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[54] **CLOCK ACTUATED AWAKENING DEVICE**

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

[58] **Field of Search**.....58/16, 19, 21, 38, 58/50, 152 B, 21.12, 21.11, 21.13, 21.14

[56] **References Cited**

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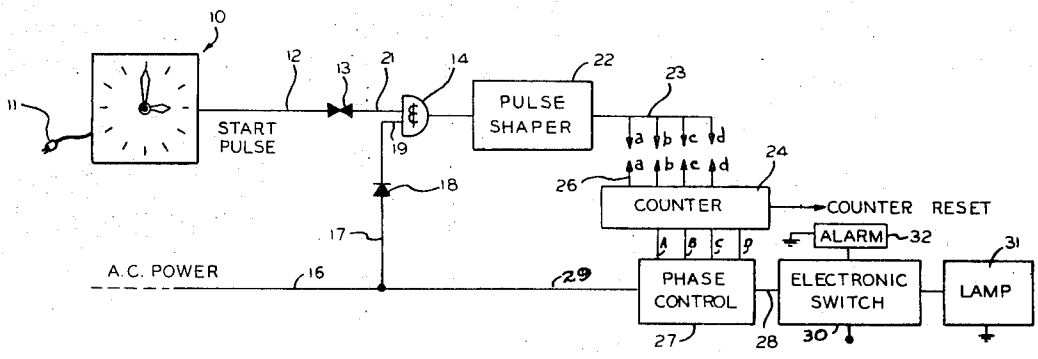
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Assistant Examiner—Lawrence R. Franklin
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[57] **ABSTRACT**

A clock actuated awakening device that gently rouses a sleeper by increasing the power to a lamp as a function of time, thereby increasing the intensity of the light to simulate the sunrise. The intensity of the light is increased either mechanically or electronically.

11 Claims, 4 Drawing Figures



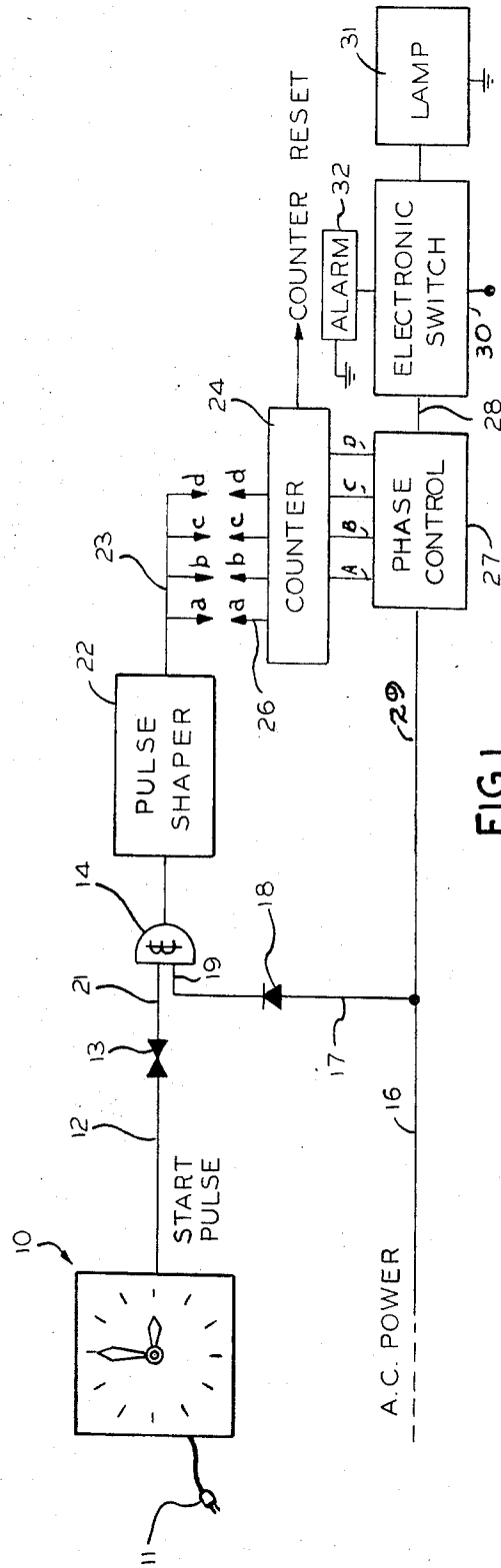


FIG. 1

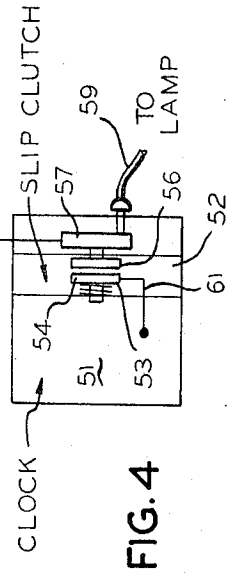


FIG. 4

FIG. 3

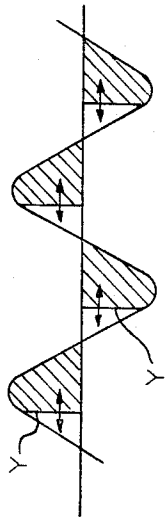


FIG. 2

CLOCK ACTUATED AWAKENING DEVICE

The invention is concerned with "alarm" clocks and more particularly with clock actuated awakening devices.

At one time, man arose with the sunrise. Awakening at that time was a gradual one. As the light from the rising sun increased people were awakened. Advances in civilization have resulted in people being jarred awake by clanging bells, irritating buzzers, or raucous radio noises. To overcome this "alarm" type awakening, there has been many devices introduced in the market place to vary the level of the noise generated by the alarm. Thus, to begin with, the alarm is actuated to provide a relatively soft noise and gradually the noise of the alarm increases in an attempt to gently awaken the sleeping party. However, a more natural method of awakening people is by increasing the intensity of light in the sleeper's room from a low level to a higher level. Accordingly, an object of this invention is to provide a new and unique clock actuated awakening system.

A more particular object of this invention is utilization of an ever-increasing light intensity to gradually awaken a sleeping person.

Still another object of this invention is to provide means for increasing the power to a lamp as a function of time to gradually increase the intensity of the light provided by a lamp and to thereby simulate sunrise.

Another object of this invention is to utilize the clock actuated circuit in combination with a high intensity lamp for controlling the power going to the lamp on an ever increasing basis as a function of time.

A more general object of this invention is to provide the means for continuously increasing power to a lamp to be used for awakening a sleeping person.

In accordance with one preferred embodiment of this invention a power control means is provided, the output of which is an increasing power as a function to time. The power control means is initiated by a pulse from the clock. The output of the power control means provides the power for the lamp to cause the lamp to gradually increase in light intensity thereby awakening the person in a manner simulating the natural sunrise. The power control means can either be electronic or mechanical and can either operate a regular lamp or a high intensity lamp.

Other objects and features of this invention will now be explained in detail with the aid of the accompanying drawings wherein:

FIG. 1 shows an embodiment of the invention using electronic means for controlling the power provided to a lamp;

FIG. 2 is a graphic showing of the control operation of the phase control unit of FIG. 1;

FIG. 3 shows a high intensity lamp circuit wherein the power to the lamp is controlled as a function of time; and

FIG. 4 shows a mechanical means for controlling the power to the lamp as a function of time.

As shown in the drawings, means including clock **10** are used to initiate the awakening process. The clock is shown having a power plug **11** for connecting the clock to a regular house power source. A lead **12** from the clock is shown leading to contacts **13**. The closure of the contacts occurs in any well known manner responsive to the clock mechanism arriving at a certain preset time, for example, seven o'clock. The closure of the contacts **13** initiates the operation of means such as a power control unit, be it mechanical or electronic, for providing an increasing power as a function of time.

In FIG. 1 an electronic power control unit is shown to provide increasing power as a function of time. The power control unit of FIG. 1 uses a gate means **14** to control the response to the closing of contacts **13**. The gate **14** is actuated by the combined signals received at the closure of contracts **13** and from the rectified half wave pulse received from the AC power line **16** through lead **17** and diode **18** to input **19** of the gate **14**. The input **21** of the gate is the path for receiving the signals resulting from the closure of contacts **13**. Means such as pulse shaper **22** provides a usable series of pulse responsive to the beginning and end of every half cycle received from diode **18**.

The pulse shaper **22** can be any well known circuitry utilized for providing pulses at the beginning and end of each half cycle. The pulse shaper **22** is shown having output **23** that can provide time displaced pulses at *a*, *b*, *c*, or *d*. Thus, the outputs *a*, *b*, *c*, or *d* vary in a timed sequence as selected by controls (not shown) on the pulse shaper **22**. The output of the pulse shaper **22** is fed into a counter **24**. The counter **24** may be any well known binary type counter that is set to give an output after a certain specified number of pulses received at its input **26**.

The plurality of leads A, B, C, or D, from the counter indicate output signals provided after different number of pulses. Thus, for example, output A is energized responsive to two pulses, B to four pulses, C to six pulses and D to eight pulses. The outputs A, B, C, D are all connected to phase control circuit **27** which contain well known circuitry for varying the phase of the power at the output **28** of the phase control unit. The input power to the phase control unit is regular AC power provided over lead **29**.

The phase control unit operates responsive to the input received from the counter to vary the phase and consequently the amount of power supplied at output **28** as a function of the number of pulses counted by the counter. For example, the phase control unit **27** is set to initially operate responsive to a signal received at the A input of the phase control unit. Unit **27** thus operates to vary the phase of the power received or supplied at output **28** responsive to the two pulses counted by counter **24**. Then the power supplied is the R.M.S. power obtained from the left side of the vertical line Y of FIG. 2. Therefore, a relatively small amount of R.M.S. power is initially provided to operate the electronic switch **30**. Switch **30** is a regular power transistor switch operated to provide the gradually increasing power input to the lamp **31**.

Subsequently the counter operates to provide an output at B after four pulses. Consequently the vertical line Y of FIG. 2 is shifted to the right and greater amount of power is provided from output **28** through switch **30** to lamp **31**.

On the next cycle the count necessary to provide an output from the counter is again increased. This process continues until the lamp is provided full power and thus operates at full intensity.

Therefore, by using the different outputs of the pulse shaper circuit in a timed sequence in conjunction with the different outputs of the counter, the R.M.S. value

of the output of the phase control circuit is varied as a function of time. If the awakening unit is not switched off after a predetermined period of time, the electronic switch **30** activates an audible alarm **32**.

In FIG. **3** an alternative arrangement using a high intensity lamp is shown. The AC power is connected to an input transformer T1 and is fully rectified at the output of that transformer by a full wave diode bridge D1. The output of the diode bridge goes through a transistor switching circuit indicated generally as **33** to the lamp circuit **34**. The transistor is shown as a normally non-conducting NPN transistor Q1. The base **36** of the transistor Q1 is shown held above ground by regulator means such as zener diode **37**.

The emitter **38** of the transistor is connected to the lamp **34** through a lead, such as lead **39**. The collector **41** of the transistor is connected to the output of the diode bridge D1 comprised of diodes **42, 43, 44** and **46** through lead **47**.

The power level of the output of the bridge at lead **47** is increased by a pulse input received from a pulse shaper circuit, such as, for example, circuit **22** of FIG. **1**. The output **23** of the pulse shaper **22** is coupled through resistor R1 that is held above ground by zener diode **48**. The combination of signals from the pulse circuit **22** and the diode bridge D1 passes through diode **49** into integrator circuit **51** comprising capacitor C1 and resistor R2.

A biasing resistor R2 switches transistor **91** to conduct responsive to the initial pulses. That occurs when the voltage in capacitor C1 is above the regulated voltage provided at the junction of resistor R2 and the zener diode **37** so that the base **36** of the transistor is positive with respect to the emitter **38**. The pulses then continuously add to the voltage at the top end of the capacitor C1 to provide an ever increasing light intensity from lamp **34**.

It should be understood that many other types of circuitry can be used to provide the ever increasing light intensity. For example, an oscillator could be used in place of the gate **14** and the pulse shaper **22**. The output of the oscillator could be used in conjunction with a thermistor or other type of control switching semi-conductor to provide an ever increasing power as a function of time and thereby provide an ever increasing light intensity as a function of time.

FIG. **4** shows a mechanical method of providing this power-time function. More particularly, the clock is depicted in FIG. **4** by block **51**. Means such as a slip clutch is generally shown at **52** and is placed in operation when a latch schematically shown as **61** is released by the clock mechanism to enable spring **53** to bring clutch plate **54** into abutting contact with clutch plate **56** to rotate a variable resistor **57** to provide varied power to the lamp from input lead **58** through the output lead **59**. After the party is awakened by the lamp he would then reset the latch which would automatically turn clutch plate **56** and variable resistor **57** back to its starting point where a minimum amount of power is provided to the light. The variable resistor **57** could of course be a variable transformer.

While the principles of the invention have been described above in connection with specific embodiments, it is to be understood that this description is made only by way of example and not as a limitation on the scope of the invention. Therefore, the appended claims are to be construed to cover all equivalent structures.

I claim:

1. A clock awakening system comprising:

a clock mechanism, lamp means for selectively providing light,

a source of electric power to energize said lamp means,

power control means for controlling said electric power,

means operated responsive to the clock mechanism for providing a start signal,

said start signal initiating the operation of said power control means,

said power control means providing an increasing power output as a function of time, and

means for connecting the output of said power control means to the lamp for providing light of increasing intensity for awakening a sleeping person.

2. The clock awakening system of claim **1** wherein the means operated responsive to a clock signal comprises normally open contacts that are closed to complete an electric circuit to furnish said start signal.

3. The clock awakening system of claim **1** wherein said power control means comprises means for providing pulses as a function of the power cycle,

counter means for counting said pulses, and

means for providing power as a function of the number of pulses wherein more power is provided when a greater number of pulses are counted.

4. The clock awakening system of claim **3** wherein said pulse means comprises gate means operated responsive to the simultaneous receipt of the start signal and to a rectified AC power signal for providing a pulse initiating signal at the beginning and at the end of every cycle of said AC power,

pulse shaper means for providing a series of pulses responsive to said pulse initiating signals received from said gate means,

counter means for providing a different output signal responsive to different numbers of pulses, and

phase control means operated responsive to the different output signals received from said counter for providing different power output signals, wherein the power of the output signal increases in accordance with increased number of pulses received by the counter means.

5. The clock awakening system of claim **4** wherein the output of the phase control means operates an electronic switch, and audible alarm means operated responsive to the operation of said electronic switch a predetermined amount of time after said lamp is operated at high intensity.

6. The clock awakening system of claim **1** wherein said lamp means comprises a high intensity lamp.

7. The clock awakening system of claim **6** wherein pulse generating means are provided to control the input of power to said high intensity lamp, and

wherein said power control means for controlling the power input to the lamp operates responsive to said pulses.

8. The clock awakening system of claim **7** wherein said power control means includes integrator means between said power source and said lamp.

9. The clock awakening system of claim 1 wherein the means operated responsive to a clock signal comprises slip clutch means operated responsive to said clock mechanism reaching a certain predetermined time to cause the plate of said slip clutch to engage.

10. The clock awakening mechanism of claim 9 wherein variable resistor means are operated by said slip clutch to provide increasing power to said lamp as a function of time after said start signal.

11. The clock awakening system of claim 9 wherein variable transformer means are operated responsive to the engagement of said clutch plate to provide an increasing power to said lamp as a function of time.

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