

April 2, 1940.

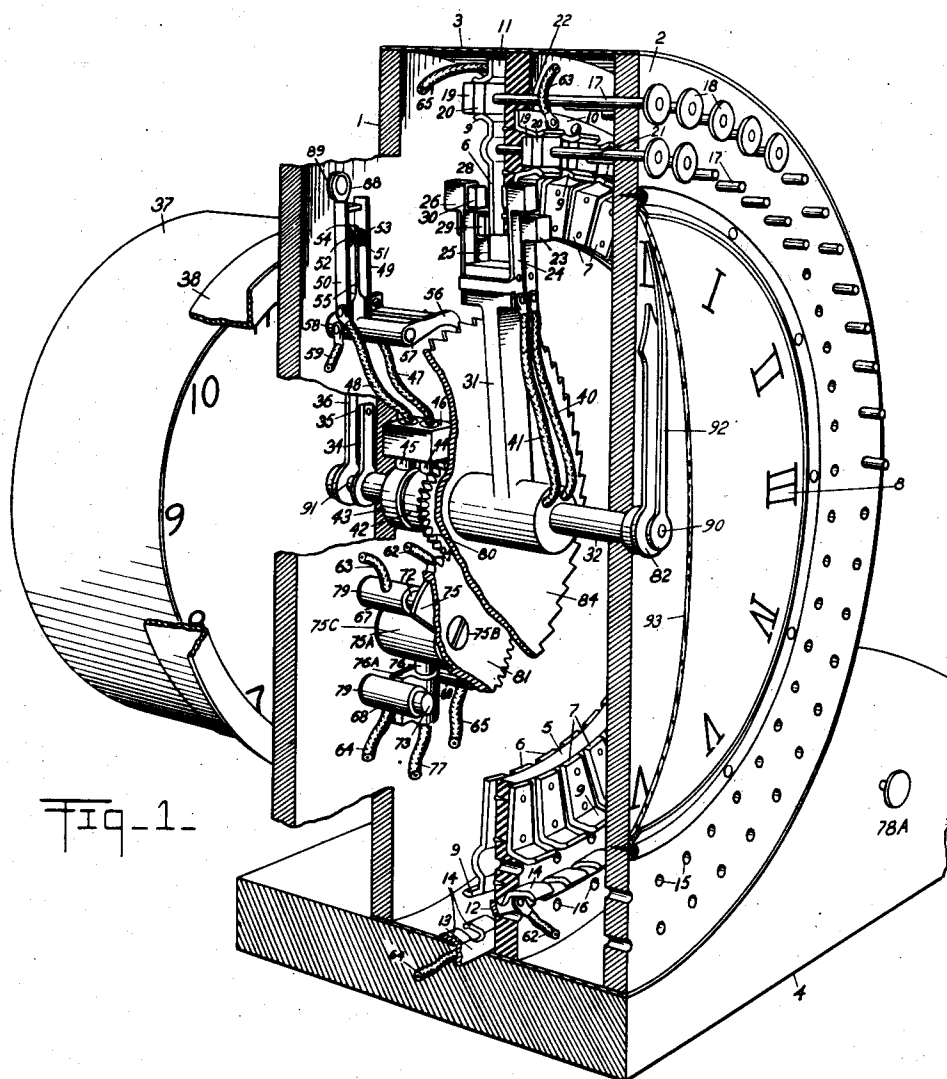
G. H. DE LARM

2,195,642

RADIO TIMING DEVICE

Filed May 27, 1939

3 Sheets-Sheet 1



Witness

H. W. Young

Inventor

Guy H. de Larm

April 2, 1940.

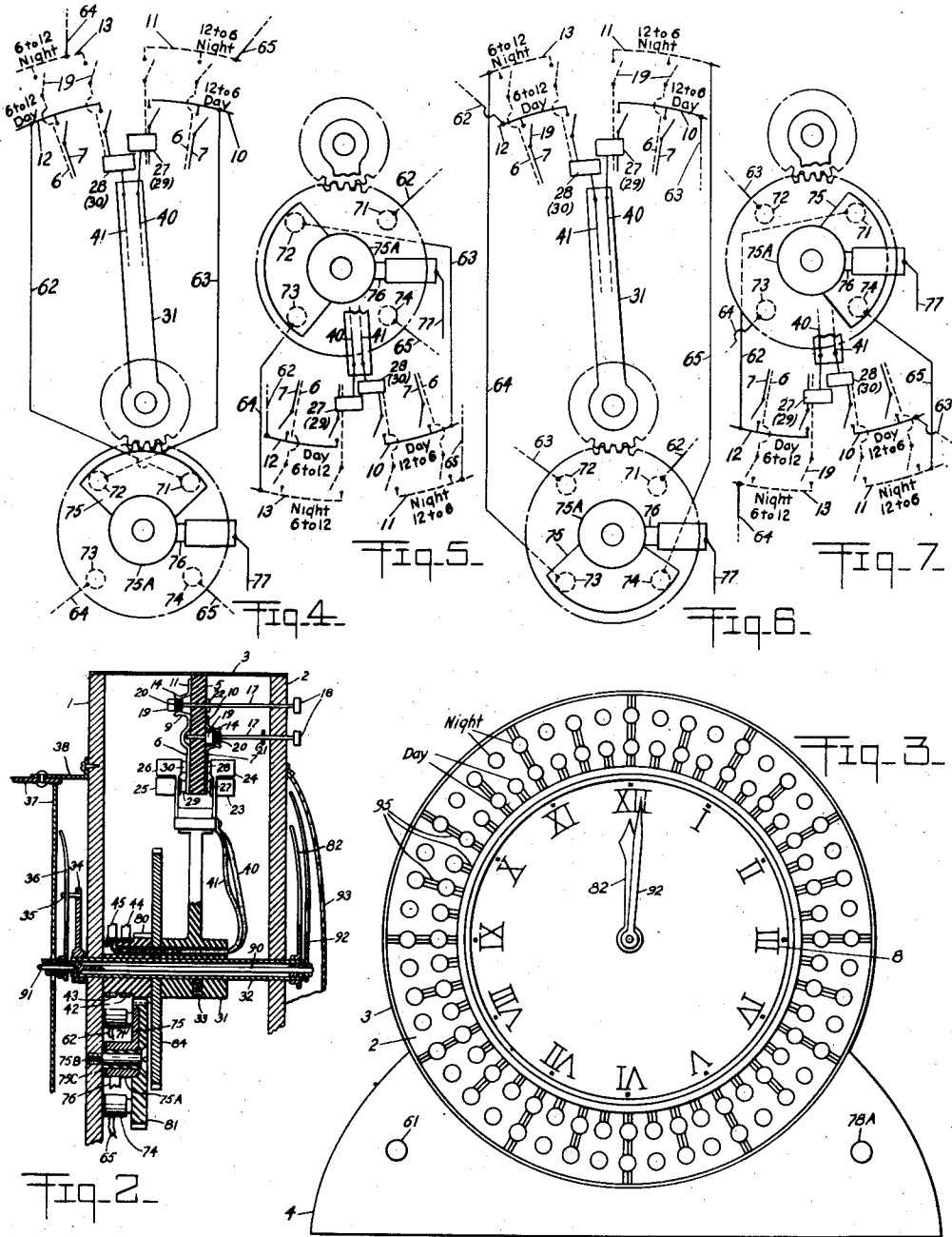
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3 Sheets-Sheet 2



Witness

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3 Sheets-Sheet 3

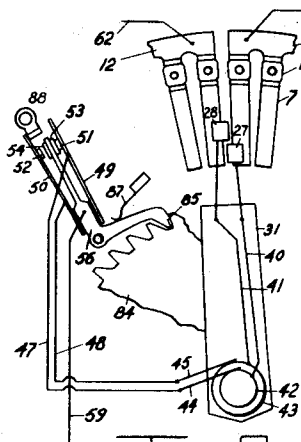
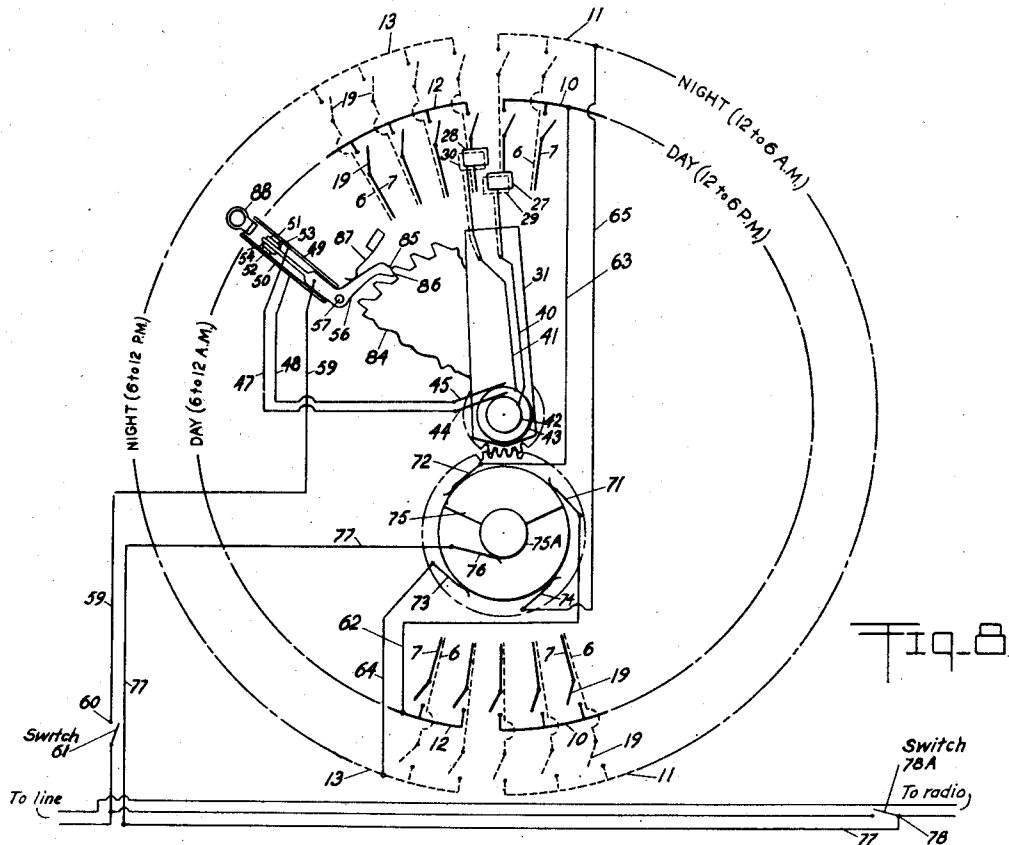


Fig. 9
Witness
H. Young

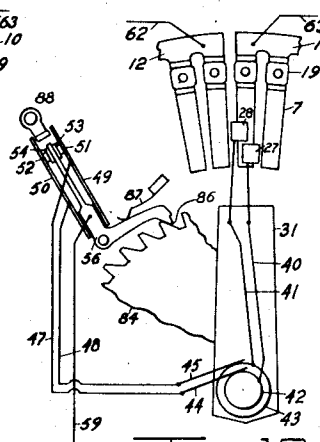


Fig. 10

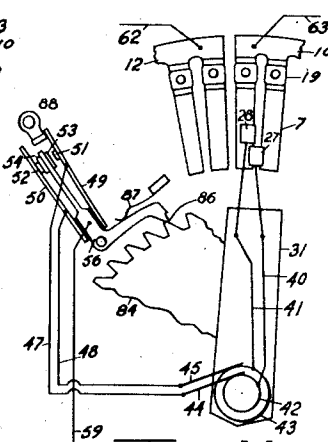


Fig. 11
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UNITED STATES PATENT OFFICE

2,195,642

RADIO TIMING DEVICE

Guy H. De Larm, Bakersfield, Mo.

Application May 27, 1939, Serial No. 276,116

4 Claims. (Cl. 200—37)

My invention relates to a radio time switch for automatically controlling radio power-line-connection and particularly to an instrument having provisions whereby selected program-periods are automatically turned on and off.

The principal object of my device is to provide a means for automatically turning the radio on and off according to any predetermined selection of quarter-hour programs or programs comprising any number of quarter-hour periods.

Another object of major importance is the provision of mechanism that will make the on or off connection instantaneously.

A further object is to provide a make-and-break mechanism affording an abundant cross sectional area at all points of the electrical circuit at all times, including the beginning and termination of a selected program period whereby to eliminate excessive concentrated resistances and consequent heating and burning of the make-and-break contacts.

Another object is the provision of means for effecting the closing of the power circuit slightly prior to the exact beginning of the time period selected and also providing means for breaking the circuit slightly after the exact ending of the period selected.

An additional object is to provide a convenient arrangement of selective switches which are positioned in co-ordinated relation to the conventional division of the ordinary 12-hour clock dial whereby advance selection of desired program periods may be easily located for either the "day" or "night" revolution of the 12-hour clock.

A further object of my invention is to provide a master switch for turning the current on at the beginning of any selected period and a similar master switch by which the circuit is broken at the end of such period regardless of the number of quarter-hour intervals included in the selected period and without a break in the circuit between adjacent selected quarter-hour intervals.

Other objects and advantages will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings:

Fig. 1 is a fragmentary perspective view of my device.

Fig. 2 is a fragmentary median vertical sectional view showing the co-relation of parts.

Fig. 3 is a front elevation of my device.

Fig. 4 is a diagrammatical view showing the relative position of brushes and commutators at 12 o'clock noon.

Fig. 5 is a diagrammatical view showing the po-

sition of brushes and commutators at 6 o'clock p. m.

Fig. 6 is a diagrammatical view showing the position of brushes and commutators at 12 o'clock midnight.

Fig. 7 is a diagrammatical view showing the position of brushes and commutators at 6 o'clock a. m.

Fig. 8 is a diagrammatical view showing the entire circuits of my device and the relative position of parts immediately prior to 12 o'clock noon.

Fig. 9 is a diagrammatical view showing my make-and-break device and its relation to the circuits slightly after 12 o'clock noon.

Fig. 10 is a diagrammatical view showing the relation of parts of the make-and-break device at approximately 7 minutes after 12 o'clock noon.

Fig. 11 is a diagrammatical view showing the relative position of the make and break mechanism at approximately 11 minutes after 2 o'clock noon.

In further detail in the drawings in which like characters of reference designate like parts throughout the several views, I have provided (with particular reference to Fig. 1) a case comprising a rear wall 1, a front wall 2, a cylindrical housing 3 and a base 4. 5 is a ring of insulating material carrying two series of spaced commutator bars 6 and 7 radially disposed and each series comprising one commutator bar for each quarter-hour division of the twelve-hour clock dial 8 and each commutator bar having an outwardly turned spring portion 9 forming switch blades. 10, 11, 12 and 13 indicate semi-circular connector-bars having outwardly turned spring portions 14 forming switch blades pairing with the switch blades 9 of the commutator bars and in spaced concentric relation thereto. Openings 15 are provided in the front wall 2 and similar openings 16 are shown in the ring 5 in which are slidably mounted switch rods 17 of non-conductive insulating material having pull buttons 18 mounted on their outer ends and carrying metallic blocks 19 and adjacent blocks 20 of non-conductive insulating material forming off and on switches for optionally connecting the outwardly turned switch blades 9 and 14 whereby any commutator selected may be connected in circuit with a corresponding connector bar 10, 11, 12 or 13. It will be noted that commutator bars, front and rear, located on the right-hand half of the clock (12 o'clock to 6 o'clock) are adapted to make connection with the semi-circular connector-bars 10 and 11 respectively, while the front and rear commutator-bars on the left half of the

clock (6 o'clock to 12 o'clock) are connectable with connector-bars 12 and 13 respectively. It will be further observed that the outer row of pull buttons control the connection between the commutator-bars 6 (located at the rear of the ring 5) and the connector-bars 11 and 13 while the inner row of pull buttons control connection between the front commutator-bars and the connector-bars 10 and 12.

Pins 21 through the inner row of switch rods act as stops limiting the outward movement of these rods while pins 22 serve a similar purpose in limiting the inward movement of the outer row of rods. Brush holders 23, 24, 25 and 26 supporting brushes 27, 28, 29 and 30 are carried by the revolving arm 31 which is secured to the tubular shaft 32 by set screw 33 (Fig. 2). The shaft 32 is designed to be rotated through the arm 34 and pin 35 by the hour-hand 36 of a standard clock, preferably of the electrical type. Such a clock is indicated at 37 and is secured to the rear wall 1 through the flange 38 by screws.

Brushes 27 and 28 are in co-operative sliding contact with commutator-bars 7 while brushes 29 and 30 similarly cooperate with commutator-bars 6. These brushes are of such width and so associated that either pair 27—28 or 29—30 will rest exclusively on a single commutator bar when centrally positioned thereover, and when centrally located over the space between two adjacent bars one brush will contact one commutator-bar while the other contacts the adjacent bar. This provision is indicated graphically in Figures 9 and 10 as regards brushes 27—28 co-operating with commutator-bars 7. These centralized positions occur simultaneously between brush pairs 27—28 (at the front) and pairs 29—30 (at the rear). It is here noted that brush holders 24 and 26 are connected at their lower ends while holders 25 and 27 are likewise connected. Lead wires 40 and 41 are connected to holder pairs 23—25 and 24—26 respectively. Wire 40 leads to the collector ring 42 while wire 41 leads to the collector ring 43. Rings 42 and 43 are in sliding contact with brushes 44 and 45 respectively which are held in insulated holder 46. Lead wires 47 and 48 are in electrical connection with flat spring members 49 and 50 respectively, thereby connecting brush 44 with spring 49, and brush 45 with spring 50. Spring members 49 and 50 carry breaker points 51 and 52 designed to make electrical contact with similar points 53 and 54 mounted on the metallic arm 55 which is a part of the pawl member 56. The pawl member is mounted to oscillate on pin 57 which is secured to the rear wall and insulated therefrom by the part 58. The tension of spring members 49 and 50 normally close the contact point pairs 51—53 as well as 52—54. Wire 59 leads from pawl member 56 to terminal 60 of switch 61 (Figs. 3 and 8). Lead wires 62, 63, 64 and 65 connect the connector-bars 12, 10, 13 and 11 with brush holders 66, 67, 68 and 69 (respectively) carrying brushes 71, 72, 73 and 74. Brushes 71, 72, 73 and 74 are in sliding contact with rotor segment 75 which is a metallic part of the collector-ring 75A rotatably mounted on stud 75B and insulated from the rear wall 1 by insulation 75C. The ring 75A is in sliding engagement with brush 76 held by the brush holder 76A. Lead wire 77 connects brush holder 76A with binding post 78 of switch 78A (Figs. 1 and 8). 79, 79 indicate insulation separating the brush holders 66, 67, 68 and 69 from the rear wall. Gear 80 secured to shaft 32 and in operative engagement with gear 81 rotates the

latter in a 2 to 1 ratio whereby gear 81 together with the rotor segment 74 which it carries, makes a complete revolution while the gear 80 (together with the hour hand of the clock) makes two revolutions.

It will be noted that the rotor segment is of such arcuate proportions that it may contact two adjacent brushes simultaneously, as for instance 71 and 72 (Figs. 4 and 8). It will be noted that the arm 34, collector rings 42 and 43, gear 80, arm 31 (together with the brush assembly) revolve as a unit with shaft 32 once each 12 hours, as does also the hour hand 82 attached to the outer end of shaft 32. A further element of this unit is the toothed cam wheel or ratchet wheel 84 which has 48 teeth corresponding to the 48 quarter-hour periods in 12 hours. It will be noted that pawl 56 makes co-operative engagement with ratchet wheel 84 and further that a double ratcheting effect is secured by virtue of the long point 85 and the short point 86 of the pawl 56. The spring 87 provides a resilient means for urging the pawl against the ratchet wheel. The stop 88 (separated from the rear wall by the insulating member 89) is adjusted to allow engagement of both pair of contacts 51—53 and 52—54 when the ratchet wheel occupies such positions that the pawl has dropped off the short point 86 (see Fig. 8) but still rests on the long point 85. This position occurs when brush pairs 27—28 and 29—30 are centrally located over the space between adjacent commutator-bars and co-incidentally with the initial stage of the change from one quarter-hour period to the next following quarter-hour period. The operation of these parts will be more fully explained later.

Figures 1 and 2 show in addition to the parts previously enumerated an extension 90 designed to telescope over the minute-hand pinion shaft of the ordinary clock and which carries the minute hand 92 of my device. A crystal 93 is provided to cover the dial. Decorative marking such as indicated at 95, Fig. 3, may be provided as an aid in differentiating the quarter-hour periods.

The operation of my device and the co-operative synchronization of parts will best be explained with reference to the diagrammatical Figures 4 to 11 in which the connector bars 11 and 13 together with the commutator bars 6 corresponding to these parts which are located at the rear of ring 5 (Fig. 1) and which are employed for the night-time circuits are represented in dotted lines while the daytime circuits are represented by solid lines.

Starting with the incoming power circuit (in series with the radio) 77, Figs. 4, 5, 6, 7 and particularly Fig. 8, the current is led to brush 76 and collector ring 75A which is a part of the rotor segment 75, the latter being always in contact with at least one of the brushes 71, 72, 73 or 74, each of these in turn being in electrical communication with one of the connector bars 10, 11, 12 or 13. Through the rotation of the segment 75 periodic changes are made in the circuits (every 6 hours) by successively directing the current to different connector-bars. It will be noted that during certain portions of the revolution of the segment 75 two adjacent brushes (71 and 72, Figs. 4 and 8; 72 and 73, Fig. 5; 73 and 74, Fig. 6, and 74 and 71, Fig. 7) are in contact with the rotor segment 75. These periods of dual contact occur during and overlapping the time when a change is made from one 6-hour period to the next 6-hour period and serves to provide a circuit to the connector-bar corresponding with the on-

coming 6-hour period in advance of the actual use of that circuit, while retaining electrical connection with the connector-bar corresponding to the off-going 6-hour period until after the actual use of that circuit is ended.

From the connector-bars the circuit is provided through selective switches 19 to commutator bars 6 and 7 and thence through the brushes 27, 28, 29 and 30 to lead wires 40 and 41.

In Fig 4 (representing the time at 12 o'clock noon), it will be noted that (assuming that all switches 19 are closed) a circuit will be provided only through connector bars 10 and 12 and thence through brushes 27 and 28 to lead wires 40 and 41. Should the switches co-operating with the commutator bars representing 11:45 a. m. and 12 o'clock noon be open no circuit would be made even though the adjacent "night-time" switches are "on," inasmuch as the connector bars with which the "night-time" switches co-operate are not in circuit with the rotor 75.

Similar explanation applies to Figs. 5, 6 and 7 which represent the time at 6 p. m., 12 midnight and 6 a. m. respectively. Attention is called, however, to the fact that at 6 p. m. (Fig. 5) the current is shifted from the daytime connector-bar 10 to the night-time connector bar 13, while at 6 p. m. (Fig. 7), the night-time connector-bar 11 is exchanged for the day-time bar 12. Thus the 24 hour day is divided into 4 periods of 6 hours each and a connector bar is provided for each 6-hour period. Power connection to these connector-bars being provided in alternating order permits at least two of them being out of circuit at all times. The circuit is extended through the selective switches 19 to commutator bars 6 and 7 as desired and the current is picked up by the brushes 27, 28, 29 and 30 (as the latter are rotated) and carried to lead wires 40 and 41.

With reference to Fig. 8 (representing the time at slightly before 12 o'clock noon) a further extension of the circuit will be explained. From lead wires 40 and 41 the current passes to collector rings 42 and 43 respectively and through brushes 44 and 45 thence through wires 47 and 48 to springs 49 and 50 to contact points 51 and 52 which are contactable with points 53 and 54 whereby the current is directed through pawl 55 and wire 59 to switch 61 and thence to the power line.

Here it will be noted that brushes 27 and 28 are in advance relation (rotatively) to brushes 29 and 30 whereby the former pair (27-28) contacts exclusively a new, or oncoming, pair of commutator bars 6 and 7 while the retarded pair of brushes (29-30) are still contacting exclusively the off-going pair of commutator bars. With reference to Fig. 8 it will be noted that the short point 86 of the pawl has just dropped off one of the points of the ratchet wheel 84, thereby allowing both pairs of contact points 51-53 and 52-54 to make contact and allowing the current to flow through both brushes 27 and 28 (assuming the 11:45 a. m. and 12 o'clock noon switches to be closed), thereby preparing to exchange the circuit through brush 28 for one through brush 27 without a break in the circuit. (It will be understood that just prior to this time the pawl point 86 was resting on top of the ratchet tooth and therefore points 51-53 were disconnected, current being supplied only through brush 28).

Fig. 9 represents the time at slightly after 12 o'clock noon and in which it will be noted that the long point 85 of the pawl 55 has dropped off the point of the ratchet wheel tooth allowing the

contact points 52-54 to suddenly separate and discontinue the circuit through brush 28 while allowing it to continue through brush 27 (still assuming the 11:45 a. m. and 12 o'clock noon switches to be "on").

Passing to Fig. 10, representing the time at approximately 7 minutes after 12 o'clock noon, it is found that both brushes 27 and 28 are contacting the same commutator bar and that as the ratchet wheel has correspondingly rotated, the sloping side of the next tooth has lifted the pawl to allow contact between points 52 and 54 in addition to the contact already made between points 51 and 53, whereby a divided circuit is provided for the current through both brushes 27 and 28. It is to be noted here that this newly made circuit through points 52 and 54 is never actually completed throughout the device unless the circuit through points 51 and 53 is also completed, therefore the slowness in closing the points 52 and 54 has no detrimental consequences.

With reference to Fig. 11, representing the time at approximately 11 minutes after 12 o'clock noon, it is observed that the pawl 55 has been raised to cause points 51 and 53 to separate thereby transferring the current entirely through brush 28. This change actually takes place before brush 27 reaches a new commutator bar. As shown in Fig. 11 the brushes have advanced near the position where a further movement will allow the short point 86 of the pawl to drop off the ratchet tooth and allow sudden contact with points 51 and 53 to make a new circuit through brush 27. This actually takes place after the brush 27 has cleared the commutator bar representing 12 o'clock noon and will connect commutator-bar representing 12:15 p. m. (provided the corresponding switch is "on").

It will be noted that if we assume the 11:45 o'clock day-time switch (Fig. 8) to be "off" and the 12 o'clock noon switch "on" no circuit would have been provided until the short point 86 of the pawl has dropped off the tooth as shown when suddenly contact would have been made through brush 27, this occurring preferably 1 or 2 minutes prior to the exact beginning of the "program period" to allow the radio to "warm up" and assure the user complete coverage of the first part of the program.

Again at the end of a selected program (assuming the following quarter hour period is not desired) it is found that connection is maintained until slightly after the actual "program closing time" due to the fact that the long point 85 of the pawl does not drop off the tooth of the ratchet wheel until slightly (preferably 1 or 2 minutes) after the exact "program closing time." See Fig. 9.

In my device I have provided means whereby high resistance circuits (such as would be caused by slow contacts) are eliminated and likewise fluctuation in resistance is avoided by providing ample contact area at all times.

I have provided a device in which all make-and-break operations are performed by a master mechanism that is not likely to get out of adjustment, that will allow long continued use and that is easily and economically replaced.

Due to the fact that the sliding brushes of my device undergo no make-and-break operations no undue wear of these parts is incurred.

Through my arrangement of parts I have provided a time switch having the selective switches arranged in conventional order around the clock face and having the day and night switches in

separate rows whereby it is easy to select the desired program or programs. Due to the 24 hour arrangement of my device it seldom requires re-setting or attention once the desired program periods are selected; especially in the case of those tuning to the same station throughout the day.

I claim:

1. A radio timing device comprising a clock driven shaft designed to revolve once each 12 hours, a revolving commuting ring carrying a sector switch blade, geared means for synchronizing the rotation of the switch blade and the clock driven shaft whereby the switch blade will revolve once while the clock driven shaft makes two revolutions, two series of independent commutator bars, each series having a commutator bar for each quarter hour of the 12-hour clock dial, each series being arranged concentrically around said clock driven shaft, the bars of each series being divided into groups of adjacent bars, a connector bar for each group, independent switch means for optionally connecting any commutator with a corresponding connector bar, means for successively connecting said connector bars with said revolving commuting ring, said means comprising radially spaced stationary brushes designed to be successively contacted by said sector switch blade, brush means for connecting said ring with an electrical source, brush means revolving with said clock driven shaft, said means comprising two sets of brushes, each set comprising two interconnected brushes, one brush of each set being in sliding engagement with the bars of one series of commutator bars and the other such brush being in sliding engagement with the other series of commutator bars, one of said sets of brushes being in advance rotative relation to the other set, means for alternately connecting the sets of brushes with the radio, said means comprising dual breaker points and breaker means synchronized with said clock driven shaft.

2. A radio time switch comprising brush means designed to be rotated about a center by an ordinary clock means, two sets of commutator bars, each set comprising radially spaced commutator bars in concentric relation to said center, each set of commutator bars being divided into two groups, each group having an adjacent connector-bar, each commutator bar of a group having independent optional switching means whereby to connect any of said commutator bars in the

group to said connector-bar, means synchronized with said rotating brush means for directing a radio power circuit through alternate connector-bars, said rotating brush means comprising two sets of brushes, each set comprising two brushes, one set being in advance rotative relation to the other, one brush of each set being in sliding engagement with one set of commutator bars and the other brush of each set being in sliding engagement with the other set of commutator bars and means for alternately connecting and disconnecting the circuit through said brush sets, said last named means being synchronized with said rotative movement of said brush means whereby a cycle of alternation is produced while the brush sets are traversing the space occupied by one commutator bar.

3. A radio time switch comprising a clock driven commutating means, individual selective switches for each quarter hour of the 24-hour day, said switches being divided into groups, the switches of each group having one side thereof in common connection, means synchronized with said commutating means for periodically connecting different groups of said switches to one radio power terminal through said common connection, said commutating means being designed to periodically direct current from a power line to different individual switches.

4. In a radio timing switch having a clock driven commutator means for directing periodically a power circuit through different selective switches, dual brush means on said commutator said brush means comprising an advanced brush and a lagging brush, a dual make and break switching means, said means having a power-line connection and having two commutator connections, one of said connections being in circuit with said advanced brush and the other of said connections being in circuit with said lagging brush, said dual switching means being designed to be operatively synchronized with said commutator means and being designed to periodically and alternately direct the power circuit through said advanced brush and said lagging brush, said switching means being designed to make the circuit with the advanced brush prior to breaking the circuit with the lagging brush, said switching means being designed to make the circuit with the lagging brush prior to breaking the circuit with the advanced brush.

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