: Assuming that the outer row of openings 23a of the selector plate represents one station, say WTIC, and it is desired to automatically tune that station in at 12 o'clock midnight, a plug 24 may be inserted, as shown in Fig. 3, in the opening adjacent the numeral 12 which indicates midnight. Assuming that the center circle of openings 23b represents WJZ, and it is desired to

bring that station in at 1 o'clock in the morning, a plug 24 will be inserted in the 1 o'clock opening of that circle. Assuming, further, that the inner row of openings 23c represents station WBR, and it is desired to tune that station in at 1:15 in the morning, a plug 24 will be positioned in the 1:15 opening of that circle.

Now when 12 o'clock midnight comes around, the clock will have rotated the selector plate to a position where the twelve o'clock plug engages the cam surface of the lever 40a whereupon the mercury switch 30a will be thrown from "off" to "on" position. Just an instant before 12 o'clock, the master switch 54 will be thrown "off" and then almost immediately thrown "on" exactly at 12 o'clock so as to insure that the programme is brought in at the exact desired time. In the event, when the mercury switch 30a is thrown "on", the electro-magnet 44a is in the neutral position shown in Fig. 4, no current will pass through that electro-magnet, but this is immaterial as the condenser was obviously set on a previous operation of the electro-magnet 44a to bring in the selected station which, in this instance, is WTIC. The radio set is now in circuit, the circuit being from the line 61 through wire 64, switch 63, contacts 33' and 33'' of the mercury switch 30a, and wire 65 back to the other line 60. The WTIC programme will now be played for fifteen minutes and at 12:15 the plug will ride off of the cam surface of the lever 40a, whereupon the weight 43 associated with that arm will cause the mercury switch 30a to be thrown to "off" position, thus breaking the circuit through the receiving set.

When 1 o'clock a. m. arrives, the 1 o'clock plug associated with the circle of openings 23b will engage the lever 40b, thereby throwing the mercury switch 30b into "on" position. At this time, the master switch will again operate in the manner previously described. The current will now pass from the line 61 through the wire 64, contacts 33' and 33'' of the mercury switch 30b, wire 66b, the coil of the electro-magnet, wire 67, and the master switch 54 back to the line 60. Upon energization of the electro-magnet 44b, its armature will be drawn to neutral position resulting in the tuning device or condenser 10 to be set to bring in the selected station which, in this instance, is WJZ. As soon as the core of the magnet 44b is drawn to neutral position, the insulating washer associated with that magnet is interposed between the contacts 49 whereupon current through the magnet is broken. At the same time that the electro-magnet 44b is energized, a current is completed through the radio set, and this current continues after the circuit is thrown "off" of the electro-magnet 44b. The circuit through the receiving set includes the wire 64, contacts or terminals 33' and 33'' of the mercury switch 30b, and the wire 65. The WJZ programme is now brought in for fifteen minutes and, at 1:15, the 1 o'clock plug associated with the series of openings 23b rides off of the cam surface of the operating lever 40b with the result that the mercury switch 30b is thrown "off", thus breaking the circuit through the receiving set. As the 1 o'clock plug rides out of engagement with the lever 40b, the 1:15 plug associated with the WBR circle of openings 23c becomes effective so as to tune in station WBR for fifteen minutes.

It will be observed, from the foregoing description taken in connection with the accompanying drawings, that this improved arrangement is extremely simple, it comprising but relatively few

parts, and therefore it may be constructed at a relatively low cost. The arrangement is very flexible in that the selected stations may be tuned in in any desired order and at any desired times. The stations may be tuned in in sequence or in any other order desired at selected intervals. The mechanism may be very easily set to bring in the desired stations at the desired time, it being merely necessary to insert the plug in the openings which correspond to the times it is desired to bring in the several stations. To do this, no computations are necessary on the part of the operator.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. In a selective control mechanism for radio sets and in combination with a tuning device of the set, a clock mechanism, dial means driven thereby and having a plurality of circles of openings, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with said circles of openings, an operative connection between each switch and the control plugs carried by the respective circle of openings, each of said connections including a pivoted lever having a cam surface of predetermined length representing a predetermined length of time and adapted to be engaged by the respective plug to hold the switch in operated position, and a plurality of electro-magnets respectively associated with said switches and operatively connected to said tuning device and arranged to move said tuning device differentially to several predetermined positions.

2. In a selective control mechanism for radio sets and in combination with a tuning device of the set, clock mechanism, dial means driven thereby and having a plurality of rows of openings, control plugs adapted to be selectively positioned in said openings, a plurality of mercury switches respectively associated with said rows of openings and each having an "on" position and an "off" position, an operative connection between each switch and its respective row of openings and arranged so that when a plug cooperates therewith a switch is thrown "on" and held "on" for a predetermined time and then released, a plurality of electromagnets electrically associated with the respective mercury switches and arranged to be energized when the corresponding mercury switch is thrown "on", and operative connections between said tuning device and electromagnets.

3. In a selective control mechanism for radio sets and in combination with a tuning device of the set, a clock mechanism, selector means driven by said clock mechanism and having a plurality of rows of openings, the several rows representing different stations and the openings of each row representing time intervals, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with the rows of openings and adapted to be oper-

ated by the plugs carried thereby, all of said switches being electrically connected to said set so that when any one of said switches is "on" the set is energized and when all of the switches are "off" the set is de-energized, and a plurality of electrically operated operating means for said tuning device and respectively associated with said switches so as to be controlled therethrough, said operating means being arranged to move said tuning device to different predetermined positions.

4. In a selective control mechanism for radio sets and in combination with a tuning device of the set, a clock mechanism, dial means driven thereby and having a plurality of circles of openings, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with said circles of openings and adapted to be operated by the plugs therein, all of said switches being electrically connected to said set so that when any one of said switches is "on" the set is energized and when all of the switches are "off" the set is de-energized, and a plurality of electromagnets respectively associated with said switches and operatively connected to said tuning device so as to move the same differentially to predetermined positions.

5. In a selective control mechanism for radio sets and in combination with a tuning device of the set, a clock mechanism, dial means driven thereby and having a plurality of circles of openings, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with said circles of openings and arranged to be operated by the control plugs thereof, each plug when in operative position being arranged to hold the associated switch in "on" position for a predetermined time, the switches then being moved to "off" position, all of said switches being electrically connected to said set so that when any one of said switches in "on" the set is energized and when all of the switches are "off" the set is de-energized, and a plurality of electromagnets respectively associated with said switches and operatively connected to said tuning device so as to differentially move the same to predetermined positions.

6. In a selective control mechanism for radio sets and in combination with a tuning device of the set, clock mechanism, dial means driven thereby and having a plurality of rows of openings, control plugs adapted to be selectively positioned in said openings, a plurality of mercury switches respectively associated with said rows of openings and each having an "on" and an "off" position, an operative connection between each switch and its respective row of openings and arranged so that when a plug cooperates therewith the switch is thrown "on" and held "on" for a predetermined time and then released, an electrical connection between all of said switches and including said radio set whereby when any one of the switches is "on" the radio set is energized and when all of the switches are "off" the radio set is out of circuit, a plurality of electromagnets electrically associated with the respective mercury switches and arranged to be energized when the corresponding mercury switch is thrown "on", and operative connections between said tuning device and electromagnets.

7. In a selective control mechanism for radio sets and in combination with a tuning device of the set, clock mechanism, selector means driven by said clock mechanism and having a plurality of rows of openings, the several rows representing

different stations and the openings of each row representing time intervals, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with said rows of openings and adapted to be operated by the plugs carried thereby, a plurality of electromagnets respectively associated with said switches and operatively connected to said tuning device so as to move the same differentially to predetermined positions, and a plurality of switches respectively associated with said electromagnets, said last mentioned switches being in series with the coils of said electromagnets and being operated by the armatures thereof.

8. In a selective control mechanism for radio sets and in combination with a tuning device of the set, clock mechanism, dial means driven thereby and having a plurality of circles of openings, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with said circles of openings and adapted to be operated by the plugs therein, a plurality of electromagnets respectively associated with said switches and operatively connected to said tuning device so as to move the same differentially to predetermined positions, and an individual switch associated with each electromagnet and in series with the coil thereof and a respective first mentioned switch, each individual switch being "off" when the associated electromagnet has been moved to operated position.

9. In a selective control mechanism for radio sets and in combination with a tuning device of the set, clock mechanism, dial means driven thereby and having a plurality of circles of openings, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with said circles of openings and arranged to be operated by the control plugs thereof, each plug when in operative position being arranged to hold the associated switch in "on" position for a predetermined time, a plurality of electromagnets respectively associated with said switches and operatively connected to said tuning device so as to differentially move the same to predetermined positions, and an individual switch associated with each electromagnet and in series with the coil thereof and a corresponding first mentioned switch, the armature of the electromagnet constituting a closing member for said individual switch, said armatures having means for opening the respective individual switches.

10. In a selective control mechanism for radio sets and in combination with a tuning device of the set, clock mechanism, dial means driven thereby and having a plurality of rows of openings, the several rows representing different stations and the openings of each row representing time intervals, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with the rows of openings and adapted to be operated by the plugs carried thereby, all of said switches being electrically connected to said set so that when any one of said switches is "on" the set is energized and when all of the switches are "off" the set is de-energized, a plurality of electromagnets respectively associated with said switches and operatively connected to said tuning device so as to move the same differentially to predetermined positions, and a plurality of switches respectively associated with said electromagnets and adapted to be operated thereby, said last mentioned

switches being respectively in series with the coils of the electromagnets and said first mentioned switches.

11. In a selective control mechanism for radio sets and in combination with a tuning device of the set, clock mechanism, dial means driven thereby and having a plurality of rows of openings, control plugs adapted to be selectively positioned in said openings, a plurality of mercury switches respectively associated with said rows of openings and each having an "on" and an "off" position, an operative connection between each switch and its respective row of openings and arranged so that when a plug cooperates there- with a switch is thrown "on" and held "on" for a predetermined time and then released, an electrical connection including all of said switches and said radio set whereby when any one of said switches is "on" the radio set is energized and when all of the switches are "off" the radio set is out of circuit, a plurality of electromagnets electrically associated with the respective mercury switches and adapted to be energized when the corresponding mercury switch is "on", operative connections between said tuning device and electromagnets, and a plurality of switches respectively associated with said electromagnets and adapted to be operated thereby.

12. In a selective control mechanism for radio sets and in combination with a tuning device of the set, a clock mechanism, selector means driven by said clock mechanism and having a plurality of rows of openings, the several rows representing different stations and the openings of each row representing time intervals, control plugs adapted to be selectively positioned in said openings, a plurality of switches respectively associated with the rows of openings and adapted to be operated by the plugs carried thereby, all of said switches being electrically connected to said set so that when any one of said switches is "on" the set is energized and when all of the switches are "off" the set is de-energized, a master switch periodically operated by said clock mechanism and in series with said mentioned switches, and a plurality of electrically operated

operating means for said tuning device and respectively associated with said switches so as to be controlled therethrough, said operating means being arranged to move said tuning device to different predetermined positions.

13. In a selective control mechanism for radio sets and in combination with a tuning device of the set, said tuning device having a rotatable shaft having a plurality of members extending laterally therefrom, a crank arm on each member, a clock mechanism, a station selector means driven by said clock mechanism and having a plurality of control elements representing different stations and adapted to be selectively positioned, a plurality of switches respectively associated with said elements representing the several stations, a plurality of electromagnets having cores respectively associated with said switches so as to be controlled therethrough, said cores being differentially positioned with respect to said members, and direct pivotal connections between each armature of said electromagnets and a respective crank arm.

14. In a selective control mechanism for radio sets and in combination with a tuning device of the set, said tuning device being provided with a shaft having crank arms, a clock mechanism, a station selector means driven by said clock mechanism including a disk-shaped rotatable member, a plurality of control elements individually and selectively positioned on said member, a plurality of switches, each switch having a cam actuated device located in the path of an element and representing a predetermined station, spring actuated means maintaining each switch in an inoperative position except when its cam actuating device is engaged by an element, a plurality of electromagnets having cores respectively associated with said switches and armatures connected to said crank arms, said magnets being differentially positioned with respect to said shaft, and a connection between each armature and a respective crank arm.

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