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(54) **Timed power saving device.**

(57) Device for decreasing electrical power consumption in inductive or resistive loads and particularly for decreasing electrical power consumption in public lighting systems. Based on the elimination of the sinusoidal half-wave and on the continuity through the action of a fixed or variable resistor, the saver overcomes the disadvantages of present devices, may be used in any type of lamp or resistive or inductive load, has programmable timing, extends the life of lamps, may be connected to a lamp or to a group of lamps, its cost is low, saves power and its size is small. In one embodiment the invention provides an electrical diagram of a first embodiment of the timing and power saving device for discharge lamps (Hg steam, sodium steam, metallic steam, etc.) comprising an electronic timer 1, connected in parallel to a half-wave rectifying diode 2 and four fixed value resistors 3 arranged parallel therebetween and selectable by switches 4, all connected to a phase conductor 5, and in series with a resistive load 6, normally a lamp or a group of lamps which is arranged in parallel to a conductor 7, which is of neutral or of another phase.

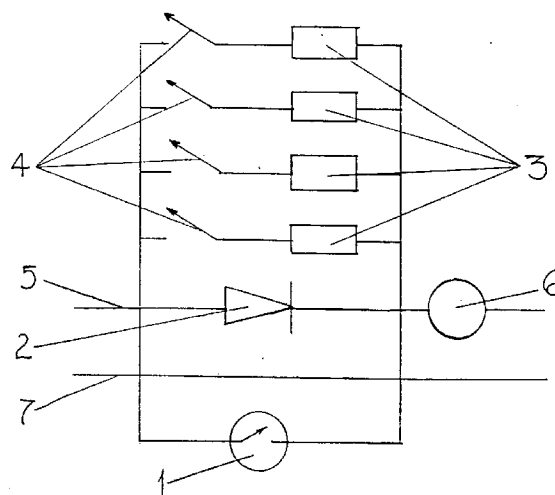


FIG 1

The instant invention relates to an electronic device for saving electrical power, to be used in lamps of any kind or for resistive or capacitive loads, by decreasing the electrical current feeding the loads, at pre-determined time periods, by means of timing, sinusoidal wave rectifying and reducing the power.

As already known in the art of electric and electronic arrangements, the decrease in electrical current supplying lamps is effected by means of thermostats, which decrease light intensity, through partial dissipation of the current in a resistor. These devices have several disadvantages: they do not save power, generate heat and have no timing features.

Afterwards, dimmers were developed which decrease light intensity of the lamp by decreasing the power supply voltage. Their use is however limited to incandescent lamps, and they are relatively expensive and have no timing features.

It is an object of the invention to provide a power saver which overcomes these disadvantages.

Accordingly a first aspect of the invention provides a timed power saver, comprising an electronic timer, connected in parallel with a half-wave rectifying diode and both connected to a phase conductor, the timer and diode being connected in series with a resistive or an inductive load and also in parallel with a second conductor, which is either neutral or of another phase.

The timed power saver of the invention was developed in order to overcome the disadvantages of present systems, since the device may be used in any kind of lamp (Mercury vapour, incandescent, fluorescent, sodium vapour, multi-vapour, halogen, etc.), on resistive loads and capacitive loads since timing may be programmed, therefore the time of power decrease may be predetermined; it extends the life of reactances and lamps, may be connected to a lamp or to a group of lamps, has low cost, saves electrical power and is of small size.

Advantageously the power saver includes at least one further resistor connected in parallel to the timer and the diode. The resistor may be a variable resistor or a plurality of fixed value resistors connected in parallel and individually selectable by one or more switches.

The invention will be described further, by way of example, with reference to the accompanying drawings in which:-

Fig. 1 is a circuit diagram of a first embodiment; and

Fig. 2 is a circuit diagram of a second embodiment.

Figure 1 is an electrical diagram of a first embodiment of the timing and power saving device for discharge lamps (Mercury vapour, sodium vapour, metallic vapour, etc.) comprising an electronic timer 1, connected in parallel to a half-wave rectifying diode 2 and four fixed value resistors 3 arranged parallel therebetween and selectable by switches 4, all connected to a phase conductor 5, and in series with a resistive load 6, normally a lamp or a group of lamps which is arranged in parallel to a conductor 7, which is of neutral or of another phase.

Figure 2 is an electrical diagram of a second embodiment of the timing and power saving device at inductive loads, comprising an electronic timer 1, connected in parallel to a half-wave rectifying diode 2 and to a variable resistor 8, all being connected to the phase conductor 5 and in series with an inductive load 9 and with the conductor 7 which is of neutral or of another phase.

Operation of the power saving device of the invention is based on the elimination of the half-wave by diode 2 and, through the action of two resistors 3 or a variable resistor 8, the electrical power supply being decreased during the discontinuity of the sinusoidal wave and, consequently, the power of the resistive or inductive load is also decreased.

Therefore, during 50% of the time period, the electrical current will be reduced to variable values, depending on resistors 3 or 8, between 1 and 99% of the normal current.

When the timer 1 is disconnected, the electrical current passes through said diode 2 and through resistors 4 or 8, actuating the saving system.

When timer 1 is connected, the current bypasses diode 2 and the two resistors 3 or 8 and normally supplies directly the load 6 or 9.

Diodes 2 used may be negative or positive diodes, which should be equally mixed thus avoiding the electrical power supply unbalance.

In the case of incandescent or mixed lamps, there is no need of compensating the rectified half-wave and, consequently, resistor 3 or 8 is not required, the remaining parts of the configuration being maintained.

Upon practical tests, and comparing the developments with and without saver, the results included in Table (A) are obtained.

On the basis of the relationships indicated in said table, the dimensioning is extrapolated for loads of different powers, such as sodium vapour discharge lamps, metal vapour discharge lamps, etc.

The energy loss due to the use of two resistors 3 or 8 is estimated between 5 and 17W in the examples.

The power saving obtained with the device of the instant invention is variable as a function of the timer programming, taking as an example a public lighting system with a lighting level X and operating during 10 hours a day, where consumption will be equivalent to 10 h.X/day. If the saver is programmed for acting after

5 hours from lit, limiting the load 50%, the saving will be $5 \text{ h.X} + 5 \text{ h.1/2 X} = 7 \frac{1}{2} \text{ h.X}$, i.e. a power saving of 25%.

TABLE (A)

Type of lamp	Power of lamp (W)	DDP (V)	Resistor 3 (ohms)	Power dissipated by resistor (W)	Current WITHOUT Saving device (A)	Current WITH Saving device (A)	Savings %
Hg vapour	125	35	165,00	7,43	1,250	0,625	50
Hg vapour	250	35	110,00	11,14	2,500	1,250	50
Hg vapour	400	35	73,15	16,75	5,000	2,500	50
Incandescent	75	110	-	-	0,259	0,125	50
Mixed	160	110	-	-	1,000	0,500	50
Mixed	250	110	-	-	2,250	1,125	50

Claims

1. A timed power saver, comprising an electronic timer (1), connected in parallel with a half-wave rectifying diode (2) and both connected to a phase conductor (5), the timer (1) and diode (2) being connected in series with a resistive or an inductive load (6, 9) and also in parallel with a second conductor (7), which is either neutral or of another phase.
2. A power saver as claimed in claim 1 wherein the timer (1) and diode (2) are both further connected in parallel to at least one resistor (7, 8).

3. A power saver as claimed in claim 2, wherein the resistor is a variable resistor (8).
4. A power saver as claimed in claim 2, wherein there are four fixed value resistors (3) which are individually selectable by switches (4).
5. A timed power saver as claimed in claim 1, using a resistor or a variable resistor of an incandescent or mixed lamps.

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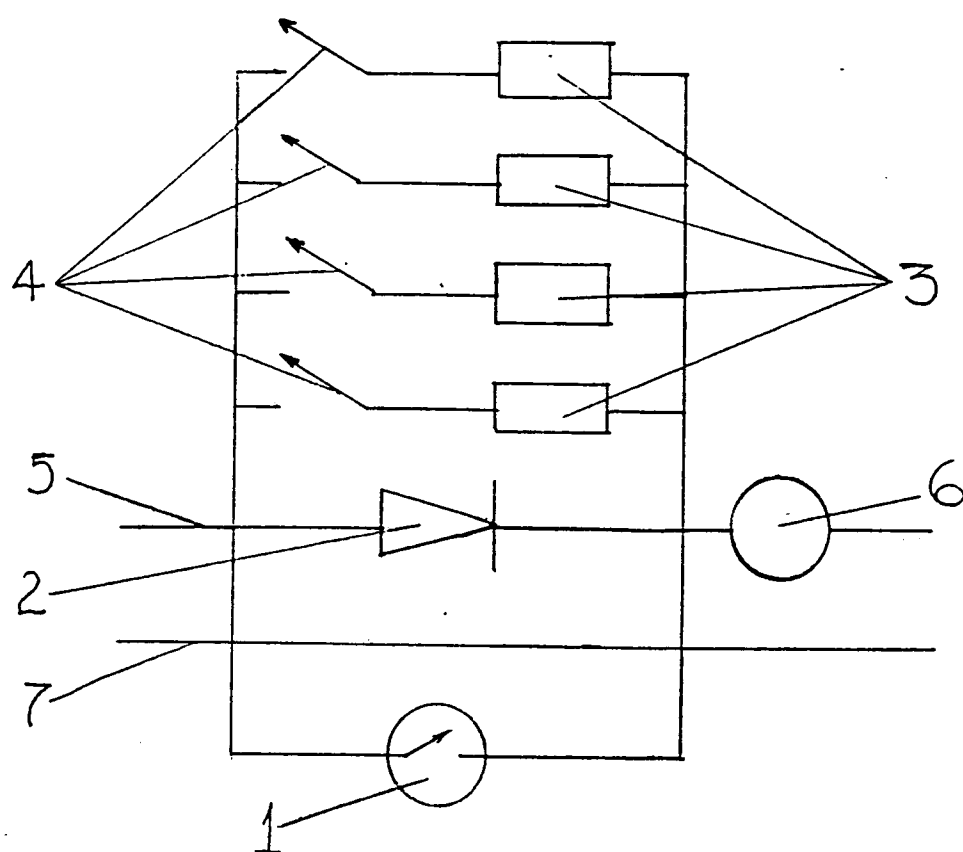


FIG 1

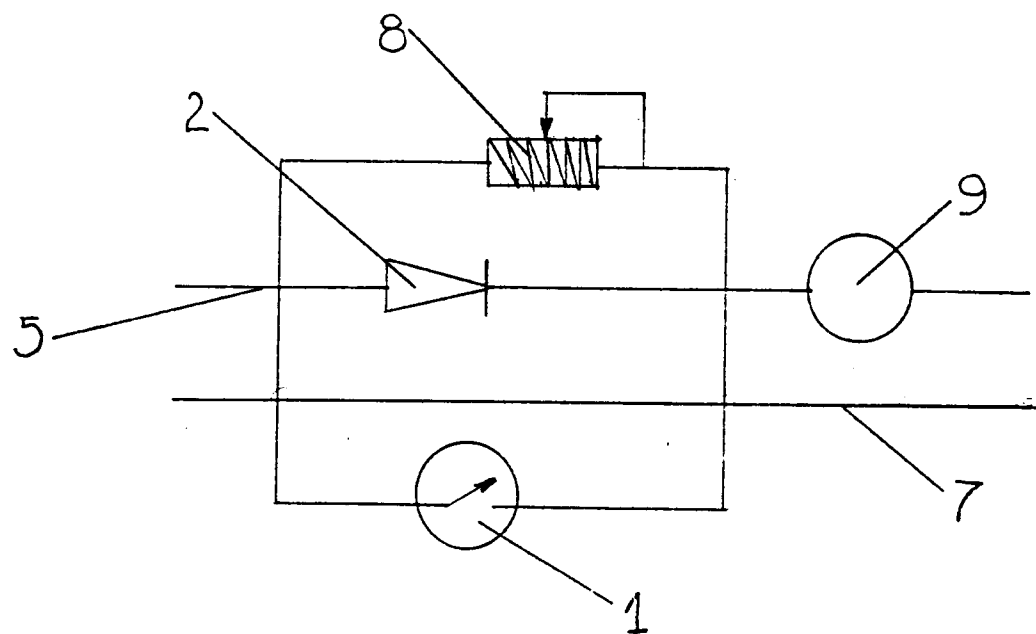


FIG. 2



European Patent
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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 92307296.1
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	<u>EP - A - 0 143 884</u> (AREX) * Abstract; fig. 6 * --	1	H 05 B 37/02 H 05 B 41/36
A	<u>DE - A - 3 438 003</u> (PHILIPS) * Abstract; fig. 1-4 * ----	1-3	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) H 05 B 37/00 H 05 B 39/00 H 05 B 41/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 17-12-1992	Examiner TSILIDIS
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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