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Chadwick

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[54] **ARTIFICIAL SUNRISE**

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[52] **U.S. Cl.** ..... **58/19 C,** 58/21.12, 58/38

[51] **Int. Cl.** **G04c 21/16**

[58] **Field of Search** 58/3, 16, 19–21, 58/21.12, 22, 22.5, 42.5–44, 50

[56] **References Cited**

UNITED STATES PATENTS

3,727,395	4/1973	Baylor	58/19 C
2,159,917	5/1939	Wagner	58/50 X

Primary Examiner—Lawrence R. Franklin

[57] **ABSTRACT**

A clock alarm system wherein a lamp arrangement is utilized to announce the arrival of a preset time, the intensity of which light is controlled by appropriate electronic circuitry so as to increase in brilliance with the continued passage of time beyond that preset into the system, thereby simulating a natural sunrise.

4 Claims, 3 Drawing Figures

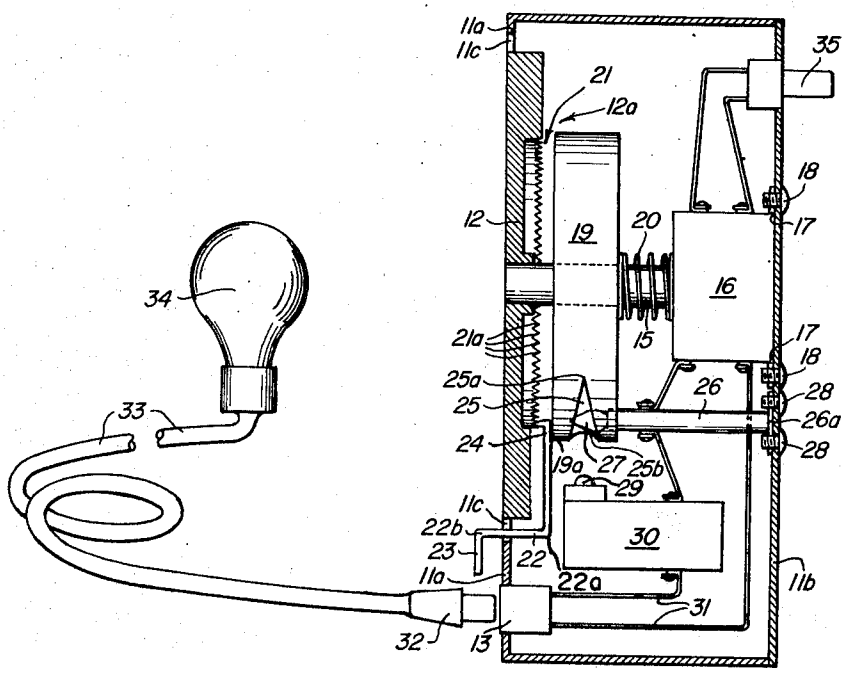


FIG. 1.

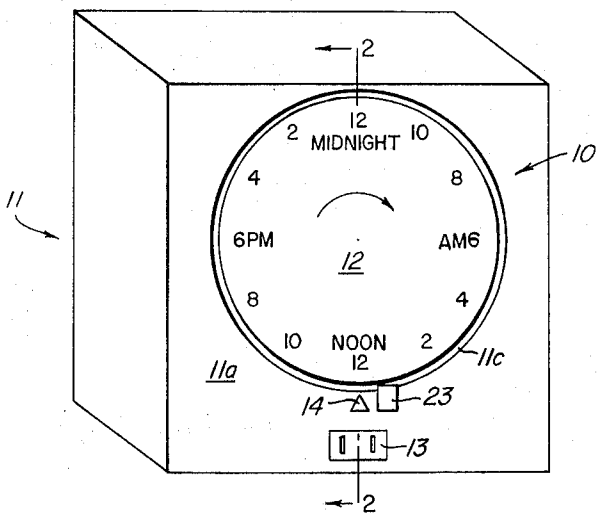


FIG. 2.

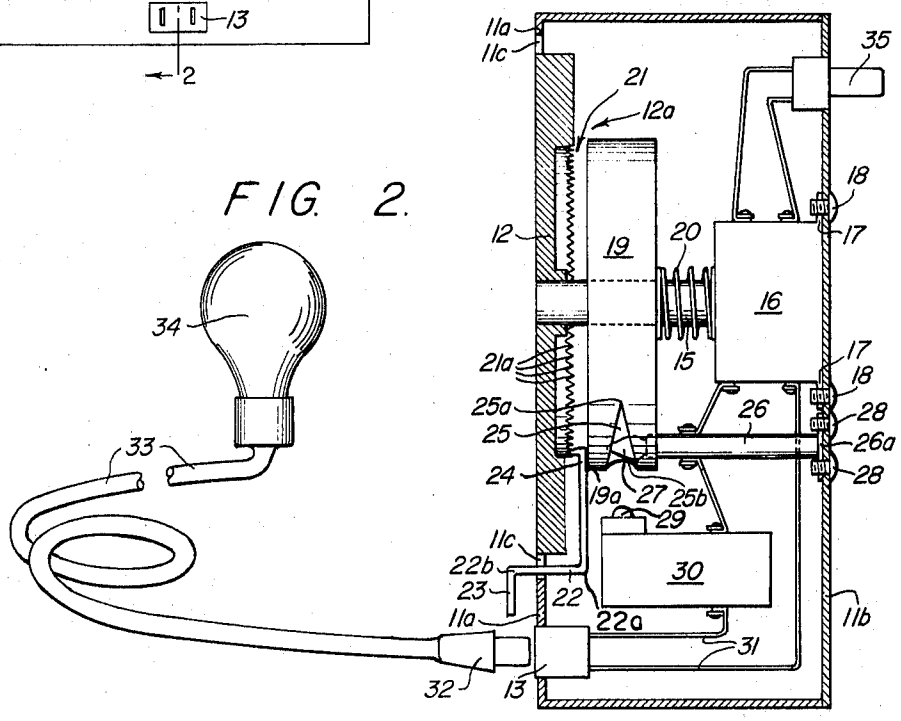
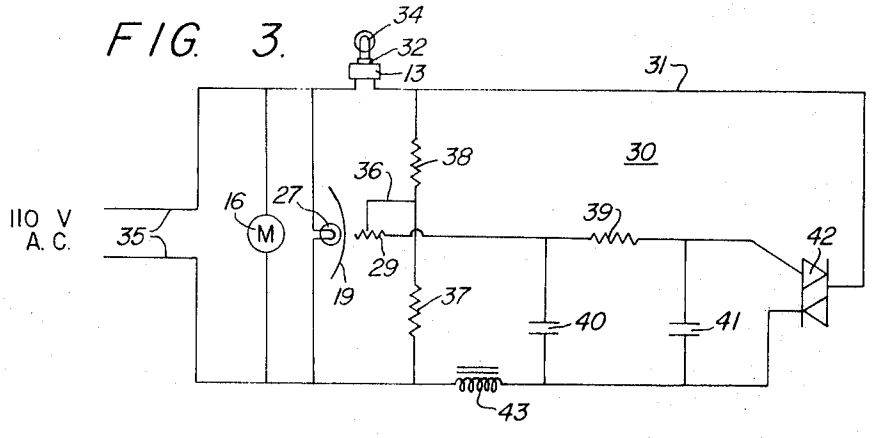


FIG. 3.



ARTIFICIAL SUNRISE

BRIEF DESCRIPTION OF THE INVENTION

1. Field of the Invention

This invention relates to light alarm arrangements operated by a timer mechanism.

2. Prior Art

Light alarm arrangements for clocks and variations thereof have been proposed in the past. Such arrangements are disclosed in U.S. Patent Nos. 2,460,634, 2,636,336, 2,276,339 and Re23,261, for example. While these show systems wherein a light is energized at a predetermined time, they do not suggest a light alarm system having the capability of increasing the lamp brilliance with the continued passage of time past a time preset into the system.

Conventional sound alarm systems have long been known and a sound alarm system providing increased crescendo with time passage is disclosed in U.S. Pat. No. 2,856,751. This patent, like the others noted, does not teach the increasing brilliance light system of the present invention.

Summary of the Invention

It is a principal object of the present invention to provide a light alarm system, for operation with a timer mechanism such as a standard electric clock motor, having a lamp and associated electronic circuit whereby the lamp will be illuminated at a preset time increment and will increase in brilliance with the continued passage of time until full illumination is reached.

Other objects are to provide a circuitry arrangement and mechanism for controlling lamp brilliance which is reliable, inexpensive to produce and quiet in operation.

Principal features of the present invention include an electric clock motor turning an hour indicator. A programmer, operated by the hour indicator, is set by a user to automatically initiate the light alarm at a desired time increment. The programmer consists, in part, of a programmer cylinder arrangement that is suspended independently of the hour indicator, but is releasably connected thereto so as to turn with the time indicator by programming a time therein.

A continually energized, long life, electric light bulb is arranged within the programmer cylinder but is not connected thereto. The programmer cylinder provides a light barrier between the light bulb and a light sensitive resistor spaced from the bulb. A slot or notch in the programmer cylinder is arranged to allow light transmission through the cylinder and onto the light sensitive resistor once during each period of revolution of the cylinder. The shape of the slot determines the amount of light which the light sensitive resistor will initially receive and will receive over the period of time in which the cylinder slot is between the light source and resistor as the opening is turned opposite thereto. Resistance values produced by the resistor sensing light through the turning slot can therefore be made to increase from a small to large resistance value, as desired, dependent upon the shape of the cylinder slot and the amount of light passed through.

A circuit including the light sensitive resistor and a lamp of the light alarm is connected to a source of alternating current. The circuit translates the current input into an output voltage reflective of the resistance value of the light sensitive resistor. As the slot in the turning programmer cylinder first moves between the light bulb and the light sensitive resistor, the resistor, which has reflected an open circuit or infinite value, decreases in resistance, and reflects a small output voltage to light the lamp. As the slot turns to allow more light passage, a larger amount of light strikes the light sensitive resistor, decreasing the resistance produced. As an optimum resistance value is reached, the voltage transmitted is at a maximum value, and results in an increased voltage output to more brilliantly illuminate the lamp. The change in brilliance is dependent upon the rate of turning of the programmer cylinder and thereby occurs gradually with the passage of time to create a changing illumination pattern that simulates a natural sunrise.

Additional objects and features of the invention will become apparent from the following detailed description, taken together with the accompanying drawings.

THE DRAWINGS

FIG. **1** is a perspective view showing the face of the invention;

FIG. **2**, a vertical sectional view taken on the line 2—2 of FIG. **1**; and

FIG. **3**, an electrical schematic view of the circuitry of the present invention.

DETAILED DESCRIPTION

Referring now to the drawings:

In the illustrated preferred embodiment, a timer **10** is mounted in a housing **11**. A clock dial **12** serving as a time indicator is arranged to turn within an opening **11c** in a front face **11*a***, housing **11**, and an electrical plug receptacle **13** is provided in the front face. The clock dial **12** is circular and has numbers reflecting the hours in a 24 hour period around the periphery thereof. A stationary pointer **14** is fixed on face **11*a*** adjacent to the dial **12**. Pointer **14** reflects or points to a particular number or a gradient between numbers on the clock dial, which dial is mounted to be rotated in the direction shown by the arrow, FIG. **1**. The time over a 24 hour period is thereby reflected by the position of the numbers on dial **12**, relative to pointer **14**.

As shown in FIG. **2**, dial **12** is fixed to one end of a shaft **15** having an opposite end extending into and turned by a clock motor **16**. The housing of clock motor **16** has ears **17** projecting outwardly from its base opposite to shaft **15**. Attachment means, shown herein as screws **18**, are fitted through appropriate holes formed through the back **11*b*** of housing **11** and into threaded holes in ears **17** to secure the clock motor **16** to housing **11**. Shaft **15** is journaled through a cylinder **19** such that the cylinder **19** is capable of rotating independently of the shaft **15**. A spring **20**, arranged around shaft **15** and between cylinder **19** and clock motor **16**, biases the cylinder away from the clock motor and towards a rear face **12*a*** of clock dial **12**. The clock dial rear face **12*a*** has a circular rack **21** formed around the outer periphery such that the engaging surfaces of teeth **21*a*** thereof face towards cylinder **19**. A spring arm **22** is connected on one end to the edge of cylinder **19** at **19*a***, and is bent a **22*a*** and **22*b*** to clear the clock dial **12** and the edge of opening **11*c*** before terminating at a tab **23**. A tooth **24** is fixed to the end of arm **22**, opposite to the tab **23**, and is urged by spring **20** into mesh with a tooth **21*a*** of rack **21**. When tooth **24** is moved

out of meshing engagement with rack **21**, as by depressing tab **23** against the biasing of spring **20**, the cylinder **19** can be rotated freely around shaft **15**. Tab **23** therefore provides the means for programming or positioning the programmer cylinder **19** with respect to time as reflected by the relative position of the clock dial **12** to pointer **14**.

A slot or notch **25**, formed in the wall of programmer cylinder **19**, provides an opening or window in the turning cylinder. The leading edge of the slot is aligned with tab **23** such that the positioning of tab **23**, relative to clock dial **12**, determines the time at which light will initially pass through the slot to contact a variable resistance producing means to be hereinafter described.

An electrical socket **26**, having a long lasting light bulb **27** electrically connected therein, is fixed at its base **26***a* by screws **28** to the back **11***b* of housing **11**. Bulb **27** is continuously energized by electronic circuitry that will be explained later herein, and is aligned within the interior of the cylinder **19** so as to be positioned immediately opposite to the slot **25** when the cylinder **19** is turned appropriately. A light sensitive resistor **29** is arranged directly opposite to the light emitting bulb **27**, and is separated thereform by the wall of cylinder **19**. Light sensitive resistor **29**, FIG. **2**, is connected to a circuit **30**, shown as a box in FIG. **2**, and schematically in FIG. **3**.

The outer wall of cylinder **19** acts as a light shield preventing, except when a slot **25** is positioned therebetween light emitted by the light bulb **27** from reaching the light sensitive resistor **29**. Resistor **29** presents an open circuit or infinite value resistance configuration in the absence of light, prohibiting the electrical circuit **30** from passing a voltage therethrough. When, however, the slot **25** is turned between bulb **27** and resistor **29** such that light from the bulb passes therethrough to contact the resistor **29**, the resistance value decreases in proportion to the intensity of light striking thereon, finally stabilizing at a desired value when the widest part of the slot **25** is between the light bulb **27** and resistor **29**. The value of resistane produced thereby is directly related to the amount of light received from the light bulb **27**, which amount of light is controlled by the shape of slot **25**. The circuit is arranged such that by initially introducing a small amount of light to resistor **29**, the resistance therein remains high and only a small amount of current output will flow through the circuit **30**. The small current output passed, when connected to a household lamp **34**, will produce only a low level of illumination therein. The amount of light passage from light bulb **27** to resistor **29** is varied from lesser to greater passage by appropriately forming slot **25**, such that the narrowest slot dimension, such as slit **25***a*, FIG. **2**, is initially turned between the bulb and resistor. As the slot **25** is continuously turned, exposing more slot area between the light bulb **27** and resistor **29**, the resistance output from resistor **29** is lowered, resulting in an increased current output from circuit **30**. Shown in FIG. **2**, the sides of slot **25**, from the slit **25***a* beginning slant apart, increasing the open area therebetween to pass more light therethrough. Continued turning of cylinder **19**, therefore, gradually rotates the more open portions of slot **25** in between bulb **27** and resistor **29**, thereby gradually increasing the amount of light passed proportionally increasing the current output from circuit **30**.

The current output, produced through the resistor **29**, is connected by wires **31** to the electrical receptacle **13** mounted in the face **11***a* of housing **11**. Receptacle **13** is adapted to receive a standard electrical plug **32** that is preferably connected by wire **33** to the lamp **34**. As lamp **34** emits light in proportion to the current received from circuit **30**, when the cylinder **19** is finally turned such that the slot **25** is turned past resistor **29**, the current passing through circuit **30** is cut off. The arrangement of the slot **25** thereby changes, with time the intensity of lamp **34** to simulate a natural sunrise. Continued turning of cylinder **19**, of course, moves slot **25** out from between bulb **27** and resistor **29** to again cut off voltage flow through circuit **30**. It will be apparent that the cut off can be rather abrupt or can provide a gradual dimming and eventual cut off of the lamp, depending on the shape of the end **25***b* of slot **25** opposite to the slit end **25***a* thereof.

The cylinder **19**, connected through tooth **24** to one of the teeth *a*, rotates with dial **12** and blocks light transmission between the fixed bulb **27** and resistor **29** for a 24-hour period, unless, using tab **23**, the cylinder **19** is repositioned with respect to dial face **12**.

Input electrical energy is supplied to the clock arrangement **10** through a conventional electrical plug **35** mounted through the back **11***b* of housing **11**. Plug **35** can be inserted into a standard room electrical outlet to suspend the clock arrangement therefrom.

A preferred circuit arrangement of the present invention is shown in FIG. **3**. Shown therein, the clock motor **16**, light bulb **27**, the light sensitive resistor **29**, and the circuit components associated therewith are all connected in parallel to a power source shown as 110 volts AC. A portion of cylinder 19 is schematically shown, FIG. 3, positioned between the light bulb 27, and a schematic of the light sensitive resistor 29. The light sensitive resistor 29 is shown to be variable with its value of resistance, as already described herein, determined by the amount of light striking thereon. Two conventional resistors 37 and 38 are shown in FIG. 3 connected in series with tap arm 36 of the light sensitive resistor as a voltage dividing network that reduces the voltage applied to the light sensitive resistor 29. A conventional resistor 39 is connected in series with, and parallel to capacitors 40 and 41, which capacitors intersect the circuit on either side of the resistor 39. The resistor 39, and capacitors 40 and 41, all constitute a phase shift network capable of controlling variations in resistance across the light sensitive resistor 29 to produce an alteration in the time that a bilateral silicon controlled triac rectifier 42 will conduct for each cycle of the voltage wave applied to it.

An inductor **43** is included in parallel arrangement with the phase shift network to reduce high frequency transients and to cut down on spurious electromagnetic radiation that could cause static interference in nearby radios, etc.

The preferred timer and circuit arrangement herein described is intended to provide a quiet, long lasting control as a current supply for a standard type illuminating lamp as a variable brilliance alarm. By appropriately shaping the slot through which light is passed, a desired pattern of light brilliance can be obtained from the lamp, which lamp will not flicker as a result of wear of mechanical rheostat wipers or others like mechanical components.

Although a preferred form of my invention has been herein disclosed, it is to be understood that the present disclosure is made by way of example and that variations are possible without departing from the scope of the hereinafter claimed subject matter, which subject matter I regard as my invention.

I claim:

1. A device for producing an electrical current output that varies with time

a housing;

a time indicator mounted with said housing, so as to turn with the passage of time;

means for turning said time indicator with the passage of time;

programmer means arranged to be movably positioned with respect to said time indicator for initiating an energy transfer, said programmer means comprising

a cylinder,

a shaft journaled through said cylinder, which shaft is secured on one end to the time indicator and is turned to reflect the passage of time,

means for releasably connecting said cylinder to said time indicator,

a light source positioned within said cylinder, and

a slot formed through the wall of said cylinder, said slot being of gradually increasing size in the direction of rotation of the cylinder;

variable resistance means energized by operation of said programmer means for producing a value of resistance that varies with movement of said time indicator, said variable resistance means being positioned opposite to the light source and such that the cylinder rotates between the light source and the variable resistance means;

an electrical circuit means that includes said variable resistance means for passing an electrical current therethrough that varies with the resistance value of said variable resistance means;

a source of electrical energy connected to said electrical circuit means; and

an electrical outlet connected to said electrical circuit means.

2. A device for producing an electrical current output that varies with time as recited in claim **1**, wherein the variable resistance means comprises

a light sensitive resistor arranged to be contacted by light passing through the slot during rotation of the cylinder.

3. A device for producing an electrical current output that varies with time as recited in claim **1**, wherein the programmer means further includes

a rack of teeth arranged on the time indicator;

a tooth means extending from the cylinder, for engaging said rack of teeth;

means for resiliently biasing said tooth means into engagement with said rack of teeth; and

means for disengaging said tooth means from said rack of teeth.

4. A device for producing an electrical current output that varies with time as recited in claim **3**, wherein the means for disengaging the tooth from said rack comprises

an arm carrying said tooth secured to the cylinder and extending to a point outside the housing.

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