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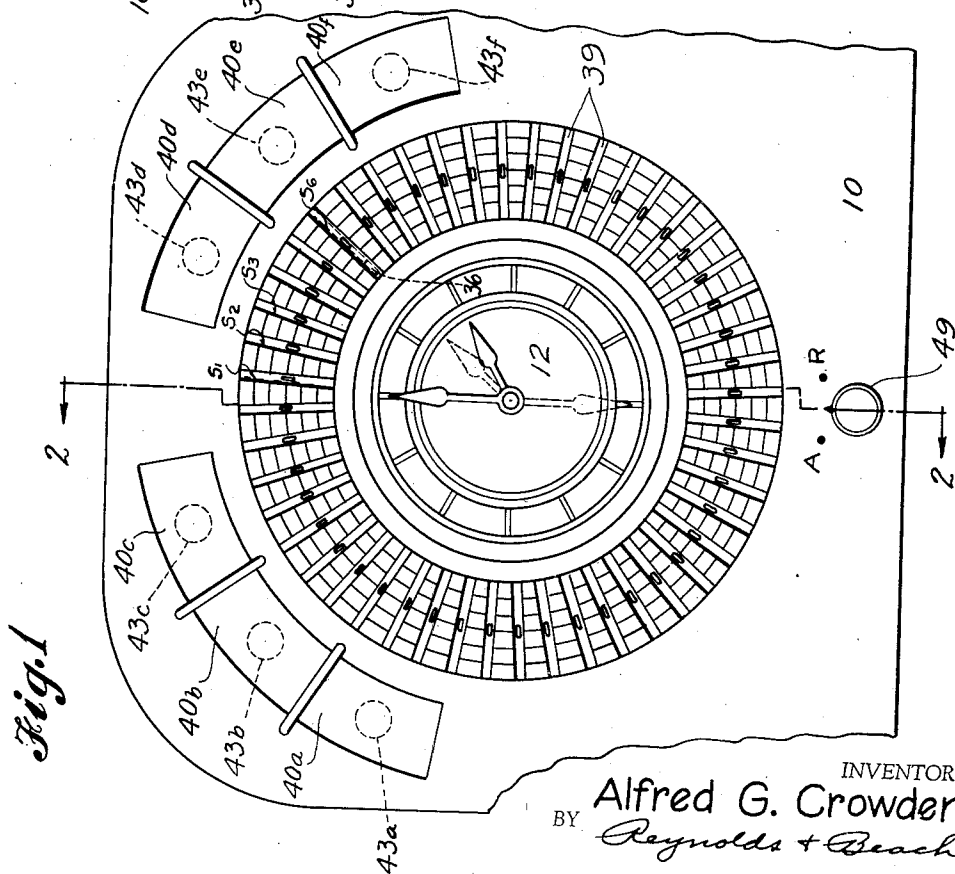
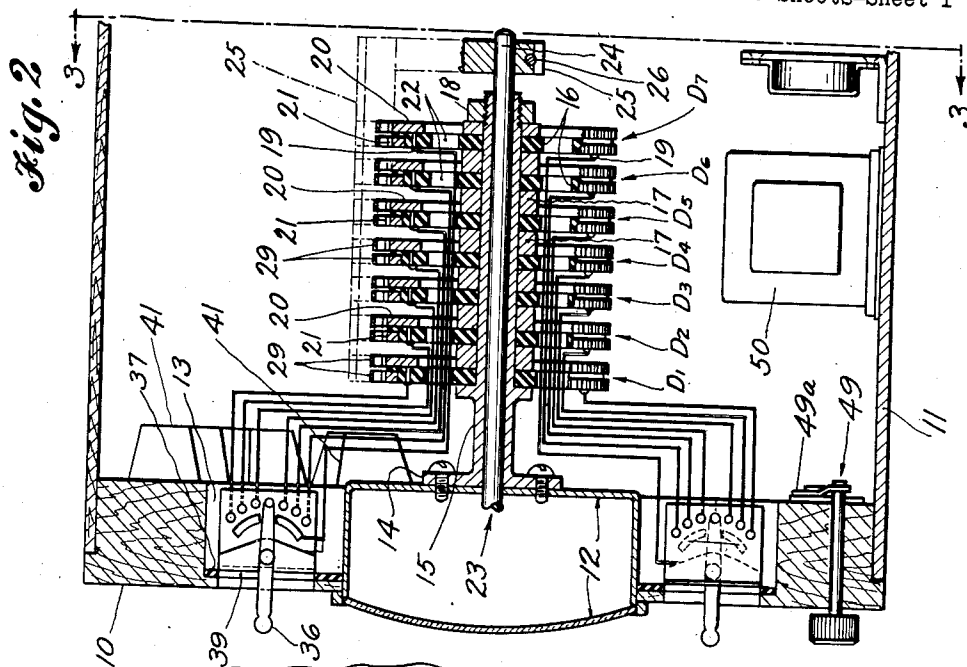
A. G. CROWDER

2,326,930

TIME-CONTROLLED CIRCUIT SELECTOR

Filed June 3, 1940

3 Sheets-Sheet 1



INVENTOR.
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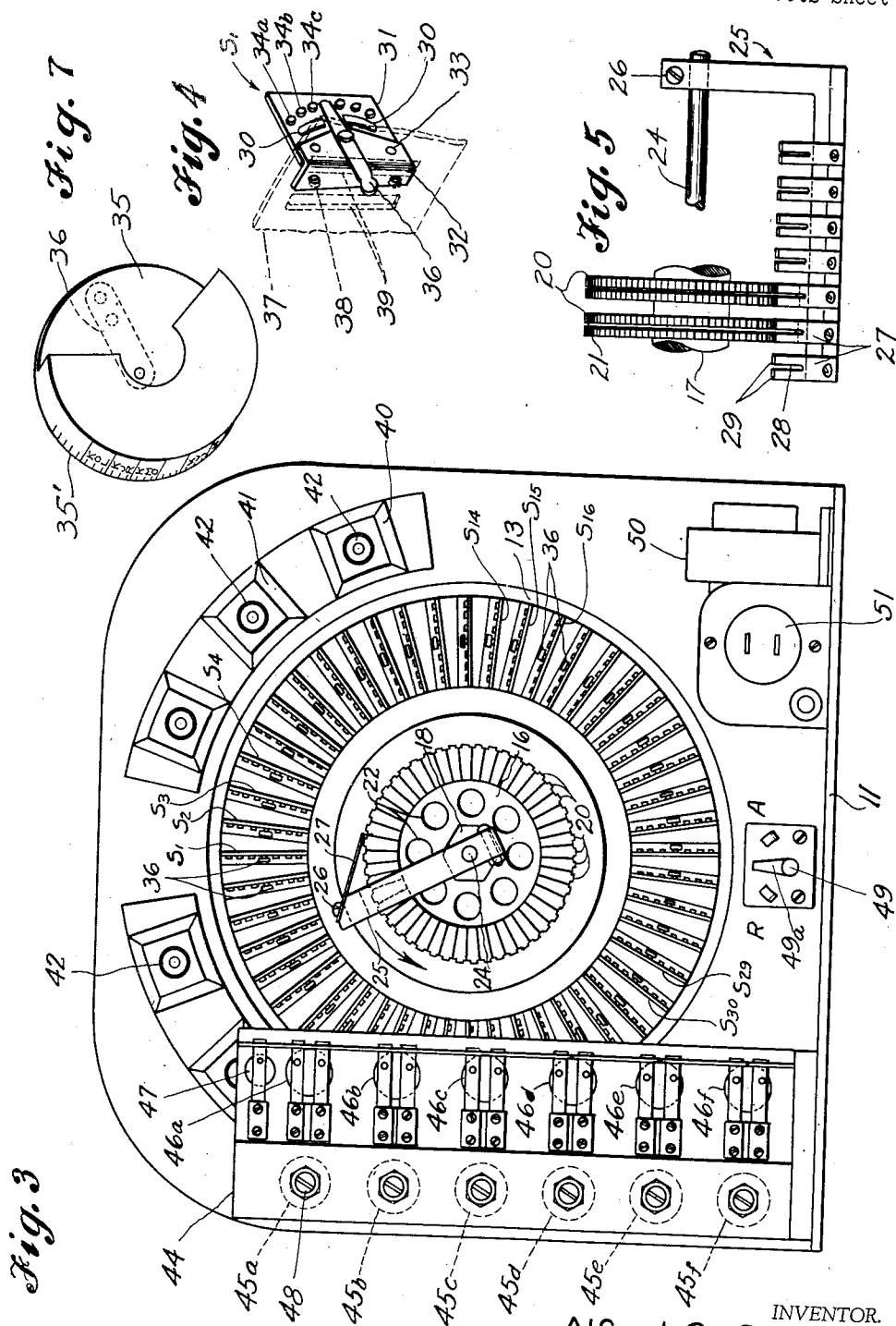
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3 Sheets-Sheet 2



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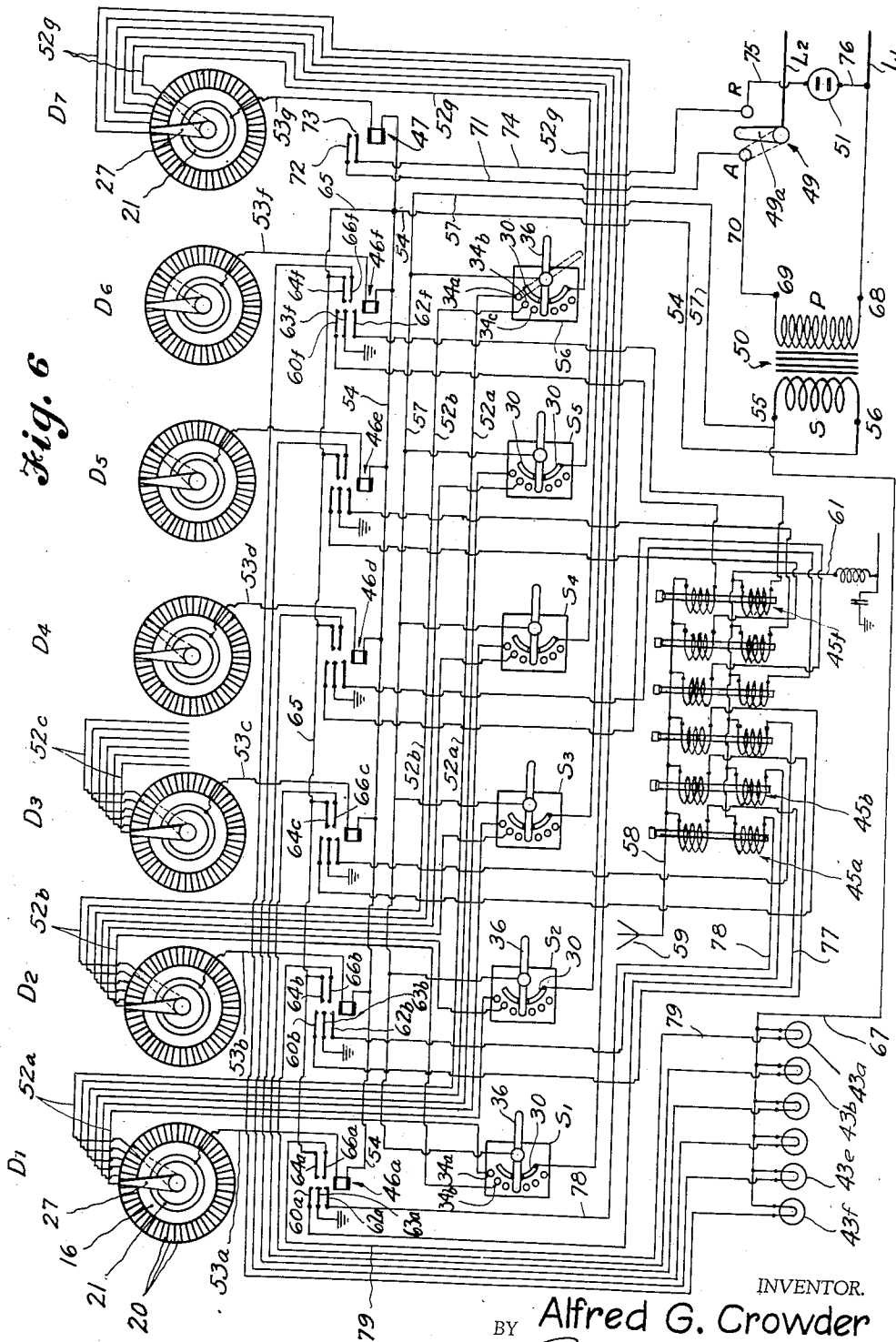
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3 Sheets-Sheet 3

Fig. 6



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UNITED STATES PATENT OFFICE

2,326,930

TIME-CONTROLLED CIRCUIT SELECTOR

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Application June 3, 1940, Serial No. 338,527

11 Claims. (Cl. 161—1)

My invention relates to time-controlled circuit selecting devices, and more particularly to such a device well adapted for use in the automatic tuning of a radio receiving set. More specifically my invention is directed toward improved mechanism employed in such devices.

Many have sought to develop mechanism for effecting the automatic tuning of a radio receiving set, but all proposed devices have been inaccurate in operation, have had operating limitations or have been inconvenient to use. The general purpose of time-controlled circuit selecting devices, when applied to the tuning of a radio receiving set as a typical use, is to enable a reception program to be selected at one time for automatic operation over a 12-hour or a 24-hour period. It is desirable to enable a radio receiving set to be turned on automatically at any desired time, and at such time to be tuned to a particular station. Such a station will then be received for a predetermined length of time, usually a multiple of a 15-minute period, and at the end of such reception period, for example an hour, the radio set will automatically be tuned to another station or will be turned off. If retuned, the new station may be received also for a predetermined length of time, for example a half hour, at which time the radio set will automatically be tuned to still another station or may be turned off automatically. Moreover, if turned off at either of these times the automatic mechanism can again energize the radio receiving set and tune it to a desired station at a selected later time, all in accordance with the program prearranged by the user, and without further attention on his part.

In performing such an automatic circuit selecting operation, for example in the tuning of a radio receiving set, it is essential that the mechanism be accurate, so that a change of tuning, for example, is accomplished at precisely the instant desired. From a commercial standpoint, moreover, the mechanism should be compact and neat in appearance.

Briefly, my circuit selecting mechanism includes time-keeping mechanism, such as a clock, about the face of which, in compact fashion, may be arranged circuit selecting units, each lying in a radial plane of the clock face and each corresponding to a definite time. There may be forty-eight of such selectors, for example, each of which will be in control for a different 15-minute interval, such as commencing on the hour, a quarter past, half past, and three-quarters past the hour. Each of these circuit selecting units

is connected electrically in series with a time-controlled circuit closing or time switching mechanism having time segments, one for each circuit selector, which are energized successively, each during the time interval corresponding to its respective circuit selector unit, namely for a 15-minute period, for example. Each switching unit may include a time segment ring and a common ring of equal diameter held in side by side relationship coaxial with the clock arbor. A bridging brush having a snap action contact with both rings may then be driven by the clock arbor to snap from one time segment to the next, precisely at the end of the time interval corresponding to the contacted time segment.

Such circuit selectors and time switching mechanism may be connected in series with a power source and several relays, each relay corresponding to one of the circuits capable of selection by the circuit selectors. Thus when such a series circuit is closed through some one circuit selector and a corresponding time segment, the relay of the circuit selected will be energized at the time corresponding to such particular circuit selector. Moreover such selectors may be constructed to select more than one relay circuit at the same time. The various relays of the several circuits may, for example, control appropriate tuning and power circuits, for the purpose of simultaneously effecting tuning of a radio receiving set and energizing its power circuits. Preferably pretuned reception circuits are employed, although the relays may control a reversible motor or other tuning mechanism instead, if desired. At least one relay should control the power circuits of the radio receiving set, which will be energized simultaneously with a tuned circuit relay.

A principal object of my invention, therefore, is to provide mechanism for selecting one or more circuits from a group and to energize such circuits selected at different desired times, and which will perform such operation accurately and instantaneously, precisely at the time it is desired to effect a change in selected circuits. I accomplish such object by mechanism which is of efficient, simple and rugged construction.

A further object of my invention is to provide such time-controlled circuit selecting mechanism which will be exceedingly compact and will be arranged for convenient operation.

In adapting my circuit selecting mechanism to the tuning of a radio receiving set it is an object to make such device practically self-contained, so that it may be attached readily to a conventional

radio receiving set, and need not be built into the construction thereof as an integral part.

Still another object of my invention, when adapted to the automatic tuning of a radio receiving set, is not to interfere with the ability of the user to turn the set on and off and tune it manually entirely without regard to the presence of the automatic tuning mechanism.

An additional object of my circuit selecting device is to enable a different circuit to be selected at any time regardless of whether an operating circuit is energized at such time, and regardless of the instant during an operating period of the automatic device at which such change is to be made.

It is also an object to provide means which will indicate at all times whether a circuit is energized by my device, and if so, which of the available circuits is so energized.

Other objects, and more particularly those inherent in my preferred construction, will be understood from the following description thereof.

My improved circuit selecting mechanism is embodied in the drawings in a typical electrical installation, but it will be understood that the various mechanisms may be connected in circuits of a different type, and may be used to control devices other than a radio receiving set, for which the specific arrangement illustrated herein is intended to be used, a complete working installation being described to exemplify the capabilities of my mechanism.

Figure 1 is a front elevation view of my device, showing the circuit selecting and clock mechanism.

Figure 2 is a vertical section taken along line 2—2 of Figure 1, showing the cooperation between the circuit selectors and the time-controlled circuit closing or time switching mechanism.

Figure 3 is a rear elevation view of my device as seen from the line 3—3 of Figure 2.

Figure 4 is a perspective view of a circuit selector, such as shown incorporated in my device in the preceding figures.

Figure 5 is a side elevation view of the time switching mechanism, parts of which have been broken away.

Figure 6 is a circuit diagram, illustrating an automatic radio tuning mechanism incorporating my novel circuit selecting mechanism.

Figure 7 is a perspective view on an enlarged scale of a different type of an operating member which might be incorporated in a circuit selector such as shown in Figure 4.

As has been pointed out, applicant's device, when used to tune a radio receiving set automatically, is preferably incorporated in a self-contained unit which has only a power connection, indicated by outlet 51, and an input or tuned circuit connection 61 with the radio receiving set. Thus my device may be built into a separate cabinet having a front panel 10 and a base 11 upon which the various parts of the mechanism are mounted, to be connected to the radio receiving set proper by only three wires.

Disposed centrally of the mounting panel 10 is a clock 12 having the usual hour and minute hands, as shown in Figure 1, constituting time-keeping driving mechanism for circuit closing or time switching mechanism. Surrounding the clock is a recess 13 in the back of the panel, which accommodates circuit selecting units S1, S2, S3, etc. Preferably when providing a 12-hour selection period forty-eight of these sta-

tion selectors are employed, one corresponding to and controlling the automatic mechanism during each 15-minute interval of such period. Thus, for example, S1 would correspond to 12:15 o'clock, S2 to 12:30, S3 to 12:45, S6 to 1:30, and so on. The particular construction, mounting and operation of these circuit or station selecting units will be described in greater detail hereafter.

The time-controlled circuit closing or time switching mechanism is also supported from the panel 10, such as by means of a flange 14 secured to the rear of the clock casing, and carrying a mounting sleeve 15 extending axially of the clock 12, as shown in Figure 2. On the sleeve 15 are mounted one or more discs 16 of insulating material. If several of these discs are employed the one nearest the clock 12 may abut a shoulder formed on sleeve 15, and between adjacent discs spacer rings 17 may be inserted. In the example shown seven such discs are employed, and the entire assembly is clamped in place by a nut 18 threaded on the end of the sleeve.

In the form of mechanism which I prefer to use, each insulating disc 16 has fixed on it two peripheral rings. A time segment ring 20 incorporates a plurality of segments, each held by a rivet 19 to the disc, the number of segments being equal to the number of selecting units S1, S2, S3, etc., and each such segment being electrically connected in sequence to one of such circuit selecting units. Each time segment of this ring is insulated not only from the adjacent segments but from the common ring 21, mounted directly on the periphery of the disc 16. An insulating flange on the disc is shown as separating the rings 20 and 21. Since each rivet 19 makes contact with a different time segment 20, such rivets may be used as taps for the electrical connections from the respective time segments 40 to the circuit selectors S1, S2, etc. If several discs 16 are employed, as shown for example in Figure 2, apertures 22 may be provided through which wires may pass for connection to rivets 19.

As has been stated, the common rings and the time segment rings remain fixed. Mechanism is provided to interconnect each time segment with its common ring at the time corresponding to such segment. Such bridging mechanism is driven by the time-keeping mechanism of clock 12 connected at 23 to the shaft 24, which is journaled in sleeve 15. Upon the rearward end of such shaft a brush carrying arm 25 is secured by means of a clamping screw 26. Such screw will, of course, clamp the arm 25 in the proper position to correspond with the position of the clock hour hand, the brushes moving in synchronism with such hand. The time-controlled brushes proper, indicated at 27, are mounted upon the arm 25, as shown in Figures 3 and 5, in alignment with the several discs 16.

While the brushes could themselves be energized to complete a circuit between them and the time segment rings, and the common rings 21 thus eliminated, it is preferred that such brushes constitute merely bridging connections between the common rings and the time segment rings. It will be noted, as shown best in Figures 3 and 5, that the registering peripheries of the time segment and common rings of each disc are notched correspondingly to leave coinciding grooves between all adjacent time segments. The brushes 27, as shown in Figure 3, are mounted at an angle to the arm 25, so that the tips of the brushes contact the time rings. Such brushes are made of resilient material, such as spring metal, and

their lengths and the length of the arm 25, together with the angular relationship therebetween, are such that the brushes are placed under tension with their tips slightly bowed upward by contact with the time segment and common rings. Not only is a firm contact thus assured between the brushes and these rings, but as the arm 25 is turned by the time-keeping mechanism to draw the tips of brushes 27 off a crest of such rings, the brush tips snap through the intervening notch into instantaneous contact with the next ring crest. The brushes then ride on this next crest or line of crests, for the next time interval, for example of fifteen minutes duration, whereupon the brush tips again snap from such crest through the intervening notch onto the following crest. This snap action affords very accurate and instantaneous shift of connection from one circuit selector unit to the next, although it will be seen that such mechanism is simple in nature. To increase such snap action still further, a notch 28 may be formed in each brush to define a bifurcated end 29. A separate brush finger for contact with each of rings 20 and 21 of each disc is thereby formed, so that each finger is more flexible than would be a metal strip extending across both rings of each disc.

The circuit selecting units, as shown in Figures 1 and 3, are mounted in radial planes of the clock, so that they may be mounted in a small circle surrounding the clock face. Such units thus may be incorporated in a compact instrument. Unit circuit selecting devices are shown in Figures 4 and 7, these illustrating alternate forms. When used in an automatic radio tuning device, a contact to control the set power circuits and additional contacts, one corresponding to each station circuit, are provided. The power circuit contact may take the form of interconnected arcuate strips 30, spaced in the center to provide a neutral position, and mounted upon a plate 31 of insulating material, which in turn may be supported from an angle member 32 by rivets 33. Station circuit contacts 34a, 34b, 34c, etc. are mounted on an arc concentric with the arc formed by strips 30, but preferably having a larger radius. The preferred type of rotary circuit selecting member is shown in Figure 7 as a disc 35 of insulating material, which has a periphery 35' knurled along one edge and bearing the designation of the station to which each circuit corresponds. Labels bearing the call letters of the several stations may be inserted in the periphery of disc 35 and held in suitable clips, not shown in detail. The peripheries of such discs would project through the slots in panel 10 for manipulation by the user. A light placed behind the panel could illuminate the call letters of the various stations, either by making the peripheries of the discs 35 translucent or by perforating the letters of the labels. Contact between the bearing of disc 35, constituting one electrical contact and the contact points 34a, 34b, 34c, etc., and the arcuate power circuit strips is afforded by a metal arm 36 carried by the disc, as shown in broken lines.

A simplified circuit selecting member, as shown in Figure 4, may consist of the arm 36 alone, which is pivoted to the plate 32 just as it is when attached to disc 35. The forward end of such arm is extended to project through the panel 1, as shown in Figure 2, whereas the rearward end, when in circuit selecting position, contacts

both one of the buttons 34a, 34b, etc. and a power circuit segment 30. It will be noted that during circuit selecting movement both disc 35 and arm 36 would be swung in a plane disposed radially of the clock 12. Each station selecting unit is mounted upon ring 37, being held thereto by rivets 38 in a position projecting through a slot 39 in such ring.

In the use of such mechanism it is desirable for the user to know instantly what circuit is being energized at any time without having to ascertain the position of a circuit selecting unit. I therefore prefer that signals 40a, 40b, 40c, etc. be provided as shown in Figure 1, which may be positioned also concentrically of the clock 12, radially outward from the circle of circuit selectors. Such signals may take the form of glass windows, each of which may be colored to designate a different network. Behind each window is mounted a light housing 41 each holding a socket 42 in which are mounted lights 43a, 43b, 43c, etc. Thus the appropriate light will be energized when the corresponding circuit is completed through a unit S1, S2, etc. and the time segment of a ring 20 corresponding to such circuit selecting unit. Such circuit indicator windows may further illuminate the call letters of the station being received.

The principal energizable circuits control operating units mounted upon a panel 44 which may take the form of variable inductance units 45a, 45b, etc., each incorporating two inductances, the circuits of which are completed by operation of corresponding relays 46a, 46b, etc. Each inductance unit will be pretuned to correspond to one of the radio stations to be received. Another relay, in circuit with the power circuit segments 30 of the circuit selectors, may be employed to energize the power circuits of the radio receiving set. Adjusting screws 48 may operate upon armatures within the inductances 45a, 45b, etc. to alter their characteristics to correspond to various tuned reception frequencies. The power switch 49 may be moved manually, as shown in Fig. 2, to enable the relay 47 to energize or deenergize the set power circuit outlet 51 when its arm 49a is in contact with the point A, designating that the automatic mechanism is connected for operation, or may render relay 47 inoperative to control such circuits by such arm being in contact with terminal R, indicating that the radio receiver is being operated in the conventional manner.

The mechanism thus described may be used in various automatic circuit selecting arrangements, but a representative circuit diagram to afford an understanding of typical operations of the several parts is shown in Figure 6. In essence the circuit selecting units S1, S2, etc. and the time-controlled circuit closing mechanism, such as one or more of the units D1, D2, etc., are in series with a power source and electrically controlled actuating mechanism. In the circuit shown the power source is a transformer 50, the primary winding P of which is connected, when the switch arm 49a is in contact with the terminal A, to the power source L1, L2. The radio receiving set is supplied with power, when the relay 47 is energized, by the outlet 51. In series with the operating circuit's power source, which is the secondary winding of the transformer 50, are the circuit selector units S1, S2, S3, etc. and the time-controlled units D1, D2, D3, etc., which are interconnected in series by wires 52a, 52b, etc. It will be noted that each time segment of a

unit D is connected to a different station selector unit S, so that there will be a connection from each time segment ring to all of the circuit selectors.

In order to complete the series circuit between the power source, namely the transformer 50, and the actuating elements indicated as relays 46a, 46b, etc., a connection must be made from the circuit selectors to one of these devices, and from the time-controlled mechanism to the other of the devices. While either of these arrangements may be employed, I have illustrated the use of a time controlled element for each operating relay and connect the common rings 21 of these units to the respective relays by wires 53a, 53b, 53c, etc. The wires 52a, 52b, etc. from the time segments will therefore be connected to the respective buttons 34a, 34b, etc., corresponding to the several tuned frequency circuits, and the power circuit segments 30 will be connected by wires 52g to the time-controlled unit D1. Likewise the common ring 21 of the unit D7 will be connected by wire 53g with its operating relay 47. To complete the series circuit the other side of each relay coil 46a, 46b, etc. and 47 will be connected by a wire 54 to one terminal of the transformer secondary 56, while the other terminal 55 will be connected through a lead 57 to each of the circuit selector arms 36.

A circuit has thus been completed in which the transformer secondary power source, the circuit selectors, the time-controlled elements, and the relays are all in series when a selected circuit is energized. Naturally in any such circuit only one of the circuit selector units S, one segment of one of the time-controlled elements, and one relay is in use, not taking into account the unit D7 or relay 47, which serve the different purpose of energizing the radio receiving set power circuits. This situation exists as a matter of course, for it is my purpose to energize only one of the relays 46 at a time corresponding to only one of the circuit selector units S and its associated time segment of the time-controlled unit D for which such selector is set. Thus the elements in use at any one time are all in series connection, as described, when any relay is energized, although all of the circuit selector units are connected in parallel with each other.

Energization of the relays effects operation of the respective radio receiving set tuning inductances 45a, 45b, etc., when my device is used in an automatic radio receiver tuning arrangement. These various inductance units may be connected in parallel by a wire 58 from the aerial 59. The opposite ends of these inductances may be connected respectively to relay operated contacts 60a, 60b, 60c, etc., so that a circuit will be completed to the ground through another contact 63a, 63b, 63c, etc., upon energization of a relay. Another contact 62a, 62b, 62c, etc., connected respectively to one end of each of the other inductances of the respective units 45a, 45b, etc. is also engaged with the ground contact upon such relay energization. The opposite ends of these latter inductances are likewise connected in parallel by a common lead 61 serving as the radio receiving set input.

In addition to completing a tuned circuit of the radio receiving set in the manner described, additional contacts 64a, 64b, 64c, etc. may be operated by the relays, which are connected in parallel by a common wire 65 joined to the terminal 56 of the power source through wire 54. Another contact for each relay 66a, 66b, 66c, etc.,

adapted to make contact selectively with the contacts 64a, 64b, 64c, etc., is connected respectively to the several circuit indicating lights 43a, 43b, etc. The opposite terminals of these lights are connected together by a lead 57, in circuit with the opposite end 55 of the winding S. Thus when a given relay 46 is energized, not only will the appropriate tuning circuits through contacts 60, 62 and 63 be completed, but through engagement of contacts 64 and 66 of the energized relay a circuit to light a signal light 43 corresponding to such relay and tuning circuit will be energized.

When any relay is energized at a particular time through one of the contacts 34 of a circuit selecting unit the relay 47 will also be energized through a segment 30. Such relay energization effects a connection between the power lines L1 and L2 and the set power circuit outlet 51, when the switch arm 49a is in contact with the terminal A. The switch arm 49a controls one lead L2 of the power source, so that when it is in contact with switch point A, indicating automatic operation, the primary P of transformer 50 is energized by connection of one of its ends 68 with line L1, and its other end 69 through lead 70 and arm 49a with L2. This latter power line is also connected to the outlet 51 of the receiving set power circuits when the relay 47 is energized, since a lead 71 connects the switch point A to a contact 72 which will be drawn into engagement with contact 73, in turn connected to the outlet 51 through wires 74 and 75. The other side of the outlet is connected directly to the other power line L1 by a wire 76. When the relay 47 is not energized, therefore, contacts 72 and 73 are not engaged and the connection between the points A and R will be broken, but this circuit will remain unbroken during the time relay 47 is energized.

If manual operation of the radio receiving set is desired, switch arm 49a is moved into contact with point R, indicating receiver, in which case the outlet 51 will be energized directly through leads 75 and 76, and the transformer primary P will not be energized. If the switch arm 49a occupies a position not in contact with either the automatic point A or the receiver point R, the set will be positively disconnected. When the arm 49a of switch 49 is shifted from the off position shown in solid lines in Figure 6 to the broken line position in contact with the automatic switch point A, the primary P of transformer 50 is energized, which in turn energizes its secondary coil S.

Assuming now that various contact arms 36 of the circuit selecting units have been moved into contact with one of the buttons 34a, 34b, etc., contact will also be made with the associated power circuit strips 30. At the time corresponding to one unit S thus set, for example S6, a circuit will be completed between the transformer and a relay, for example 46a, through the corresponding time segment of time-controlled unit D1. Under such circumstances the arm 36 of circuit selector S6 will be in the broken line position shown in Figures 1 and 6, and the several time-controlled brushes 27 will be in the broken line positions shown diagrammatically in Figure 6. In such position a connection is made between each common ring 21 and the 1:30 time segments at 1:30 o'clock. Current can now flow from secondary S of transformer 50 to one terminal of relay 46a through connection 54 and from the other re-

lay connection through lead 53a, ring 21, and arm 27 of time-controlled unit D1 to wire 52a connected to the contact point 34a of circuit selector unit S6. The series circuit will then be completed through its arm 36, which is in contact with point 34a, and through lead 57 to the other side 55 of the transformer secondary. The coil of relay 46a is thus energized. Immediately the three contacts 60a, 62a, and 63a will be drawn into engagement with ground wires 77 and 78, thus to place in operation tuning inductance unit 45a, which will tune the radio receiving set to the station (KOL) as indicated by Figure 7) for which this inductance unit has been adjusted by its screw 48. Simultaneously relay 46a will bring into engagement contacts 64a and 66a, which will complete a circuit 79 through signal light 43a, indicating that the set is tuned to the station (KOL) for which inductance unit 45a is set.

In addition to such energization and indication of a circuit tuning operation the power circuits of the radio receiving set will be energized. This is accomplished because a circuit is similarly completed between the secondary S of transformer 50 and relay 47 through the power circuit strip 38 of circuit selector S6 and its arm 36. Such a circuit will include, as before, a connection from lead 54 to one side of the relay 47, and a circuit from the other side of the relay to terminal 55 of the transformer secondary by way of lead 53g, ring 21 and arm 27 of time-controlled unit D1, and the wire 52g, which is connected from the appropriate time segment to strip 38 of circuit selector unit S6, and thence through arm 36 and wire 57 to the terminal 55. When relay 47 is energized through this circuit, contacts 72 and 73 will immediately be drawn into engagement, which will complete a circuit from power line L2 through switch arm 49a and wires 71, 74, and 75 to the radio receiving set power circuit outlet 51. Energization of such outlet will be completed by way of lead 76 connected with the other power line L1. Thus at 1:30 not only has the radio receiving set been tuned automatically to station (KOL) corresponding to inductance unit 45a, but the fact that such tuning has been completed is shown by signal light 43a, and the power circuits of the receiving set have been energized.

It will be evident that none of this automatic operation will occur if the switch arm 49a is either in the off position shown in solid lines in Figure 6, or in contact with switch point R instead of with switch point A. In either of the latter cases no path for current to the primary winding P of transformer 50 is provided, and hence none of the relays 46a, 46b, etc. or 47 can be energized, whatever positions time-controlled brushes 27 and circuit selecting arms 36 may assume. Thus no signal light 43 will operate, nor will a circuit be completed through an inductance tuning unit 45, and if the set power circuits are energized it must be by way of leads 75 and 76 only, and not through armatures 72 and 73 of relay 47, which will not be in contact.

The circuit as thus described, when arm 36 of circuit selector unit S6 is in contact with switch point 34a, will remain energized until brushes 27 of the units D, including that of unit D1, have snapped from the 1:30 time segments through the intervening notches to the 1:45 time segments. By such movement relays 46a and 47 will be deenergized, unless arm 36 of cir-

cuit selector S7 has also been moved to engage its switch point 34a, in which case the relays 46a and 47 will remain energized, to retain in operation signal light 43a, tuning inductance unit 45a, and the set power outlet 51. If the arm 36 of unit S7 is not in contact with its point 34a, but instead is in the neutral position, signal 43a will be deenergized, the ground connection of the inductance unit 45a will be interrupted, and the set power circuits will be deenergized, by separation of the several relay contacts.

If on the other hand the arm 36 of unit S7 is in contact with some other switch point, such as 34b, relay 47 will remain energized as will the power circuits of the radio receiving set, but relay 46b will be energized instead of 46a, so that while inductance unit 45a will be disconnected, unit 45b will be immediately connected to the ground through engagement of contacts 60b, 62b and 63b. At the same instant signal light 43a will go out, but light 43b will come on, as contacts 64b and 66b engage, indicating that while the radio receiving set is still in operation, the station to which it is tuned has been changed to KJR (see Figure 7) in accordance with the setting of the next selector S7.

Without further discussion it will be evident that succeeding circuit selector units S may be left in the neutral position to turn the radio receiving set off, may be set to continue reception from the same station, or may be adjusted to tune in a different station while the set power circuits remain energized uninterruptedly.

It will be evident also that during any time period the arm 36 of the unit for such time period may be moved from one contact point 34 to another. Relay 47 will not be deenergized by such movement since the arm will remain in contact with the power circuit strip 38, but as the arm is swung from the point 34a, for example, the various relays 46b, 46c, etc. will be energized in turn until the one corresponding to the desired station is reached. Thus if a mistake has been made in presetting a circuit selector unit it may be rectified at any time merely by shifting the arm of the appropriate selector S to the desired position. The change in station thus effected will, of course, be indicated instantly by energization of a different signal light 43. Similarly if a program is being received, but none of the signal lights is energized, the user will know that the automatic mechanism has been cut out by engagement of the switch arm 49a with switch point R. The tuning of the radio set in such case may be changed in the usual way entirely without regard to the presence of the automatic mechanism described.

What I claim as my invention is:

1. In a time-controlled circuit selecting device, rotary switching mechanism including a stationary time segment ring having peripheral time segments and spacing notches therebetween, a similarly notched common ring equal in diameter to said time segment ring, fixed thereto in coaxial relationship with its notches registering with the time segment ring notches, said common ring being insulated from said time segment ring, a bridging brush including a spring metal strip supported by one end and having its other end bifurcated, each of such bifurcations being in contact with the periphery of one of said rings, and time-keeping mechanism operable to rotate said brush to snap its bifurcated end progressively from one pair of aligned ring crests to the next through the intervening pair

of notches, and operating to interconnect successive time segments with said common ring at times corresponding to such respective segments.

2. In a time-controlled circuit selecting device, clock mechanism including a clock face, a plurality of circuit selectors each corresponding to a different time spaced about such clock face, each including a contact arm and a plurality of contact points engageable by said arm, a power source connected to each of said arms, a plurality of operating circuits corresponding respectively to said selector contact points, rotary switching mechanism including a time segment ring for each of said operating circuits, and each having peripheral time segments and spacing notches therebetween, each time segment being connected to a different one of said circuit selector contact points, a similarly notched common ring fixed in coaxial relationship to each time segment ring and insulated therefrom, each common ring being connected to a different one of said operating circuits, said common rings being equal in diameter to said time segment rings and all the notches of all the rings being in registry, a brush including a spring metal strip for each pair of rings supported by one end and having its other end bifurcated, each of the bifurcations being in contact with one of said rings, and time-keeping mechanism operable to rotate all said brushes in synchronism, to snap their bifurcated ends simultaneously from one series of aligned ring crests to the next through the intervening aligned notches, and operating to interconnect successive time segments with their companion common rings at times corresponding to such respective segments, to complete a series circuit through a time segment and a circuit contact point and contact arm between a selected one of said operating circuits and said power source.

3. In the time-controlled circuit selecting device of claim 2, an indicator light for each operating circuit, and means for energizing the indicator light corresponding to the selected operating circuit completed at the time of such completion.

4. In a time-controlled circuit selecting device, clock mechanism including a clock face, a power source, a plurality of operating circuits, and time-controlled circuit selecting means interposed between said power source and a selected one of said operating circuits including a plurality of circuit selectors spaced about said clock face, each selector comprising a pivoted member rotatable in a radial plane of said clock face into various operating circuit selecting positions about its pivot axis disposed perpendicular to such radial plane.

5. In a time-controlled circuit selecting device, clock mechanism including a clock face, a power source, a plurality of operating circuits, and time-controlled circuit selecting means interposed between said power source and a selected one of said operating circuits including a plurality of circuit selectors spaced about said clock face, each selector comprising a plurality of contact points, one corresponding to each of said operating circuits, disposed in a radial plane of said clock face and about an arc in such plane whose center also lies in such plane, a pivot disposed perpendicular to such plane at the center of such contact point arc, and an arm mounted on said pivot and selectively oscillatable parallel to such radial plane into con-

tact with various ones of said operating circuit contact points.

6. In the time-controlled circuit selecting device of claim 5, an arcuate contact strip for each selector disposed concentrically with the contact point arc of such selector, and adapted for contact by the selector arm simultaneously with contact with any of its contact points.

7. In a time-controlled circuit selecting device, clock mechanism including a clock face, a panel parallel to and encircling the clock face, a power source, a plurality of operating circuits, and time-controlled circuit selecting means interposed between said power source and a selected one of said operating circuits including a plurality of circuit selectors spaced about said clock face, each selector comprising a pivoted disc rotatable about its axis in a radial plane of said clock face into various circuit selecting positions, such axis being disposed perpendicular to such radial plane and behind said panel for projection of a portion of the disc's periphery through the panel to the front side thereof, and the periphery of said disc bearing an index to indicate the circuit selected corresponding to the rotative position of said disc.

8. In a time-controlled circuit selecting device, a power source, a plurality of operating circuits, time-keeping mechanism, and mechanism for successively completing series circuits between said power source and selected ones of said operating circuits during successive desired time intervals, including circuit selecting means operable to select one of said operating circuits, a time segment ring having segments to be energized throughout successive time intervals composing a continuous composite time period, one segment corresponding to each such desired time interval, and switching mechanism, including a resilient contact member movable relative to said time segment ring by said time-keeping mechanism to snap instantaneously into contact with successive time segments of said ring at the beginning of the corresponding time intervals, and to remain in contact with each said segment throughout the corresponding time interval to complete the selected operating circuit through said circuit selecting means and said time segment.

9. In a time-controlled circuit selecting device, rotary switching mechanism including a time segment ring having peripheral time segments separated by narrow notches extending transversely across the peripheral face of the ring, a brush including a spring metal strip supported by one end and having its other end in substantially tangential contact with the periphery of said time segment ring, and time-keeping mechanism operable to rotate relatively said brush and ring to snap instantaneously the ring contacting end of said strip successively from one time segment to the next through the intervening notch.

10. In a time-controlled circuit selecting device, a stationary time segment ring having peripheral time segments separated by narrow transverse notches, a common ring having a peripheral contact surface and substantially equal in diameter to said time segment ring, fixed thereto in coaxial relationship and insulated therefrom, time-keeping mechanism, and a brush bridging between said rings and rotated by said time-keeping mechanism, including contact members resiliently urged generally radially inwardly against the peripheries of their re-

spective rings, said time segment ring contact member snapping instantaneously from each time segment to the next segment through the separating notch, for maintaining substantially continually an electrical circuit between said common ring and successive time segments of said first ring.

11. In a time-controlled circuit selecting device, rotary switching mechanism including a time segment ring having peripheral time seg- 10

ments separated by narrow notches extending transversely across the peripheral face of the ring, a brush urged into substantially tangential contact with the external periphery of said time segment ring, and time-keeping mechanism operable to rotate relatively said brush and ring to snap instantaneously the brush successively from one time segment to the next through the intervening notch.

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