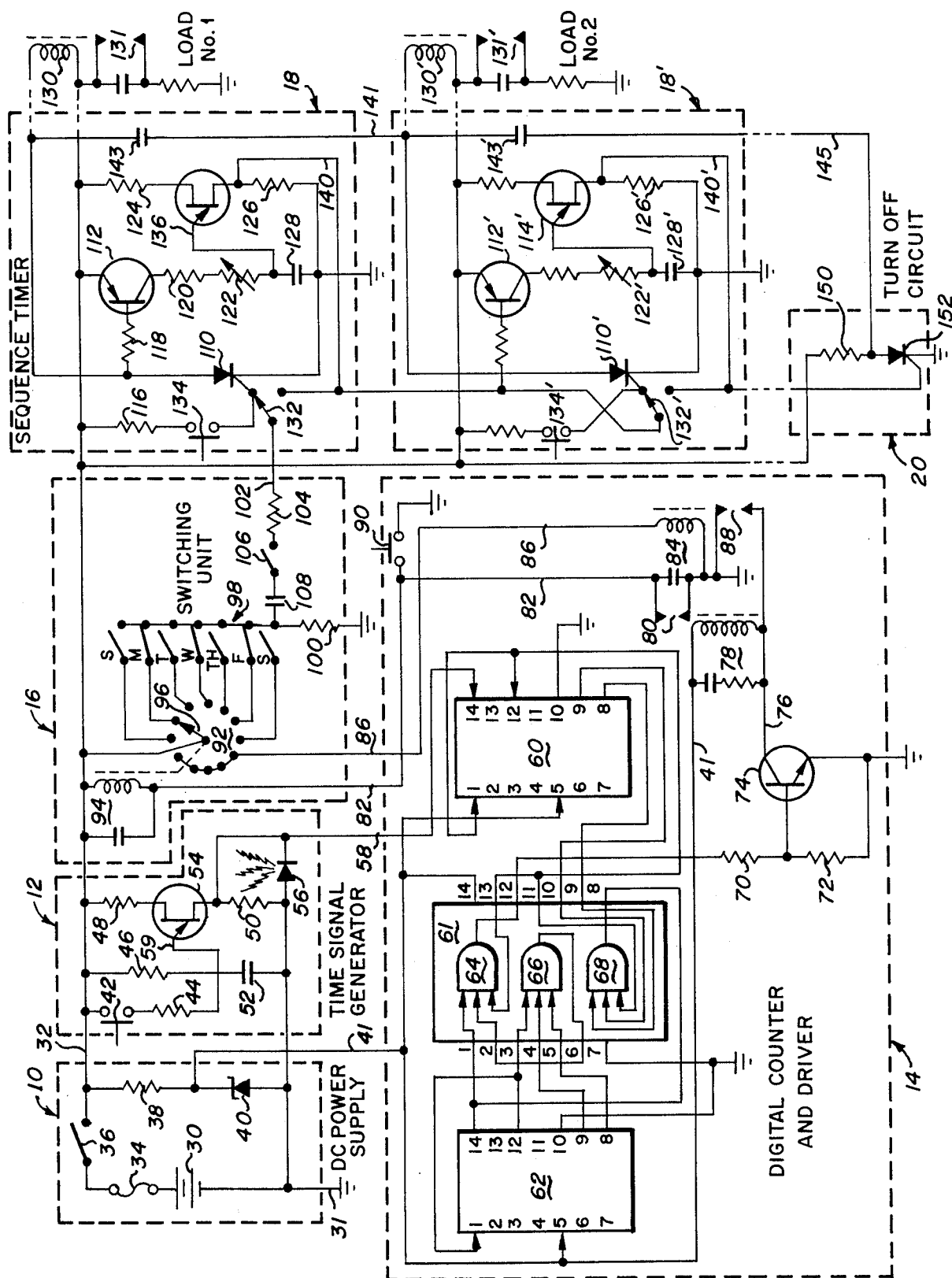




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INSECTICIDE VARNISH

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method of manufacturing a varnish and primarily to a product imparting washability to wallpaper and which possesses contact insecticide activity, and also relates to the resultant varnish ready for use and to a support coated with this varnish.

2. Description of the Prior Art

In the paint industry it is known for emulsified bases, particularly vinyl and acryl emulsified bases, to be applied to suitable supports, such as wallpapers. This application is fairly common with wallpapers of mediocre quality, in order to make them washable by coating them with plastics. The use of wallpaper to provide a permanent insecticide wall covering has however not been found possible in a satisfactory manner up to the present time.

An object of the present invention therefore, is to provide a method of producing an agent imparting washability to wallpapers which in addition has a lasting insecticide activity in respect of a large number of insects, this activity being developed by contact.

SUMMARY

According to the present invention a process for producing a varnish having insecticidal activity comprises dissolving or dispersing at least one suitable insecticide product in a polar organic solvent compatible with the insecticide, the resulting solution or emulsion being incorporated, at ambient temperature, in an emulsified base for varnish which is compatible with the polar solvent.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The insecticide may be dissolved or dispersed in a hot state in the polar organic solvent and may be dissolved or dispersed at a temperature of 15° to 80°C in an amount of 1 to 12% by weight of insecticide in the polar solvent.

The insecticide product may be of organophosphorus, organo-chlorine, or carbamate type, alone or mixed.

The polar organic solvent may be butanol, toluene, a xylene, or isobutyl acetate.

The solution of insecticide product in the polar organic solvent may be incorporated in the emulsified base for varnish, with agitation, in an amount of 15-45% by weight.

The emulsified base may be of the vinyl, acryl, or fatty type.

The insecticide activity of the agent which imparts washability and which is obtained by the process of the invention, irrespective of the nature of the contact insecticide product incorporated in the base emulsions acting as binder, is developed provided that the active insecticide product rises to the surface of the film enclosing it before the polymerisation of the film. This result is achieved both as the result of the surface tension of the carrier varnish, which remains transparent, and through the effect of the strong polarity of the solvent.

If a plurality of insecticides are applied simultaneously, a better shock curve and also better remain-

nence can be obtained due to the synergistic effect of outside

The evaporation of the polar solvent, after application of the insecticide varnish to a support, entrains, transports, and orients the reformed insecticide crystals to the outside of the coat of varnish, which, on drying, retains the active product in a vigorous manner.

The varnish obtained by the process of the invention has an effective insecticide activity, in contradistinction to the result which would be obtained by simply adding an insecticide product to an emulsion; in the latter case, in fact, the contact insecticide would remain enclosed in the varnish film and would consequently be inoperative.

The process of the invention is applied to the production of transparent insecticidal varnishes with any type of binder and may be applied to the coating of any suitable support, particularly wallpaper. In this case, coating may be effected after the paper has been applied to the wall surface or during its manufacture.

While the present invention has been described in connection with a preferred example any technically equivalent means may be applied.

I claim:

1. In a process for the production of a varnish having contact insecticidal activity and utilizable as a wall covering, comprising mixing an insecticide selected from the group consisting of organo-chlorine insecticides, organo-phosphorus insecticides, carbamate insecticides and mixtures thereof with a varnish selected from the group consisting of the fatty type, the vinyl type and the acryl type, the improvement consisting essentially of:

mixing 1-12% by weight of said insecticide at 15°-80°C. with a polar organic solvent compatible with said insecticide, said organic solvent being selected from the group consisting of butanol, xylene, toluene and isobutyl acetate, to provide a mixture having polarity and surface tension characteristics to effect migration thereof to the surface of said varnish; and

incorporating 15-45% by weight of said resulting mixture, at ambient temperature, into said varnish in the form of an emulsified varnish based compatible with said polar solvent to provide a varnish having contact insecticidal activity upon the evaporation of said solvent and the drying of said varnish after application to a support, the insecticide being oriented toward the surface of the resulting film through the action of the surface tension of the product and the polarity of the solvent.

2. A process according to claim 1, in which said insecticidal product is brought into contact with said polar solvent by dissolution.

3. A process according to claim 1, in which said insecticidal product is brought into contact with said polar solvent by dispersion.

4. Varnish having contact insecticidal activity and utilizable as a wall covering, resulting from the method comprising:

mixing at 15° to 80°C from 1 to 12% by weight of at least one insecticidal product selected from the group consisting of organo-chlorine, organo-phosphorous and carbamate compounds, in a polar organic solvent selected from the group consisting of butanol, toluene, xylene and isobutyl acetate,

coupled to leads (9), (10) and (11) and (13) of gate module 61. The signal input to circuit 62 is made from terminal (8) of package 61 to terminal (12). The outputs from circuit 62 are taken at terminals (8), (9) and (12) for input to AND gate 66 through the terminals (5), (4) and (3) respectively, of module 61.

The output of AND gate 66 is coupled out through lead (6) and back into one input of AND gate 64 through lead 2. Each twelfth 10 minute pulse developed on output line 58 causes a single 120 minute pulse to be developed at pins (8), (9) and (12) of circuit 60 for input through pins (9), (10) and (11) of module 61 to three inputs of AND gate 68. Since line 58 is also coupled into the third input of AND gate 68 through pin (11), the coincidence of the 10 minute pulse and the two 120 minute pulses will cause gate 68 to develop an output at pin (8) for input to pin (14) of circuit 62 and through pin (1) of module 61 to one of the inputs of AND gate 64.

Circuit 62 will develop an output pulse on lines (8), (9) and (12) each time a total of twelve 120 minute pulses have been input thereto, i.e., one output pulse each 1,440 minutes (24 hours). These signals are input to the three inputs of AND gate 66 causing it to develop an output signal at pin (6) which is fed back through pin (2) to one of the inputs to AND gate 64. Since the other two inputs to AND gate 64 are the ten minute pulse from line 58 and the 120 minute pulse, it will be appreciated that an output signal will be developed at lead (12) at the end of each 1,440 minute period.

Power line 41 from power supply 10 is coupled to lead (5) of modules 60 and 62, and to lead 14 of module 61. Lead (7) of circuit 61 is connected to ground. Lead (10) of 60 and 62 are connected to ground.

This signal is fed through a pair of resistors 70 and 72 to circuit ground to develop a turn-ON potential across resistor 72 for rendering the npn driver transistor 74 conductive. The collector 76 of transistor 74 is coupled to one side of a solenoid actuating coil 78. The other side of the coil is coupled to the five volt potential supply line 41. When energized, solenoid 78 is operative to close a set of contacts 80 which ground a counter output line 82. A push-button switch 90 is also provided to permit selective grounding of line 82 as will be explained below. Driver 14 also includes a second solenoid winding 84 which is coupled between circuit ground and a line 86. When energized, solenoid 84 is operative to close a set of contacts 88 which grounds the collector 76 of transistor 74 and the lower end of coil 78 as will be further explained below.

Switching unit 16 includes a rotary stepping switch 92 which should have at least 7 sequentially engageable positions and a bank of seven independently closeable switches 98. In the preferred embodiment a standard 12-contact solenoid operated stepper switch was used. Switch 92 is step-wise actuated by a solenoid winding 94 having one end coupled to buss line 32 and the other end coupled to line 82. The rotary contactor 96 is coupled to buss line 32 and each of the first seven contacts are coupled to one of the contactors of the seven switches 98. The remaining five contacts of switch 92 are coupled together and to line 86. The fixed contacts of switches 98 are ganged together and coupled to circuit ground through a resistor 100. A switching unit output line 102 is connected to the top side of resistor

100 through a resistor 104, a switch 106 and an isolating capacitor 108.

Each of the sequence timers 18 includes an SCR switching device 110, a pnp transistor 112, and a uni-junction transistor 114. In addition, each unit includes resistors 116, 118, 120, 122, 124 and 126, a capacitor 128 and a push-button switch 130. Also associated with each timer is a solenoid actuated relay and associated load which in the preferred embodiment are the sprinkler valve turnON devices of an irrigating system. The relays include coils 130 having one side coupled to buss line 32 and the other side coupled to the anode of SCR 110. When energized, coils 130 close contacts 131 which connect buss line 32 to the top side of the load number 1.

The gate electrode 132 of SCR 110 is coupled through a switch 132 to line 102 and its cathode is coupled to ground. A manual actuating circuit including push-button 134 and resistor 116 is also coupled between buss line 32 and switch 132. The base of transistor 112 is coupled through resistor 118 to the anode of SCR 110 while its emitter is coupled to buss line 32 and its collector is coupled to ground through resistors 120 and 122 and capacitor 128. The emitter 136 of UJT 114 is coupled to the junction of resistor 122 and capacitor 128, while one of its bases is coupled to buss line 32 through resistor 124. The other base of UJT 114 is coupled to circuit ground through resistor 126. An output from timer unit 18 is taken via line 140 which is coupled to the junction of resistor 126 and the lower base of UJT 114. Line 140 is connected to the gate of the SCR 110' of the next succeeding timer unit 181 through switch 132'.

The second timer unit 18' is actuated by an output signal developed by unit 18 on line 140. As SCR 110' is gated conductive to pull the top side of solenoid coil 130' to ground, it also pulls the anode of SCR 110 to ground via line 141 and capacitor 143 thereby causing it to switch OFF and de-activate load number 1. As solenoid 130' is energized it causes load number 2 to be activated, etc.

Turn-off circuit 20 is comprised of a resistor 150 and an SCR 152 connected in series between buss line 32 and circuit ground. As in the preceding timer units, the gate of SCR 152 is coupled to the output line 140' of the immediately preceding timer unit 181'. When SCR 152 is gated conductive by an output signal developed on line 140' it pulls the anode of SCR 110' to ground rendering it non-conductive. This of course causes load number 2 to be deactivated. As is apparent from the above, each of the timer units 18 includes a uni-junction transistor switching circuit similar to that included in signal generator 12 and in each case the circuit functions to start a timing sequence each time the associated SCR 110 is actuated, and terminates the timing sequence when the capacitor 128 has been charged to the turn-ON potential of the UJT 114. However, at the same time that UJT 114 fires, it triggers the next SCR 110' and a similar timing sequence begins. As in the signal generating circuit 12, the period of each timer may be set by selecting the value of resistance (resistors 120 and 122) through which capacitor 128 is charged.

Turning now to a discussion of the operation of the device, it will be assumed that the apparatus is used to operate remote loads such as irrigation or sprinkler systems having an ON state and an OFF state; that the ro-

tary contactor 96 is initially in the 12 o'clock position; that selected ones of the seven switches 98 have been closed; that switch 106 is closed and that the switches 132 are in their upper positions. Since each of the fixed contacts of rotary contactor 92 are engaged sequentially by rotary contactor 96 at 24 hour intervals, it will be appreciated that each of the switches 98 correspond to the respective ones of the days of the week. In other words, if the second, fourth and sixth switches 98 are closed, the several loads will only be actuated on Monday, Wednesday and Friday, etc.

The device may be started by merely closing switch 36. At the instant master switch 36 is closed, current immediately begins to flow into buss line 32 and through resistor 46 into capacitor 52. If the Sunday switch 98 were closed, sequence timer 18 would also be actuated. However, since the Monday switch is the first one in the series that is closed, at the end of the first 10 minute interval, UJT 54 will conduct causing a pulse to be developed on lead 58 for input to the divider circuit 60. Once capacitor 52 has discharged, UJT 54 will turn OFF and capacitor 52 will begin recharging again, etc. This operation will continue and circuit 60 will count each pulse. When the 12th pulse (120 minutes) has been input to circuit 60, a pulse will be generated by circuit 60 for input to divider circuit 62.

As the operation continues, circuit 62 will count the 120 minute pulses, and upon counting the twelfth of these (at the end of 1,440 minutes - 24 hours) will generate a signal to cause AND gate 66 and thence AND gate 64 to develop an output voltage for turning ON driver transistor 74. When transistor 74 goes conductive, the bottom side of solenoid coil 78 is pulled to ground causing current to flow from power line 41 therethrough. As solenoid 78 is energized it causes contacts 80 to be closed completing a circuit from buss line 32 through solenoid coil 94 to ground via line 82. Energization of solenoid 94 causes rotary contactor 96 to be incremented to the second contact position corresponding to the Monday switch 98.

Since the Monday switch is closed, a circuit will be completed through resistor 100 causing a pulse to be transmitted through capacitor 108, switch 106 and resistor 104 to output line 102 and thence through switch 132 to the gate of SCR 110. This causes SCR 110 to become conductive and pull the top side of solenoid 130 to ground so that current flows from buss line 32 therethrough. Solenoid 130 causes contacts 131 to close and couple the top side load number 1 to buss line 32. Where load number 1 is an actuating solenoid for a sprinkler head, it will be appreciated that so long as SCR 110 is allowed to remain conductive, load number 1 will remain energized.

Note also that as soon as SCR 110 becomes conductive, transistor 112 is also rendered conductive, and capacitor 128 begins to charge by virtue of current flowing from buss line 32 through transistor 112 and resistors 120 and 122. When a predetermined time has passed, sufficient to allow the charge on capacitor 128 to reach the firing potential of UJT 114, UJT 114 will conduct and discharge capacitor 128 through resistor 126. The current flowing through resistor 126 will cause a voltage to be developed on line 140 for input to the second timer unit 181. This voltage is applied to the gate of SCR 110' causing it to become conductive. As SCR 110' conducts it energizes coil 130' to actuate load number 2. At the same time a signal is fed back to

the anode of SCR 110 via line 141 and capacitor 143 causing SCR 110 to be rendered non-conductive, thereby deenergizing solenoid 130, opening contracts 131 and de-energizing load number 1.

Similarly, load number 2 will remain energized until such time that SCR 114' conducts and an output signal is developed on line 140' for input to the gate of SCR 152. As SCR 152 conducts, a signal is fed back through line 145 and capacitor 143' to the anode of SCR 110' causing it to become non-conductive. This of course de-energizes load number 2 assuming that only two sequence timers are in the chain preceding the turn-off circuit 20. However, it should be noted that any number of sequence timer units 18 could be included in series prior to turn-off circuit 20. It should also be noted that as the first sequence timer was actuated, the timer signal generator 12 and counter circuit 14 began a new 1,440 minute count in preparation for advancing contactor 96 to the next day's position. The above described operation will of course continue through the week until it reaches the eighth contact point.

When the eighth contact point switch 92 is engaged by contactor 96 a circuit is completed through line 86 and solenoid winding 84 to ground, thus energizing the solenoid to close contacts 88. This connects the bottom side of solenoid 78 to ground thereby energizing it to close contacts 80. As contacts 80 are closed, solenoid 94 is energized and rotary contactor 96 is moved to the next contact. Since this contact is also coupled to line 86 it will be appreciated that the above described sequence will continue until contactor 96 is finally moved back to the first contact position at which the normal timing sequence commences.

The purpose of the push-button switch 90 is to permit switch 92 to be selectively step-wise advanced for cycle setting purposes, test purposes or for any other particular reason. Similarly, the purpose of the push-button switches 134 is to permit actuation of a particular load out of sequence if so desired. Note however that since all of the load energizing solenoids 130 are connected in parallel, actuation of any push-button switch 134 will terminate energization of any load then presently energized. The switches 132 are to permit any of the various sequence timing units 18 to be selectively by-passed.

It is contemplated that for some applications it may not be necessary to provide day selection since the particular actuating sequence is to take place during each 24 hour period. In such case it will not be necessary to provide the switching unit 16, and line 69 could be coupled directly to the gate circuit of SCR 110.

It is also contemplated that other timing cycle periods than 24 hours may be required and it is to be understood that any cycle period of less than or greater than 24 hours could be selected by appropriate choice of the parameters of the timing circuit of the time signal generator 12.

Whereas the present invention has been disclosed herein in terms of a particular preferred embodiment, it is contemplated that many alterations and modifications will become apparent to those skilled in the art after having read the above disclosure. Accordingly, it is intended that the appended claims be interpreted to cover all such alterations and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. Apparatus for sequentially energizing a plurality of load devices, comprising:

a source of electrical energy;
 a first relay which when actuated connects a first of said plurality of load devices to said source of electrical energy;
 a second relay which when actuated connects a second of said plurality of load devices to said source of electrical energy;
 time signal generating means for developing a series of timing pulses;
 a counting means for counting said timing pulses and developing an output signal each time a predetermined number of said timing pulses are counted;
 a first sequence timing means responsive to said output signal and operative to actuate said first relay and to thereafter develop a first sequencing signal following passage of a first predetermined period of time;
 a second sequence timing means responsive to said first sequencing signal and operative to deactivate said first relay, actuate said second relay, and to thereafter develop a second sequencing signal following passage of a second predetermined period of time; and
 turn-off means responsive to said second sequencing signal and operative to deactivate said second load device.

2. Apparatus for sequentially energizing a plurality of load devices as recited in claim 1 and further comprising a switching means for selectively coupling various ones of said output signals to said first sequence timing means.

3. Apparatus for sequentially energizing a plurality of load devices as recited in claim 2 wherein said switching means includes a sequential switching device having a plurality of output terminals and a plurality of discrete switching elements for selectively coupling individual ones of said output terminals to said first sequence timing means.

4. Apparatus for sequentially energizing a plurality of load devices as recited in claim 1 wherein said first sequence timing means includes a first silicon controlled rectifier forming a first series circuit with the solenoid of said first relay, said first rectifier being responsive to said output signal and operative to permit current to flow from said source of electrical energy through said first relay solenoid to actuate said first relay, a second series circuit including a first resistive component, a first capacitive component, and a first switching means responsive to current flow through said first relay solenoid and operative to couple current from said source of electrical energy through said first resistive component into said first capacitive component, and a second switching means responsive to the charge stored on said first capacitive component and operative to develop said first sequencing signal when the charge

reaches a predetermined level.

5. Apparatus for sequentially energizing a plurality of load devices as recited in claim 1 wherein said time signal generating means includes a resistive component and a capacitive component forming a series circuit for receiving current from said source of electrical energy, and a switching means responsive to the charge on said capacitive impedance means and operative to develop one of said timing pulses each time the charge on said capacitive component reaches a predetermined level.

6. Apparatus for sequentially energizing a plurality of load devices as recited in claim 5 wherein said switching means includes a uni-junction transistor having one of its base-emitter junctions connected in parallel with said capacitive component.

7. Apparatus for sequentially energizing a plurality of load devices as recited in claim 4 wherein said second sequence timing means includes a second silicon controlled rectifier forming a third series circuit with the solenoid of said second relay, said second rectifier being responsive to said first sequencing signal and operative to permit current to flow from said source of electrical energy through said second relay to actuate said second relay, a fourth series circuit including a second resistive component, a second capacitive component and a third switching means responsive to current flow through said second relay solenoid and operative to couple current from said source of electrical energy through said second resistive component into said second capacitive component, and a fourth switching means responsive to the charge stored on said second capacitive component and operative to develop said second sequencing signal when said last-mentioned charge reaches a predetermined level.

8. Apparatus for sequentially energizing a plurality of load devices as recited in claim 7 wherein said turn-off means includes a third silicon controlled rectifier forming a fourth series circuit with a current-limiting resistor, said third rectifier being responsive to said second sequencing signal and operative to deactivate said second relay.

9. Apparatus for sequentially energizing a plurality of load devices as recited in claim 8 and further including a third capacitive component connected between the respective anodes of said first and second rectifiers, and a fourth capacitive component connected between the respective anodes of said second and third rectifiers.

10. Apparatus for sequentially energizing a plurality of load devices as recited in claim 8 wherein the resistance of said first and second resistive components are selectively variable so as to permit the durations of said first and second periods of time to be selected. --

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,876,950 Dated April 8, 1975

Inventor(s) David Glen O'Connor

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Cancel Columns 1 and 2, bearing Patent No. 3,877,951 and insert the attached sheets.

Signed and Sealed this

eleventh Day of November 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

BACKGROUND OF THE INVENTION

The present invention relates generally to time sequencing apparatus and more particularly to a simplified electronic sequencing apparatus which can be battery powered for remote timing and sequencing applications.

Heretofore, time sequencing devices for applications such as the control of lawn-sprinkling systems or golf course irrigation systems have typically utilized a motor driven rotating cam which closes switches at appropriate times to actuate various load devices. Since such devices are usually driven by a synchronous motor, an AC power source is required. This of course makes the timing device unsuitable for remote applications in which no AC power is readily available. Furthermore, even a mechanical timing device driven by a DC motor would require an amount of power that would make battery operation impractical.

SUMMARY OF THE PRESENT INVENTION

It is therefore a principle object of the present invention to provide a DC powered time sequencing and load activating apparatus having particular suitability for use in remote applications.

Briefly, the preferred embodiment of the present invention includes a DC power supply, a time-signal generator energized by the power supply for developing a series of timing pulses, a digital counter for counting the pulses and developing an output signal when a predetermined number of the timing pulses are counted, and a series of sequence timers which respond to the output signal to energize a plurality of load devices in sequence for predetermined periods of time. The apparatus also includes a switching unit for coupling the digital counter to the sequence timers. The switching unit contains a plurality of switches which enable the load device activation to be made selective as to the days of the week.

One of the primary advantages of the present invention is that the same DC power supply that energizes the timing and sequencing apparatus may be used to activate the various load devices.

Another advantage of the present invention is that since the various timing components of the device are entirely electronic, the power consumption of the timing and sequencing device is minimal.

These and other objects of the present invention will no doubt become apparent to those of ordinary skill in the art after having read the following detailed description of a preferred embodiment which is illustrated in the drawing.

IN THE DRAWING

The drawing is a schematic diagram of a preferred embodiment of a time sequencing apparatus in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, a simplified schematic diagram is shown to illustrate the principle components of a preferred embodiment of a portable timing apparatus in accordance with the present invention. As outlined generally by dashed lines, the apparatus includes a DC power supply 10, a time signal generator 12, a digital counter and driver 14, a switching unit 16, a plurality of sequence timer units 18, and a turn-off circuit 20.

Power supply 10 includes a battery 30 having a high current capacity for reasons which will become apparent as the description proceeds. In the preferred embodiment, a 12-volt automotive battery was utilized but it will be appreciated that any suitable source of direct current may be utilized. The negative terminal of battery 30 is coupled to circuit ground at 31 while the positive terminal is coupled to a positive voltage supply buss line 32 through a fuse 34 and switch 36. In order to provide a regulated 5 volt output for purposes which will be explained below, a resistor 38 and zener diode 40 are connected in series between buss line 32 and circuit ground.

Time signal generator 12 includes a push-button switch 42, four resistors 44, 46, 48 and 50, a capacitor 52, a unijunction (UJT) transistor 54 and a light emitting diode (LED) 56. Resistor 46 and capacitor 52 form a series RC circuit connected between buss line 32 and ground. One of the two bases of transistor 54 is coupled to buss line 32 through a resistor 48 while the other base is coupled to circuit ground through a resistor 50. The emitter 57 of UJT 54 is coupled to the junction of resistor 46 and capacitor 52. It will be appreciated that the resistive value of resistor 46 and the potential on buss line 32 determine the rate at which capacitor 52 is charged, and further that where both are fixed, the time required to charge capacitor 52 to a particular potential will remain constant.

Since UJT 54 will conduct when its emitter is raised to a particular potential and will discharge the potential stored on the capacitor 52 through resistor 50, by carefully selecting values for resistor 46, capacitor 52 for a particular UJT 54, it will be apparent that as the charge on capacitor 54 is discharged through resistor 50 pulses will be developed on output line 58 at regular intervals. In the preferred embodiment, this interval was selected to be precisely ten minutes. The light emitter diode 56 which is shunted across resistor 50 fires each time a pulse is developed on output line 58 to provide a visual indication each time an output pulse is developed. Switch 42 and resistor 44 form a switchable shunt across resistor 46 for allowing signal generator 12 to be reset or "synchronized". Resistor 44 is of a much lower value than resistor 46 and when placed in circuit by depression of push-button switch 42, enables capacitor 52 to be rapidly charged. When LED fires pressure is released from switch 42 and the normal 10 minute charging cycle commences. Note that since counter 14 counts in 10 minute increments, the device can be set to any 10 minute increment of a 24-hour cycle by holding switch 42 closed and counting the flashes of LED 56.

The counter and driver 14 includes a divide-by-twelve circuit 60, a bank of AND gates 61, and a second divide-by-twelve circuit 62. The divide-by-twelve circuits and AND gate circuits are packaged in standard 14 lead modules with the

leads being numbered as indicated.

As indicated, the output line 58 from generator 12 is coupled to lead (14) of circuit 60. Leads (1), (2) and (14) of circuit 60 are coupled to leads (11) and (13) of gate module 61. The output from circuit 60 is taken through leads (8), (9) and (12) which are respectively