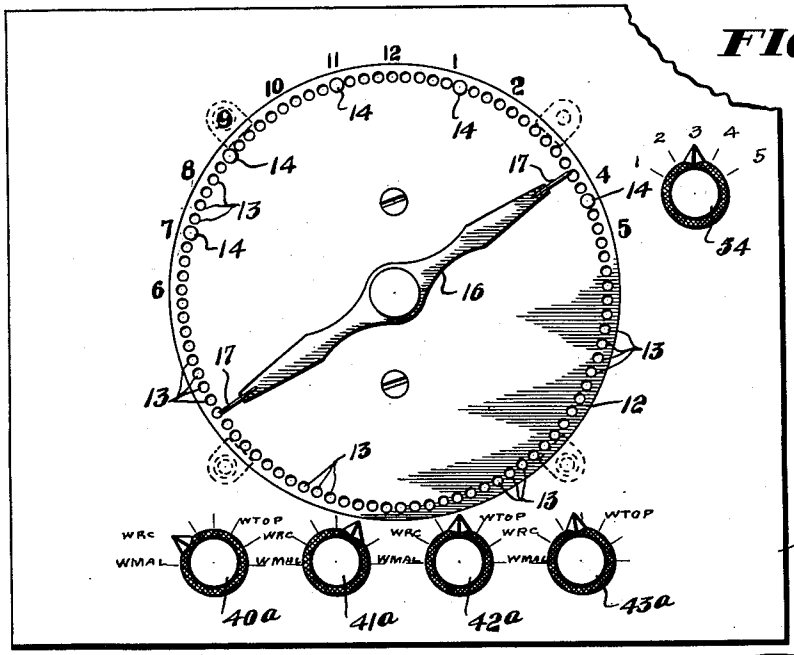
April 13, 1954 W. D. GIBBS 2,675,467

TIME CONTROLLED RADIO FREQUENCY PRESELECTION APPARATUS

Filed March 9, 1949 2 Sheets-Sheet 1

FIG. 1.



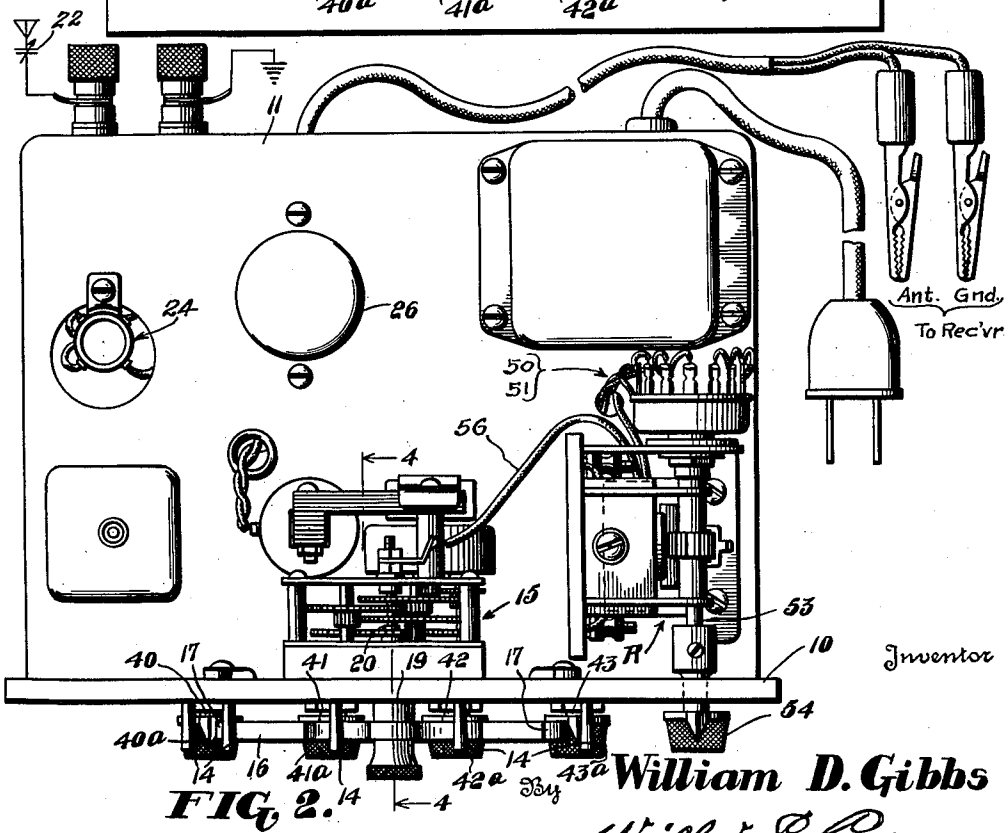


FIG. 2.

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Filed March 9, 1949 2 Sheets-Sheet 2

FIG. 5.

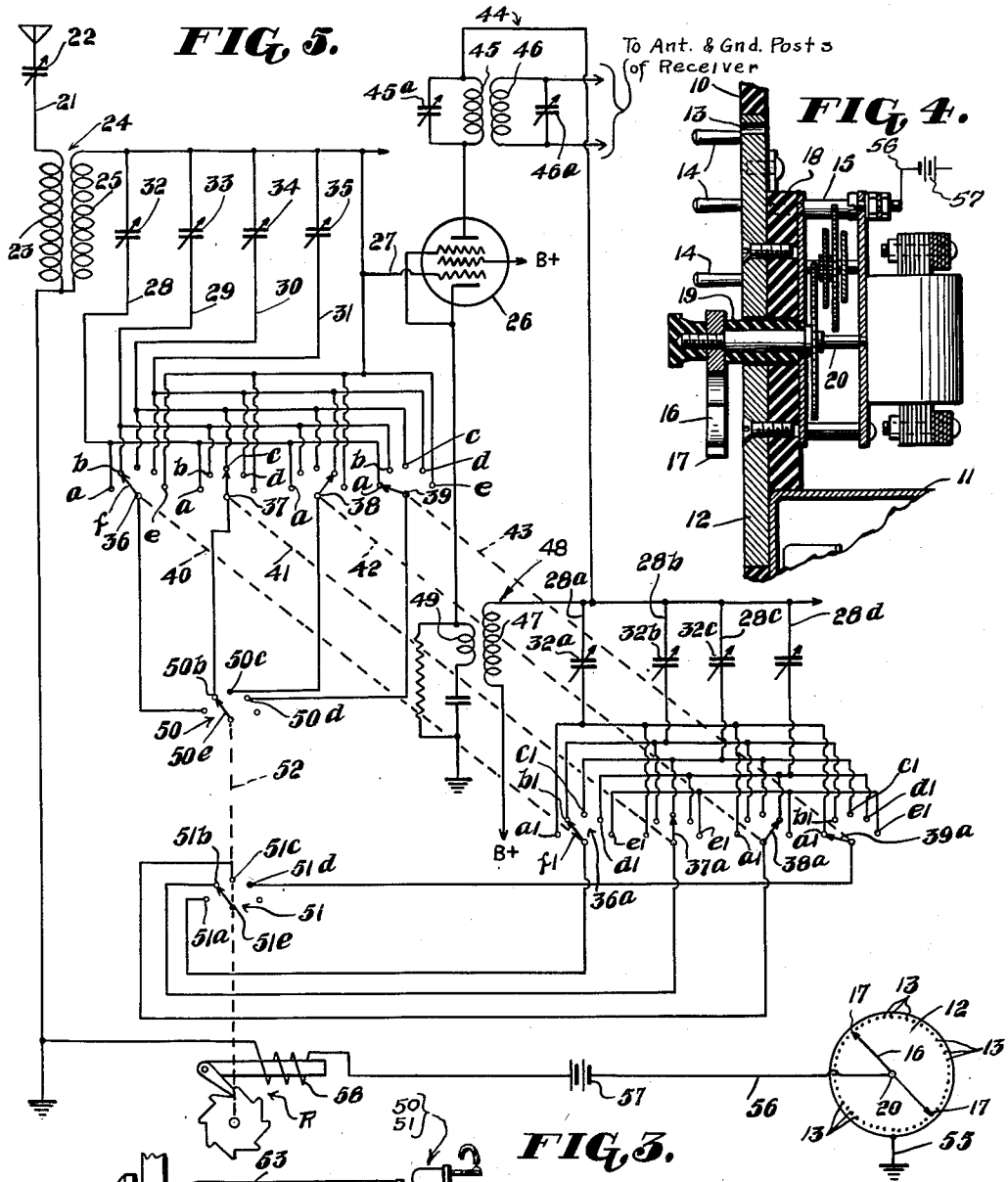


FIG. 4.

FIG. 3.

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UNITED STATES PATENT OFFICE

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TIME CONTROLLED RADIO FREQUENCY PRESELECTION APPARATUS

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Application March 9, 1949, Serial No. 80,444

1 Claim. (Cl. 250—20)

1

This invention relates generally to the class of radiant energy and is directed particularly to improvements in apparatus for connection with receivers of radio frequency impulses, by means of which pre-selection of frequencies of different wave lengths may be made to be fed into the receiver at predetermined time intervals.

A particular object of the present invention is to provide an apparatus adapted to be connected with any standard type of radio broadcast receiver, by means of which at predetermined time intervals, preselected broadcasting stations, for which circuits of the apparatus are pre-tuned, will be automatically connected with the broadcast receiver circuit whereby the program of the pre-selected broadcasting station will be heard through the broadcast receiver system.

Another object of the invention is to provide an apparatus for the selection at predetermined time intervals, of radio frequencies or stations or electric circuits of any type whatsoever, used in conjunction with any radio signal receiving device whereby the radio signal receiving device may be set to receive one pre-selected frequency which will be a beat frequency produced by the time controlled station selecting device by mixing a signal frequency received by one of several pre-tuned circuits with a locally generated signal.

Another object of the invention is to provide an improved clock controlled circuit closer by means of which pre-selected circuits may be closed at pre-selected time intervals.

Still another object of the invention is to provide an improved clock controlled circuit closer having novel means for selecting or designating the different times at which the circuit selecting mechanism will be caused to function, said means comprising a plurality of current conducting pins which are placed at desired locations around the face of a clock dial at points indicating pre-selected times and a current conducting clock hand which contacts said pins at the predetermined time period for closing a circuit by means of which a pre-tuned receiving circuit is selected and closed.

Other objects and advantages of the invention will become apparent as the description of the same proceeds and the invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of the specification, with the understanding, however, that the invention is not to be limited to the exact details of construction shown and described

2

since obvious modifications will occur to a person skilled in the art.

In the drawings:

Figure 1 is a view in front elevation of a unit constructed in accordance with the present invention, showing the time setting dial and station selectors.

Figure 2 is a view in top plan of the same, showing certain of the electrical units in plan.

Figure 3 is a view in side elevation of the step relay and duplex switch unit controlled thereby.

Figure 4 is a detail section, on an enlarged scale, taken substantially on the line 4—4 of Figure 2.

Figure 5 shows the circuit diagram of the invention.

Referring now more particularly to the drawing reference will first be made to the mechanical features of the invention by means of which the selection of the different time periods is made, at which periods a circuit selector switch will be operated to bring in pre-selected programs.

The present invention may be incorporated in the structure of a cabinet of any broadcast or television receiver or it may be set up as a separate unit adapted to be connected to a standard broadcast or television receiver, as may be desired. It is here illustrated, and will be described, as a separate unit for connection with a standard type of broadcast television or other receiver and accordingly the illustration as presented in Figures 1 to 4 discloses a mounting panel 10 connected in the usual manner to a base 11 upon which different units used in the circuit are assembled and upon the underside of which are located various switches, condensers and the major portion of the wiring in the customary manner.

Mounted in the panel 10 is the circular metal plate 12 which constitutes a clock dial, around which the hours are noted as shown, either upon the panel or upon the plate. This plate 12 carries a circular series of openings or sockets 13 in which are adapted to be inserted metal pins 14. These sockets are located one at each of the hour marks with three between so that from any one hour mark or notation a pin 14 may be placed to designate any of the fifteen minute intervals between the hours. Accordingly as shown, in addition to the socket 13 at each of the hour marks there are three sockets between each two hour marks.

Mounted upon the back of the panel 10 is an electric clock motor unit of the type commonly employed in electric clocks, the same being conventionally illustrated and generally designated

15. Since such clock units are of well known form and since the clock per se does not form a part of the present invention no detailed illustration or description of the same is considered necessary.

The hours hand shaft 20 for the clock unit 15, is carried through the center of the metal dial 12 and has secured to it the two joined oppositely directed hands 16, each of which carries at its point or tip the thin flexible contact fingers 17 which is of proper length and flexibility to wipe across a pin 14 whereby to make electrical contact with the pin without interfering with the turning of the hand by the clock mechanism.

The clock mechanism 15 is secured to the back of the dial 12 upon an insulation block 18 and the shaft 20 upon which the hands 16 are mounted and which, as above stated comprises the hour hand shaft of the clock works, extends through an insulation sleeve 19 by which it is kept from electrical contact with the metal plate 12.

Referring now to the circuit diagram the reference character 21 designates the antenna ground circuit in which is included the tuning condenser 22 and the primary winding 23 of the antenna coupler which is generally designated 24, the secondary winding of which is designated 25.

The numeral 26 designates a vacuum tube of the mixer-oscillator type, in the grid circuit 27 of which is connected a selected one of the pre-tuned receiver circuits, by means of the hereinafter described switches.

Any desired number of tuning circuits may be employed. Four of such circuits are here shown connected in parallel and designated 28, 29, 30 and 31. Each of these circuits is pre-set or tuned to a selected frequency by means of the tuning condensers 32, 33, 34 and 35. Such frequencies may represent the broadcasting frequencies of broadcasting stations which the operator of the device desires to have automatically tuned in at the selected time periods. While only four tuning circuits have been shown it will be obvious that any number may be set up in the group as desired.

The numerals 36, 37, 38 and 39 designate switches having the fixed terminals *a*, *b*, *c*, *d* and *e*. Each of the tuned circuits is electrically connected with the corresponding fixed terminal of each of these switches. That is, as shown, the circuit 28 is connected with the fixed terminal *a* of each switch; circuit 29 is connected with the fixed terminal *b* of each switch, and so on.

The switches 36 to 39 inclusive are each provided with the usual movable switch blade *f* and such switch blades are each connected with a corresponding switch blade f^1 of a second group of switches which are designated 36*a*, 37*a*, 38*a* and 39*a* by shafts 40, 41, 42 and 43, respectively, which shafts carry the control knobs 40*a*, 41*a*, 42*a* and 43*a*, located at the front of the panel 10 as shown in Figure 1.

The switches 36*a* to 39*a* control oscillator circuits 28*a*, 28*b*, 28*c* and 28*d*. Each of these oscillator circuits includes a tuning condenser, such condensers being designated 32*a*, 32*b*, 32*c* and 32*d*.

The switches 36*a* to 39*a*, like the switches 36 to 39 have the fixed points a^1, b^1, c^1, d^1, and e^1 and each oscillator circuit 28*a* to 28*d* inclusive is connected with a fixed terminal of one of the associated switches, that is, each circuit is connected to a corresponding terminal of each of the switches.

The numeral 44 designates an intermediate frequency transformer, the primary winding 45 of which is connected in each of the oscillator circuits while the terminals of the secondary winding 46 are connected with the antenna and ground posts of the radio receiver in association with which the present apparatus is used.

Trimmer condensers 45*a* and 46*a* are connected across the windings in the customary manner as shown.

The oscillator circuits 28*a* to 28*d* inclusive are connected, as shown, to one winding 47 of a coupler 48, the other or primary winding 49 of which is connected in the cathode circuit of the mixer tube.

The numerals 50 and 51 designate a pair of coupled switches which are actuated by a step relay, generally designated R which is energized at selected intervals by the clock operated mechanism. These switches are accordingly changed simultaneously and periodically by the clock mechanism and with each change a tuning circuit and its associated oscillator circuit, is either closed or maintained closed, accordingly to the pre-setting of the knobs 40*a*—43*a*.

As shown each of the switches 50 and 51 has a fixed terminal for each of the switches 36 to 39 respectively and the switches 36*a* to 39*a* respectively.

Switch 50 has each of its terminals 50*a*, 50*b*, 50*c* and 50*d* connected as shown respectively with the movable switch blades *f* of switches 36 to 39.

Switch 51 has each of its fixed terminals 51*a*, 51*b*, 51*c* and 51*d* electrically connected with the movable switch blade f^1 of the oscillator circuit switches 36*a* to 39*a* respectively as shown.

The movable switch blades 50*e* and 51*e* are electrically connected by the connector 52 and the movable blades of these two switches 50 and 51 are connected with the step relay R to be turned simultaneously when the relay is energized.

As shown in Figure 3 the step relay includes a shaft 53 which is directly operatively coupled with the switch blades 50*e* and 51*e* and extends through the panel 10 to the front of the latter where it carries a knob 54. The face of the panel is provided with designations identifying each of the station selector switch buttons 40*a*—43*a* as shown and since the indicator knob 54 will be given partial rotation with each energization of the step relay it can be seen at a glance which of the pre-set or pre-tuned circuits 29—31 is functioning at the moment. Also by means of the knob 54 re-setting of the switches 50—51 to starting position can be easily effected.

As shown in the diagram the step relay circuit may be completely separate from the other circuits, with a separate source of electrical energy for its operation. In this arrangement, the metallic dial would be grounded as indicated at 55 while the clock hand shaft 20 would be connected by a conductor 56 with one side of a suitable source of electric potential 57, the other side of such potential being grounded through the relay coil 58 as shown.

In the use of the present device each of the circuits 28 to 31 will be tuned to a selected broadcasting station frequency where it will stay tuned at all times during use of the device, and the associated oscillation circuit will be tuned to such a different frequency that the difference between the two frequencies, when the same are mixed in the mixer-oscillator tube 26, will produce a beat frequency which the broadcast receiver is pre-tuned and stays tuned, to receive. As an example if the circuit 28 is tuned to respond to a broadcast frequency of 980 kilocycles the corre-

sponding oscillation circuit 28a might be tuned to generate a frequency of 1200 kilocycles. When the incoming frequency signal of 980 kilocycles is mixed with the generated frequency of 1200 kilocycles the output from the intermediate frequency transformer would be the difference between the two or 220 kilocycles.

The next pre-tuned circuit 29 might be set to respond to frequency impulses of 1500 kilocycles. In this case the corresponding circuit 29a would be tuned to generate a signal frequency of 1720 kilocycles and when these frequencies are mixed in the mixer-oscillator tube the beat frequency resulting and fed to the broadcast receiver would also be 220 kilocycles. The other pre-tuned receiving circuits and their associated tuned frequency generating circuits would be correspondingly related so that the same beat frequency would always be introduced to the broadcast receiver and consequently the broadcast receiver would be tuned or set at their beat frequency or at any other selected beat frequency produced by the selector apparatus.

The sequence of stations or frequencies received is established by the setting of the switch buttons 40a to 43a. The turning of these buttons will set the connected pairs of switches 36—36a, 37—37a etc., as will be readily apparent. If for example, circuit 28 is pre-tuned to broadcast station WRC having a broadcast frequency of 980 kilocycles and circuit 29 is pre-tuned to broadcast station WTOP having a broadcast frequency of 1500 kilocycles and it is the desire of the user of the device to receive the program of WRC from 1:00 o'clock until 2:00 o'clock and WTOP from 2:00 o'clock until 3:00 o'clock, a contact pin 14 would be placed in the socket 13 at the 1:00 o'clock position on the dial and a second pin would be placed in a socket at the 2:00 o'clock position on the dial.

Station selector button 40a would then be set to designate station WRC which would place the switch blades f and f^1 of switches 36 and 36a on the terminals a—a^1 and station selector button 41a would be turned to designate station WTOP which would place the switch blades f and f^1 of switches 37—37a on the terminals b—b^1 of those switches.

The reset knob 54 of the clock operated switches 50—51 would be previously set at the "start" position. With these settings it will be seen that with the clock properly set and operating, at 1:00 o'clock the contact 17 of the clock hand would engage the pin in the 1:00 o'clock socket to energize the step relay. When so energized the switch blades 50e and 51e would be brought into contact with the terminals 50a—51a, thus closing or energizing the tuned circuits 28—28a to receive the broadcast station which circuit 28 is tuned to. After the lapse of one hour when the stations are to be changed, the clock hand terminal or contact 17 will engage the metalic pin in the socket at the 2:00 o'clock position wherein the step relay will be again energized and the switches 50—51 will be turned to move the switch blades to the second position into contact with terminals 50b—51b. This will bring into action the switches 37—37a together with the tuned circuits 29—29a and so on.

From the foregoing it will be readily apparent that with the apparatus herein disclosed various combinations of any number of broadcast stations may be set up to be automatically tuned in any pre-selected time periods and that after the tuning circuits have once been set to the desired station broadcast frequencies no further settings or changes will have to be made and the selection of the time periods for any number of programs from the different stations can be easily and quickly made merely by the process of setting the station selector knobs 40a—43a and then placing the contact pins in the desired time positions around the time or clock dial.

I claim:

Apparatus for automatically receiving pre-selected broadcast electrical frequencies at pre-selected time periods, comprising a plurality of receiving circuits each pre-tuned to a different selected frequency, a signal receiving system coupled with said circuits, a plurality of oscillator circuits, each oscillator circuit being tuned to have a frequency difference from one particular receiving circuit to give when mixed therewith a predetermined beat frequency which is the same for any other oscillation circuit and its associated receiving circuit, means for selecting a pre-tuned receiving circuit and an associated oscillator circuit simultaneously, said means comprising a group of multi-point switches of the same number as that of the receiving circuits each of which is connected to one point of each switch, a second group of multi-point switches of the same number as that of the oscillator circuits each of which is connected to one point of each of the latter switches, a movable point contacting blade for each of said switches, a shaft having the blades of the switches of each of the associated tuning and oscillator circuits mounted thereon, a knob on one end of each of said shafts for turning the same to pre-select the frequencies to be received, a pair of multi-point control switches, one having each of its points connected with each of the blades of the tuning circuit selector switches and the other each of its points connected with the blades of the oscillator circuit selector switches, a movable point contacting blade cooperative with the points of each of said control switches, another shaft carrying the latter blades, and a time controlled relay for imparting a step-by-step rotary motion to the latter shaft, a mixer-oscillator having the receiving and oscillator circuits connected therewith for producing said beat frequency, means for feeding the beat frequency to a receiver tuned to the beat frequency, and means for electrically coupling a pre-selected tuning circuit with its particular oscillator circuit at a pre-selected time period.

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