United States Patent [19]

Gerry

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[54] **PROGRAMMING TIMER WITH SERIES CONNECTED SWITCHES**

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[52] **U.S. Cl.** ..... **307/141.8,** 200/35 R, 200/36, 200/37 R

[51] **Int. Cl.** **H01h 43/20**

[58] **Field of Search** ..... 200/27 R, 35 R, 36, 37 R, 200/38 R, 38 A, 38 F, 38 FA, 38 FB, 38 B, 38 BA, 38 C, 38 CA, 38 D, 38 DA, 8 R, 8 A, 17 R, 18; 307/141.8

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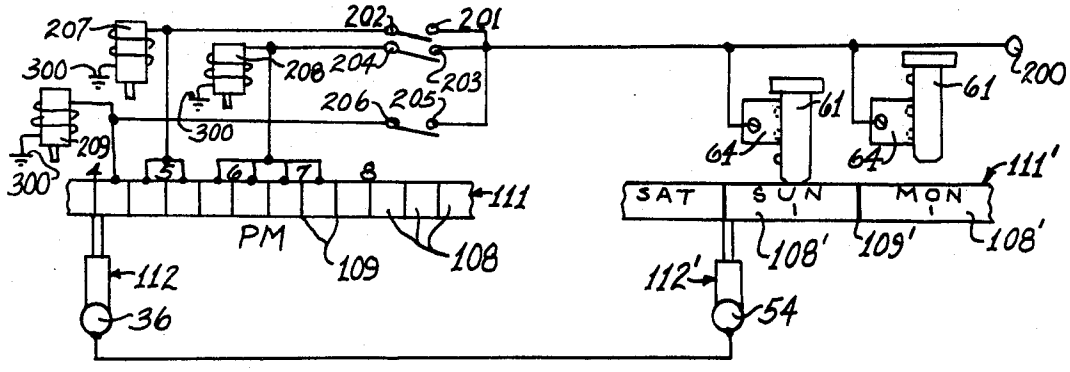
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Primary Examiner—James R. Scott

[57] **ABSTRACT**

A programming timer for periodically controlling external devices which are connected thereto. This timer includes two commutators and indicators for selection of the period during the day, and the day of the week, during which the external devices are to be periodically activated. The timer and day indicators are driven by a synchronous motor and these indicators also act as contactors to provide power to the external devices for activating same.

11 Claims, 12 Drawing Figures



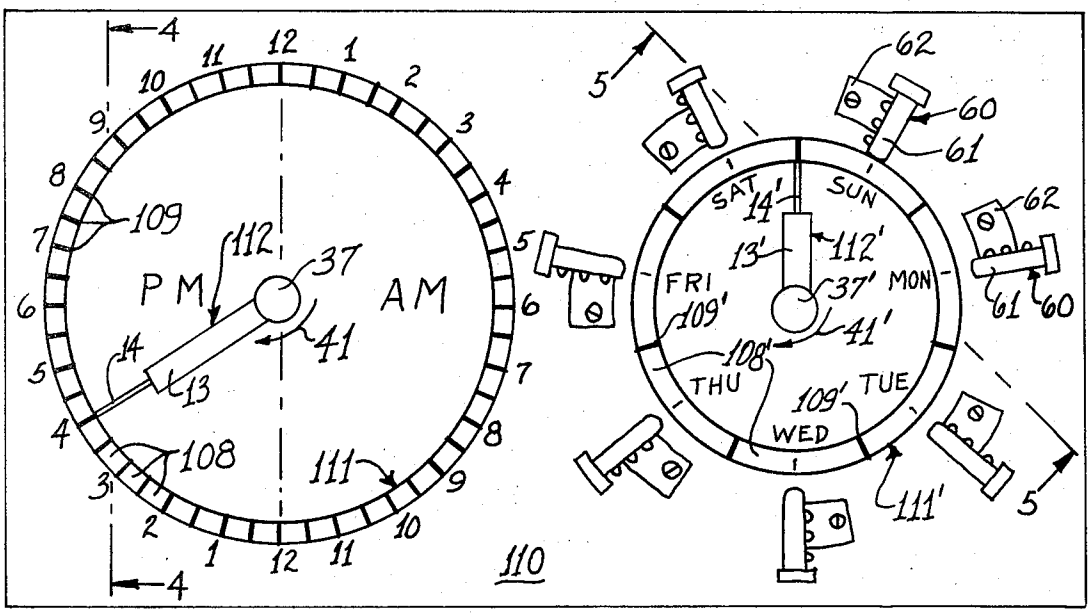

4
5
PM
AM
SUN
MON
TUE
WED
THU
FRI
SAT
109
112
37
41
14
13
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62
60
61
109'
112'
37'
41'
14'
13'
108'
111'

FIG. 1.

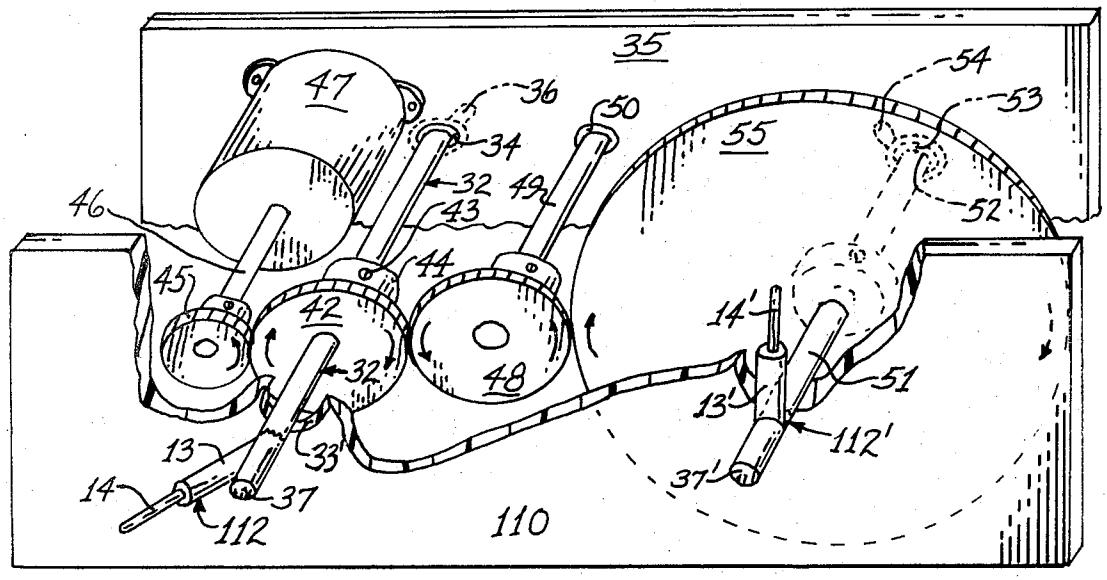

35
47
36
50
34
32
49
43
46
45
44
42
48
54
53
55
52
14'
51
13'
112'
37'
13
33'
14
37
112
110

FIG. 2.

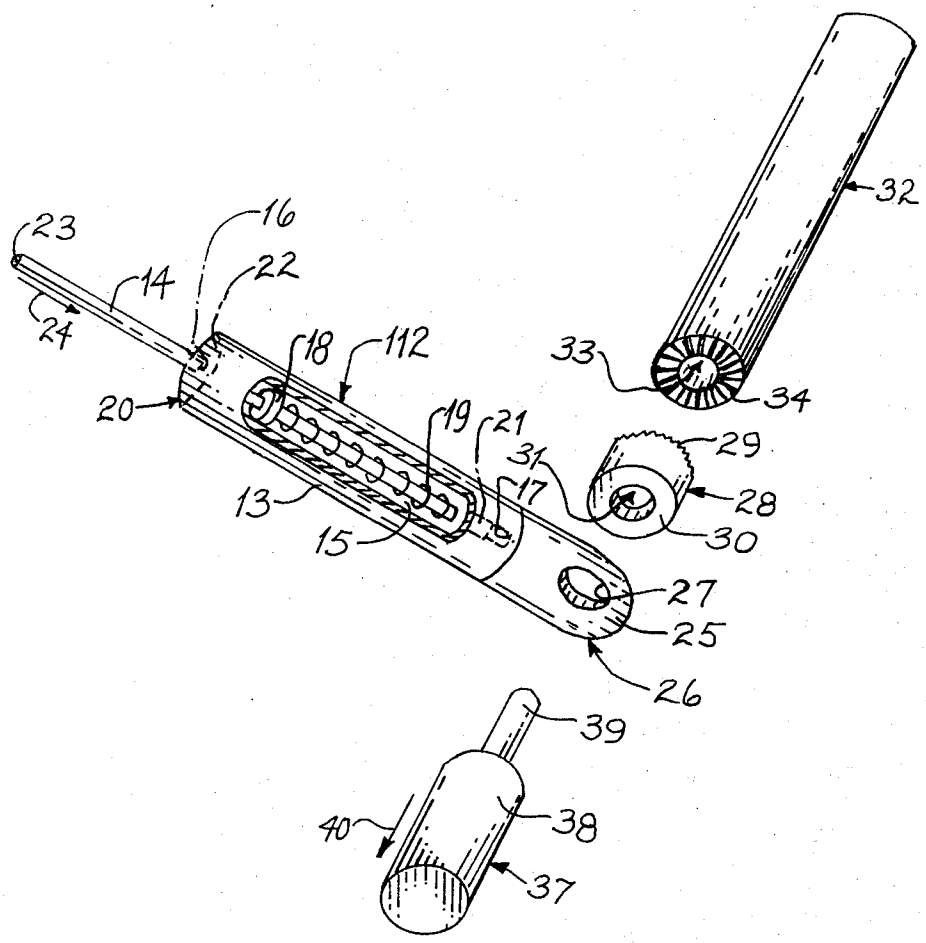

23
16
14
22
24
18
112
20
19
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31
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25
26
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38
40
37

FIG. 3.

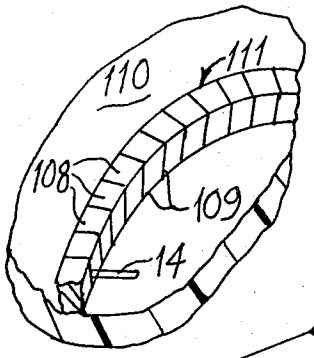


FIG. 4.

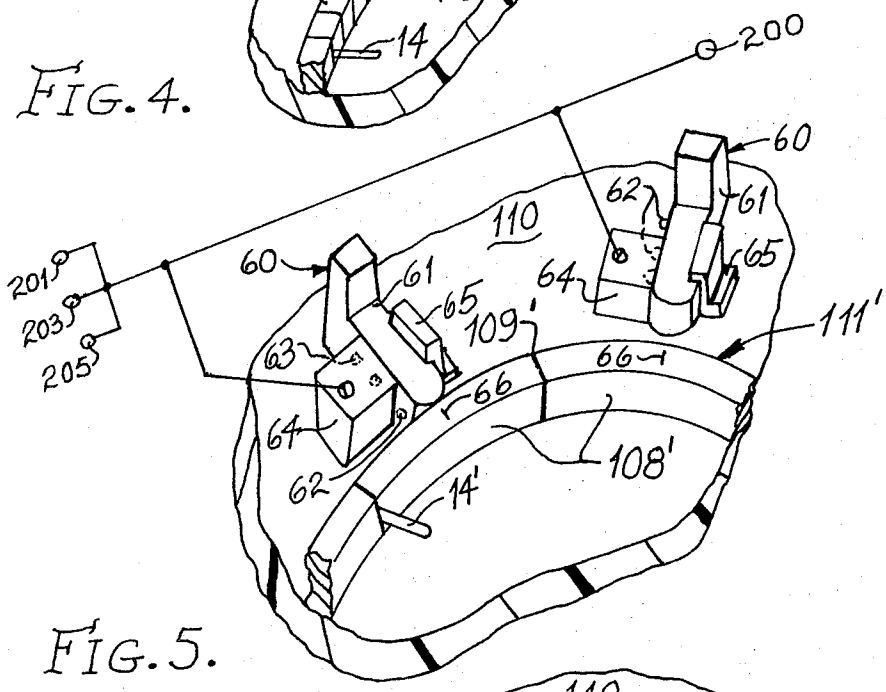


FIG. 5.

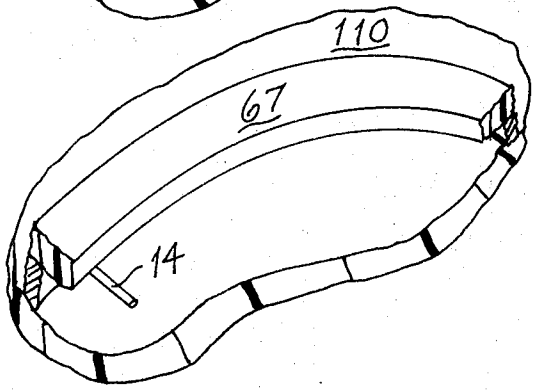


FIG. 6.

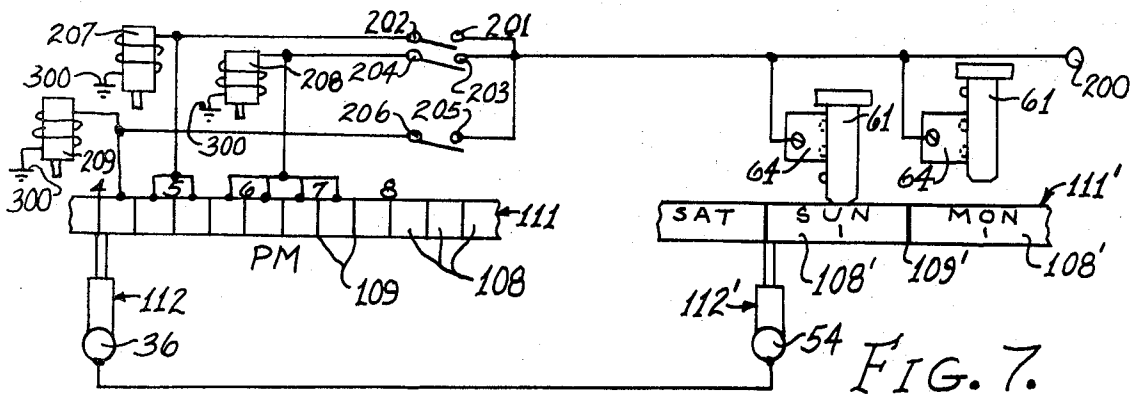


FIG. 7.

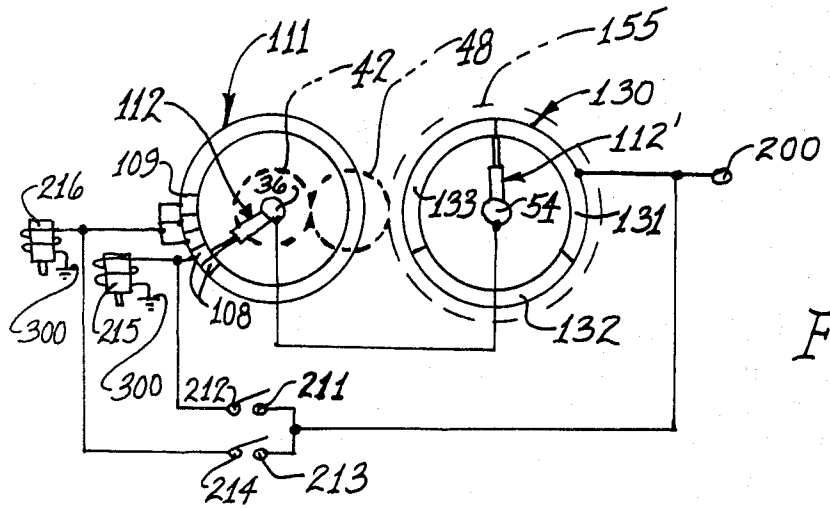


FIG. 8.

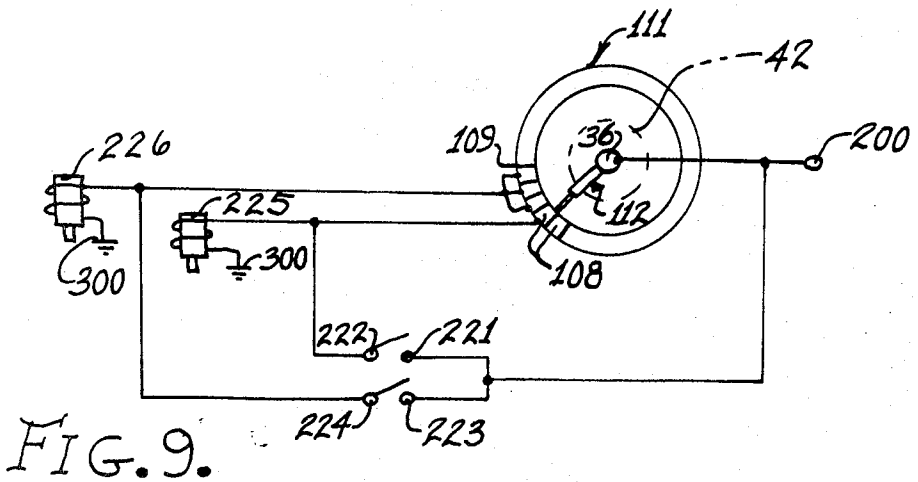


FIG. 9.

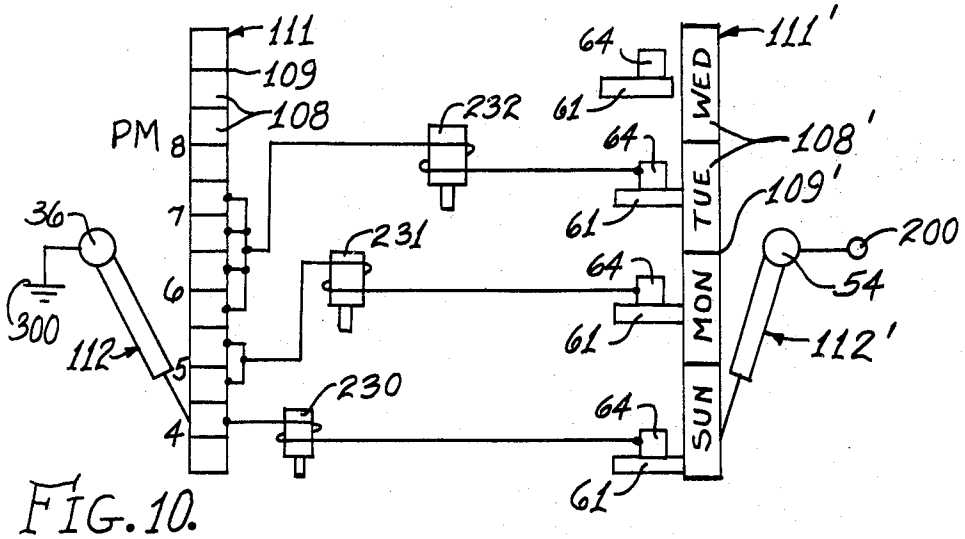


FIG. 10.

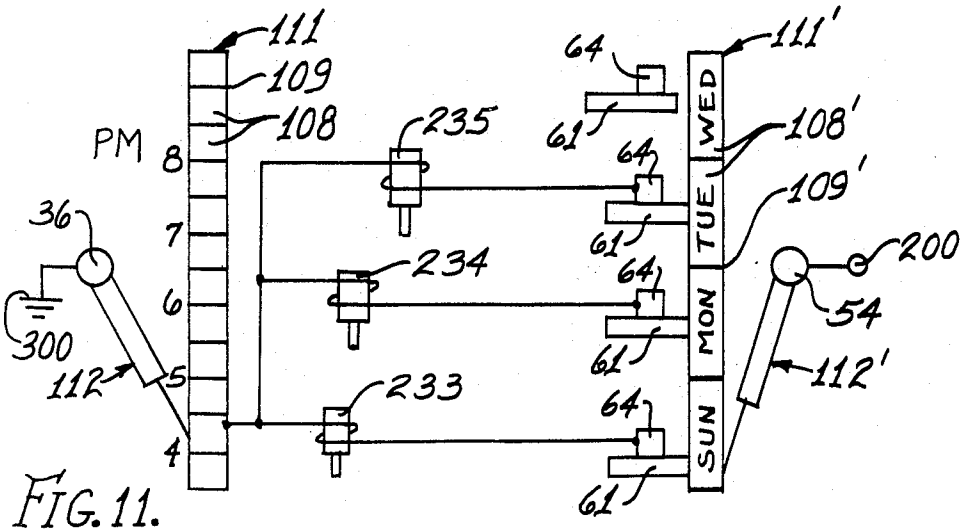


FIG. 11.

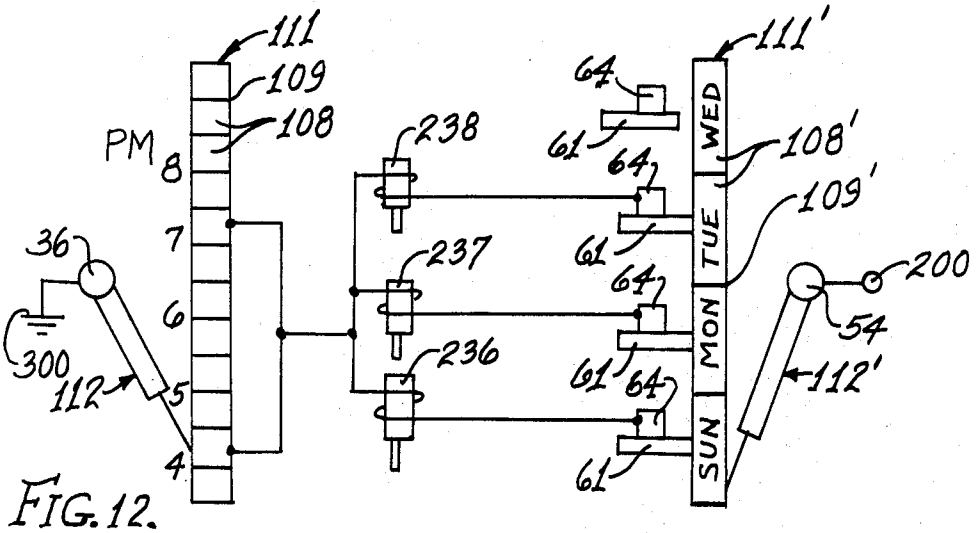


FIG. 12.

PROGRAMMING TIMER WITH SERIES CONNECTED SWITCHES

DESCRIPTION OF PRIOR ART

This invention relates to the field of timers wherein it is desired to control electrical devices external to these timers by these timers for given periods of time and during predetermined days.

Although there are timers for controlling such devices as solenoids, light bulbs and the like, there are no timers existing which provide reliable activation of these devices not only for predetermined periods but for any and a variety of different days during which such periods are repetitive.

There is also no prior art in the area of reliable timers that are simple in construction and wherein the time indicator also acts as means for selecting these devices, or days during which these devices are selected or days during which these devices are rejected.

There is further no known art where commutators are used to provide such selection of these time periods as well as days during which the time periods are programmed.

SUMMARY OF THE INVENTION

Accordingly, a programming timer for periodically controlling external means connected thereto is provided. There are present commutation means comprising a plurality of electrically conductive segments having electrical insulation between any two of the segments. Included are time indicating means in cooperation with the commutation means in accordance with the programmed time period selection of at least one of the segments of the commutation means for any day which these external means are programmed to be activated.

The indicating means comprises two coaxial members, one extending out of another, the inner member being spring loaded for urging an end thereof against the commutation segments.

Means are provided for driving the indicating means including interlock means attached to the other end of the external coaxial member for providing positive interface with the driving means. Means are attached to the other end of the outer coaxial member and the interlock means for providing frictional coupling with the driving member of the indicating means in accordance with the clock timer at which this timer is made operative.

Other commutators and coaxial indicating members similar in structure to those above described, but varied in segment lengths as to the commutator are provided for controlling the particular day or day of the week when the external devices are desired to be activated. Various combinations of days and repetition thereof are possible with individual day selectors electrically optionally connected to the segments of the day commutator. Still other commutators with fixed segments provide improved reliability of operation but fix the particular day or period of repetition, whereas one timer without the day commutation assembly provides repetition of periods during the day when the external device is activated, on a daily basis.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevation view of the timer capable of being adjusted for operation for any period of time.

FIG. **2** is a perspective view, partially cut away and in cross section of the timer of FIG. **1.**

FIG. **3** is an unassembled perspective view of an indicator, its shaft, coupling member and time setting knob, wherein the indicator is shown partially cut-away for details of internal structure.

FIG. **4** is a perspective view, partially in cross-section taken at plane **4—4** of FIG. **1.**

FIG. **5** is a perspective view, partially in cross-section taken at plane **5—5** of FIG. **1.**

FIG. **6** is a perspective view, partially in cross section showing the commutators of either FIGS. **4** or **5** having an insulating ring thereon for assuring constant cooperation of the indicator with the inner peripheral surface of the commutator.

FIG. **7** is a schematic view showing the manner in which the components of FIG. **1** are interconnected, and their interconnection to solenoids.

FIG. **8** is a schematic view showing a simplified version of the timer of FIG. **1,** wherein the timer is set for activation every third day by virtue of a three-segment commutator instead of the seven-segment selective commutator shown in FIG. **1.**

FIG. **9** is a schematic view showing a more simplified version of the timer of FIG. **1** wherein the repetition commutator is deleted making this timer operative and repeat activation of solenoids connected thereto every day.

FIG. **10** is a schematic view showing one manner in which solenoids might be connected to the timer of FIG. **1,** to avail oneself of the capability of activating the several solenoids on different days, and each solenoid for a different time duration during any one day, as well as for different time durations for each solenoid.

FIG. **11** is a schematic view showing a second way in which solenoids might be connected to the timer of FIG. **1,** wherein the solenoids are activated on different days but at the same time during each day and for the same timer periods for any one day.

FIG. **12** is a schematic view showing a third way in which solenoids might be connected to the timer of FIG. **1,** wherein the solenoids are activated on different days but at the same time during each day for the same time periods for any one day, but wherein several commutation segments are used to lengthen the periods of solenoid activation, over the manner of connection shown in FIG. **11.**

EXEMPLARY EMBODIMENT

Referring to FIGS. **1, 2, 3, 4, 5** and **6** which represent embodiment of the inventive device shown with the timer set to begin operation on Sunday at 4 P.M.

This timer has faceplate **110** on which is attached commutator **111** having forty-eight electrically conductive commutation segments, of twenty or twenty-five minute duration each and insulation members **109** between each pair of segments **108,** which insulation members occupy in terms of time about **5** minutes each, depending upon their thickness. Thus one segment **108** and one insulation member **109** occupy one-forty-eighth of a circle.

An indicating member 112 comprises a partially hollow body 13 and a member 14 partially slidable within member 13. Member 13 has a cavity 15 internal to and along its length with opening 16 at one end and aperture 17 near the other end of member 13. Contacting member 14, having a stop member 18 affixed thereto and a spring 19 circumjacent a portion of contacting member 14, is inserted generally at one end 20 of body 13 so that the contacting member 14, together with stop member 18 and spring 19 are inserted as a unit into the body 13, through end 20 so that end 21 of member 14 is slidably inserted into aperture 17. Circular member 22 having aperture 16 at its center is the slid over member 14 and welded to body 13 at location 20. Indicator member 14 can now be slidably moved along the longitudinal axis common to it and to body 13 so that end 21 is displaced in aperture 17, bottoming that aperture when end 23 of member 14 is pushed in direction of arrow 24, compressing spring 19 somewhat. Hence in operation, end 23 being in cooperation with a face of each of the commutation segments 108 and the insulating members 109, member 14 will be urged by spring 19 against commutator 111 to make good electrical contact therewith. Stop member 18 is used to prevent contacting member 14 from completely jumping out from body 13 when partially disassembled. Member 13 has a flattered portion 25 at end 26 thereof and an opening 27 therein for mounting same. Attached to one surface of flattered portion 25 is a cylindrical member 28 with one end 29 thereof being knurled, the other end thereof 30 being smooth, and having an aperture 31 at its center. Member 28 is shown in FIG. 3 as being disassembled, but when assembled end 30 is attached to the flattered portion 25 by welding or soldering so that aperture 27 is in registration with aperture 31, and hence member 28 is made an integral part of body 13.

A timing shaft is provided at 32 having an aperture 33 through part thereof along its longitudinal axis and a knurled end 34 for cooperation and engagement of knurled end 29. Shaft 32 extends through an opening 33' and through a sleeve bearing (not shown) in faceplate 110 so that its knurled end 34 extends out of opening 33' as well. The other end of shaft 32 is rotatably inserted in bushing-bearing 34 mounted in backplate 35, so that bushing-bearing 34 extending outward to the rear of backplate 35 has attached thereto solder lug 36 for making electrical connection thereto. It follows, that shaft 32, member 28, body 13 and member 14 are necessarily metallic in order to provide an electrically conductive path between a power source and segments 108 of commutator 111.

Metallic adjusting knob 37 comprises a wide diameter portion 38 and a narrower diameter portion 39. The wide diameter portion at its free end may be optionally capped with rubber or other insulating material (not shown) to prevent electrical shock while resetting the timer. The other end of knob 37 may optionally be made of spring-type material such as banana test lead probe for providing flexibility thereto when inserting same in aperture 33, so that portion 39 will make frictional and electrical contact with the inner surface of aperture 33. Although FIG. 3 shows knob 37 disassembled, it actually is welded to body 13 at 26 with end portion 39 extending through apertures 27 and 31, thereby making members 13, 14, 28 and 37 one integral component, all simultaneously removable from aperture 33' when resetting the timing control means. Commutator 111 is circularly arranged like a clock and divided in half for the AM and PM settings. Consequently one revolution of indicating member 112 constitutes the passing of twenty-four hours, or one day. When setting the timer in operation, knob 37 is pulled-out in direction of arrow 40, disengaging the knurled portions 29 and 34 and permitting the rotation of knob 37 in the direction of the proper time of day when the setting occurs, and knob 37 is then pressed back in opposite direction of arrow 40 reengaging knurled portions 29 and 34. Rotation of indicator 112 is clockwise as shown by arrow 41 to conform to normal clock motion.

Shaft 32 also has mounted thereon, gear or wheel 42 with a knurled edge by means of set screw 43 in a flange 44. Gear or wheel 42 cooperates with another gear or wheel 45 of like make, but of half the diameter compared to gear 42. Gear or wheel 45 is mounted on shaft 46 of a conventional synchronous clock motor 47 which provides one shaft revolution every twelve hours. Motor 47 is attached to backplate 35, and drives its shaft 46 counterclockwise. In cooperation of gears or wheels 42 and 45, two revolutions of gear 45 will therefore provide one revolution of gear 42 thereby converting the conventional clock motor drive to one that provides 24 hours per one revolution of indicating member 112.

Gear or wheel 42 is coupled or engages another similar gear or wheel of knurled-edge 48, which is similarly mounted to that of gear or wheel 42, on shaft 49. One end of shaft 49 is inserted in a sleeve bearing 50, while the other end, also inserted in a similar sleeve bearing in faceplate 110 (not shown) for support of shaft 49. Due to the direction of drive of gears 45 and 42, gear or wheel 48 will be driven counterclockwise.

Shaft 51 has one end 52 thereof inserted in sleeve bearing 53 mounted in backplate 35. Bearing 53 has attached thereto solder lug 54 for making electrical connection. The other end of shaft 51 has a sleeve bearing in faceplate 110 for retaining the shaft.

Shaft 51 is identically structured as shaft 32 and indicating member assembly 112' including knob 37' is identically structured as indicating member 112 and knob 37, so that FIG. 3 is representative of both indicator assemblies 112 and 112', knobs 37 and 37' and shafts 32 and 51, and operates and is reset in an identical manner.

Shaft 51 has mounted thereon gear or wheel 55 which has for the present configuration a ratio of seven-to-one in diameter as compared to diameters of gears 42 or 48, which are of identical diameters. Gear 55 is attached to shaft 51 in identical way as gear 42 is attached to its shaft. Due to drive motion provided by gear or wheel train 45-42-48, gear or wheel 55 is driven clockwise so as to provide the same clockwise motion to the day selection portion of the timer.

It is obvious, that the day portion and the hour selection portion of the timer, having a common drive, that without any special synchronizing devices, these two portions will always be synchronized.

There is also a requirement that there be electrical continuity between indicating member 112' comprising body 13', of identical construction to body 13, and member 14' and of identical construction to member 14, and knob 37' of same construction as knob 37, with the commutation segments of commutators 111 and

111′ providing continuity therethrough. Therefore commutator 111′ of same form as commutator 111 but having seven segments, will each have an insulation member 109′ between each of the segments 108′. Consequently all gears or wheels except gear or wheel 45 have to be metallic, shafts 32 and 51 must be metallic, indicators 112 and 112′ must be metallic and knobs 37 and 37′ must be metallic. As above stated, the ends of knobs 37 may be fitted with an insulation cap to each, to prevent electrical shock. Faceplate 110 and backplate 35 are insulating plates, such as nylon, fiberglass, bakelite or the like.

Movable setters for seven day operation are provided at 60, one for each day of the week. Each setter 60 is comprised of slidable member 61 that has snap-in projections 62, which engage in receivers 63 in stationary block 64 affixed to the front of faceplate 110. Slidable member 61 is held against block 64 by means of bracket 65 which is attached to faceplate 110. Calibration points 66 at the center of each of the seven day segments provide midday (noon) calibration of the timer; other calibration points may be engraved on each commutator segment, but insulation portions 109′ provide natural calibration points at the midnight points. Therefore, it is possible to set the timer accurately at both midnight and noon points of each day by setting indicators 112 and 112′ whenever the time is actually midnight or noon, to either midnight or noon points, at the respective commutator segments, for both the hour and the day commutators.

FIG. 4 shows the manner in which indicator member 14 cooperates with commutator 111, whereas FIG. 5, the manner in which indicator member 14′ cooperates with commutator 111′, and FIG. 6, representative of either commutators 111 or 111′ shows an insulating ring attached thereto and extending peripherally inward with respect to either of these commutators, provides a lip over these commutators for preventing slidable member 14 or 14′ of indicators 112 or 112′ from jumping away from these indicators and ceasing cooperation therewith.

Consequently, when any one specific slidable member 61, or more of them, are moved so that they snap into their particular stationary block 62, and cooperate with their respective segments so that electrical contact is made therebetween, and when devices, such as solenoids which are desired to be controlled by this timer are connected to one or more of the commutator segments 108, and power is applied at 200 to the stationary blocks 64 and to the power return of the side of the solenoid at 300, then the particular solenoid will be activated on the particular day of the week of which commutator segment 108 and member 61 cooperate, and for the particular period of time represented by commutator segments 108 of commutator 111, to which segment or segments the solenoid or solenoids are connected, automatically deactivating the solenoids as soon as the particular time period set-up for, and/or day, has elapsed.

One method of interconnecting solenoids or other devices such as lamps that are desired to be controlled by the timer of configuration FIGS. 1–6, is depicted in the schematic of FIG. 7. Therein, the commutators are shown in unfolded manner, that is as if the circular commutators would be cut at one place and spread out to show the segments thereof linearly. Electrical power is provided at 200-300; input power at 200, and return at 300 designated as a common ground return. Slidable member 61 is shown cooperating with the Sunday segment of commutator 111′, while the slidable member 61 relating to the Monday segment is shown not cooperating with it. Commutator 111 has the 4–4:30 PM segment connected to one terminal of solenoid 209 while power return 300 is connected to the other terminal thereof. Power is provided by means of the high side of power input at 200 to all contact blocks 64 of each of setters 60 of which member 61 is the movable portion. Since indicating member 112′ is in cooperation with the Sunday segment 108′ of commutator 111′ and solder lug 54 makes electrical contact though a shaft and through indicating member 112′ with the Sunday segment 108′, and since lug 54 is connected to lug 36 which provides continuity of connection through corresponding shafts, aforesaid, to indicating member 112, the slidable end thereof cooperating with the 4–4:30 PM segment of commutator 111, there will be established a complete electrical path to solenoid 209, activating solenoid 209 on Sunday at 4 PM, staying activated until 4:30 PM, at which time indicator 112 has been rotated by its drive means the requisite number of degrees to where it faces the insulating member 109 located between the 4:30 PM and 5 PM segments of commutator 111, thereby breaking the circuit continuity as to solenoid 209 and removing power therefrom, deactivating it. In the meantime, indicator 112′ will have been driven a comparable number of degrees over the Sunday segment 108′, but will still be in cooperation therewith for such other solenoids as are connected to other segments of commutator 111 for activation thereof. But even if there is no electrical continuity through commutators 111-111′ to activate solenoid 209, this solenoid may nonetheless be activated, by a program by-pass switch. Power input 200 being connected to stationary member 205 of the by-pass switch that has movable member 206 connected to the high side of solenoid 209, and provides power to that solenoid for as long as that switch is manually closed by causing contacts 205 and 206 to cooperate. The 4:30–5 PM segments 108 of commutator 111 are connected together and to the high side of the coil of solenoid 207, the return side of that coil connected to power return 300. The high side of the coil of solenoid 207 is also connected to movable contact 202 of a switch that has contact 201 thereof connected to blocks 64. The 5:30–7 PM segments of commutator 111 are electrically connected to the high side of solenoid 208 and to the movable contact 204 of the switch that has stationary contact 203, which stationary contact is electrically connected to blocks 64. As in the case of activation of solenoid 209, solenoid 207 will be activated on Sunday when indicator 112 will have been driven to cooperation with the 4:30 PM segment 108 and will stay activated until 5:30 PM at which time indicator 112 will have ceased to cooperate with the segments by being driven to the 5:30 segment at which time solenoid 208 will be activated and stay activated until 7:30 PM. By-pass of the programmed timing of the solenoids can be accomplished if desired by manually operating switch 201–202 for coil of solenoid 207 to be activated for as long as those switch contacts cooperate, or by manually operating switch 203–204 to cause solenoid 208 to be activated for as long as those switch contacts cooperate, any time it is desired to do so.

The configuration of FIGS. 1–7 give extremely great flexibility and more illustrations of such flexibility of use will be discussed below in connection with FIGS. 10–12.

The same concept of using the rotatable indicator to select commutator segments which have solenoids or other devices to be activated connected thereto is used in the configuration of FIG. 8 wherein a little less flexibility of usage and variance of connections are possible. Here, commutator 111 and indicators 112 and 112', drive means 42 and 48, and the clock motor with its drive means 45 (not shown in this figure) are all identical as heretofore. However, a gear or wheel with knurled edge 155 is used instead of gear or wheel 55. Gear or wheel 55 has a diameter which is three times the diameter of either gears or wheels 42 or 48. This is necessary in that commutator 130 is comprised of three segments. Segment 131 being of electrically conductive material, while segments 132 and 133 are of electrically insulative material. Of course segments 132–133 in this instance could be one segment of 240 degrees in arc. When indicator 112' cooperates with segment 131 it provides an electrical path between that segment to which power input 200 is provided, through lug 54 and its bearing connected to the shaft on which indicator 112' is connected, and since terminal 54, is electrically connected to terminal 36 to which indicator 112 is electrically connected, an electrical path is provided from 200 through 131, 112', 54, 36, 112 and segments 108 of commutator 111, solenoids 215 and 216 having one end of their respective coils connected to certain segments of commutator 111 and the other ends to power return 300, as in the configurations hereinabove described, thereby providing power to solenoid 215 wherever indicator 112 makes contact with the commutator segments of commutator 111 to which this solenoid is connected and then simultaneously indicator 112' makes contact with segment 131 of commutator 130. Likewise, solenoid 216 will be activated when indicator 112 has been driven to where it makes contact with such segments of commutator 111 as solenoid 216 is connected to, also when indicator arm 112' is in cooperation with segment 131 of commutator 130. As in the aforesaid configuration, both indicator 112 and 112' being synchronized, for each degree of indicator 112' rotation, three degrees of indicator 112 rotation will occur, thereby providing a repeat activation of the solenoids 215 and 216 once every three days. Also, as in the above configuration, solenoid 215 may be activated at any time when it is not automatically programmed for activation by closing of switch 211–212, since power is provided by electrical connection from power input means 200 to contact 211, and since contact 212 is connected to the high side of the coil of solenoid 215, power will be provided solenoid 215 wherein contacts of switch 211–212 cooperate by manual closing of that switch. Similarly, since power input from means 200 is provided to contact 213 of the switch that has its movable contact 214 connected to the high side of the coil of solenoid 216, then by closing contacts 213–214 so that they cooperate, solenoid 216 will be manually activated when it is desired to by-pass the programmed timing of the solenoids. It is therefore apparent that if one wanted every other day automatic activation of the solenoids, that commutator 130 would have to have only two segments each 180° of arc, one conductive and one insulative, and gear or wheel 155 would have to have a diameter twice that of gear or wheel 36. It follows that if solenoid activation is desired every fourth day, gear or wheel 130 would have to have a diameter of four times the diameter of gear or wheel 36, and that commutator 130 would require one 90° conductive segment and one 270° insulative segment, and so on for every fourth, fifth or sixth day action.

Referring to FIG. 9, we find a still more simplified version of the configuration of FIG. 8. The FIG. 9 configuration is usable where only daily repetition of activation of the solenoids or other devices are required. In this instance, commutator 130, indicator 112', gears or wheels 155 and 48 are not required. Instead, only the clock motor with its drive gear or wheel 45 (not shown herein) coupled to gear or wheel 42 is used, as well as commutator 111 and indicator 112 in identical manner as heretofore described. The high side of the coil of solenoid 225 is connected to the particular segments 108 of commutator 111, while other segments 108. are connected to the high side of the coil of solenoid 226. Power is applied through power means 200, through terminal lug 36 connected to the shaft, bearing gear or wheel 42, and to indicator 112 to make connection with the particular commutator segments as indicator 112 is driven. Power return 300 is connected to the other sides of the coils of solenoids 225 and 226. Therefore, when indicator 112 cooperates with the particular segment 108 of commutator 111 that is connected to solenoid 225, solenoid 225 is activated and remains activated for as long as indicator 112 is in cooperation with that commutator segment. Similarly, when indicator 112 is driven a number of degrees to make contact with other segments of commutator 111 that are connected to solenoid 226, then solenoid 226 is activated. In this illustration, solenoid 225 will remain activated for 25 minutes, (each segment plus each insulating member between segments is approximately 30 minutes in duration). Solenoid 226 will be activated for three 25 minute periods in succession as three segments of the commutator are utilized. Solenoids 225 and 226 may be operated out of sequence in view of the fact that they have by-pass switches. In switch 221–222, contact 221 is connected to power input 200 while contact 222 is connected to the high side of the coil of solenoid 225 thereby providing power to solenoid 225 when contacts 221 and 222 are in cooperation. Similarly, in switch 223–224, contact 223 is connected to power input 200, while contact 224 is connected to the high side of the coil of solenoid 226. When contacts 223 and 224 cooperate, by manual activation of switch, power is applied to solenoid 226 to activate it thereby by-passing the programming of the timer. Since indicator 112 will make one revolution every 24 hours (day), the solenoids 225 and 226 will be respectively activated in sequence for the periods indicated every single day.

Referring to FIGS. 10–12, we find the same configuration of FIGS. 1–6 are schematically shown for displaying different ways of connecting devices thereto.

FIG. 10 shows three solenoids connected in a manner to be activated, one on Sunday, one on Monday and one on Tuesday. However, power from means 200 is provided to indicator 112' making contact with the Sunday segment of commutator 111', while one of the slidable members 61 in contact with block 64 is in cooperation with the Sunday segment, and that particular block 64 is connected to one side of the coil of solenoid

230, the other side thereof connected to the 4 PM segment of commutator 111, the 4 PM segment of commutator 111 being in contact with indicator 112 which is connected to power return 300 to activate solenoid 230 for as long as indicator 112 is in contact with the 4 PM segment of commutator 111, that is, between 4 – 4:30 PM normally. Actually it is only in contact for 25 minutes, the other 5 minutes being the time duration for passing over the insulating separation between commutator segments. Connection is available for solenoid 231, it being connected between the Monday segment of commutator 111' and 4:30–5 PM segments of commutator 111 to provide activation of solenoid 231 on Monday starting at 4:30 PM for two 25 minute periods in succession. Similarly, connection is available for solenoid 232 between the Tuesday segment of commutator 111' and the 5:30–7 PM segments of commutator 111 to provide activation during these periods of time on Tuesday for solenoid 232.

FIG. 11 has solenoids 233, 234, and 235, respectively connected to the Sunday, Monday and Tuesday segments of commutator 111' with the other sides of these solenoids, all commonly connected to the 4PM segment of commutator 111. In this instance, all solenoids will be activated at the same time of the day for the same duration, but solenoid 233 will be activated on Sunday, solenoid 234 on Monday and solenoid 235 on Tuesday.

FIG. 12 has solenoids 236, 237 and 238 respectively attached to the Sunday, Monday and Tuesday segments of commutator 111', the other sides of these solenoids commonly connected together and to the 4 PM and 7 PM segments of commutator 111. Hence, on Sunday, Monday and Tuesday each solenoid 236, 237 and 238 respectively will be activated for a 25 minute period beginning at 4 PM and for another 25 minute period beginning at 7 PM. This will occur as indicators 112 will be driven over the 4 PM segments followed by a span of no activation, then resume activation at 7 PM, for each of the 3 days in question by virtue of power provided at 200 and 300 to the indicators.

It should be noted that in use of the configuration of FIGS. 1–7 and FIGS. 10–12, wherein the same configuration of timer is differently connected to the various solenoids or other programmed devices, that a seven day commutator 111' was illustrated. The seven day commutator requires a gear ratio as between diameter of the gear driving indicator 112' and that driving indicator 112, of 7, so that one revolution of indicator 112 will cause only one-seventh of a revolution of indicator 112' (one day). It follows that this may be extended to where several weeks are provided, periods of one month or any period that is suitable for that particular operation, wherein the change in the timer will amount to a change in gear diameters, and a commutator 111' of appropriate number of segments.

Referring to FIGS. 1, 7, 8, 10, 11 and 12, two timers, each comprising closed loop configuration of a plurality of insulated metallic segments and a drivable metallic arm in electrical cooperation with the metallic segments, wherein the two timers are serially electrically interconnected with each other and with an external device, whereby the timers control the day and hour of the day when the external device is electrically energized.

I claim:

1. A timer for periodically activating external means, comprising in combination:
an electrically insulating substrate;
first timing means supported by said substrate comprising a first plurality of metallic segments in closed loop configuration electrically insulated from each other and a driven first metallic contactor in periodic cooperation with each of the first plurality of segments for a first time period;
second timing means supported by said substrate comprising a second plurality of metallic segments in closed loop configuration electrically insulated from each other and a driven second metallic contactor in periodic cooperation with each of the second plurality of segments for a second time period different from the first time period, said first and second timing means being serially electrically interconnected; and
motive drive means, said first and second metallic contactors being mechanically coupled to each other and to the motive drive means.

2. The invention as stated in claim 1, including presettable contactors, supported by said substrate and circumferentially positioned about the second plurality of segments, for providing cooperation with at least one of said second plurality of metallic segments.

3. The invention as stated in claim 1, including insulating means attached to an exposed surface of each of the plurality of metallic segments in a plane parallel to the plane of rotation of the metallic contactors.

4. The invention as stated in claim 1, wherein the motive drive means is an electrically energizable synchronous motor.

5. The invention as stated in claim 1, wherein the first and second timing means are electrically connected to said external means.

6. The invention as stated in claim 1, including switch means electrically connected directly to the external means for by-passing the timing means.

7. The invention as stated in claim 1, wherein said at least one of the first plurality of metallic segments is electrically connected to said external means.

8. The invention as stated in claim 1, wherein each of the first and second metallic contactors comprises:
an elongated member, one end of said elongated member being in said driven periodic cooperation; and
a tubular member, the elongated member being coaxial with the tubular member and partially extending from one end of the tubular member, said elongated member having resilient means circumjacent a portion thereof internal the tubular member for maintaining said driven periodic cooperation.

9. The invention as stated in claim 8, wherein said tubular member includes:
interlock means attached to the other end of said tubular member so as to enable driving the metallic contactors; and
means frictionally coupled to said other end and to the interlock means for providing positioning capability of the metallic contactors with respect to their respective metallic segments.

10. The invention as stated in claim 9, including drivable means comprising a gear train coupled to the motive drive means, and means coupled to the interlock means and to the drivable means for providing driving

capability of said first and second metallic contactors.

11. The invention as stated in claim 9, including drivable means comprising a wheel train coupled to the motive drive means, and means coupled to the interlock means and to the drivable means for providing driving capability to said first and second metallic contactors.

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