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Electrolux Patentavdelningen, S-105 45 Stockholm (SE)(54) **Indicator in an air filter.**

(57) An arrangement for indication of the need to clean a filter, e.g. in a stove hood, has a time circuit actuated by a push button during at least 0,5 second, whereby a capacitor is charged. After the push button has returned to rest a discharging of the capacitor takes place during some 4-5 minutes, simultaneously an E-cell is charged by some 1 mA. When the discharging of the capacitor is finished the E-cell is connected in a circuit with an opposite current direction and an amperage, which is proportional to the current of the ventilator motor, and a signal lamp is put out. When the ventilator motor is not in duty, nothing is going on in the E-cell, as no current passes. A condition for making the cell work is that the voltage on it exceeds a step of some 1 V. This is the voltage step which can be used just for the reason that no reduction of time to the next cleaning shall take place when the motor works at minimum rpm. When finally the E-cell is discharged a signal lamp indicates «clean the filter».

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Indicator in an air filter

The present invention relates to an arrangement for indication of the need of cleaning of an air filter for instance in a stove hood. After some time of working the cleaning ability of the filter is reduced because of pollution of the filter and the arrangement shall then indicate the need of cleaning of the filter.

5 It is priorly known to use a timer for measuring the working time and, after a predetermined period, to make the timer give a signal. As a ventilator can work with different degrees of capacity and pollution of the filter is dependent thereon, it is impossible to determine a proper time of working of the filter between the cleaning procedures. In order to have an equivalent of the time passing from one
10 cleaning to another it is necessary to consider the capacity of the ventilator on each occasion. As a measure of the capacity of the ventilator the current of the motor can be used, the arrangement then constituting a time circuit which is programmed by the current of the ventilator motor, in other words, when the ventilator motor is working at the highest capacity an indication is received after
15 for instance 30 hours, when the ventilator motor is working at half the capacity the indication occurs after for instance 50 hours, and when the ventilator is adjusted to the lowest rpm no time counting at all takes place owing to the fact that in this position no pollution will fasten to the filter as the flow speed of air is then so low that the pollution will follow the air through the filter without the time limit for
20 cleaning getting nearer.

By the present invention it is presented a circuit arrangement with a time circuit where the main component is constituted of a time summing galvanic cell comprising an anode and a cathode and an electrolyte therebetween. By charging
the cell a certain current passes during a time period in the direction anode -
25 cathode whereby a certain quantity of anode material, in this case silver, is transferred to the cathode which e.g. is made of gold. If the current is reversed

through the cell the silver is transferred back to the anode, but when no more silver remains and gold will not be dissolved, the cell ceases conducting. The voltage over the cell during the electrolysis is about 1 V but increases when the cell is discharged. The transient voltage then occurring can in an arrangement with
5 components be used for emitting a signal. A realization of this principle is featured as the arrangement according to the characterizing clause of claim 1.

An embodiment of the invention is described in the following with reference to the accompanying drawing which shows a wiring diagram of the arrangement of the invention.

10 When the arrangement is connected to the mains an AC-voltage is supplied on the input 10, 11 and applied via a series resistor 12, a control 13 and a switch 14 to a ventilator motor 15. From the voltage input 11 current is supplied to a time meter, the substantial part of the arrangement. The voltage is rectified by a rectifier 16 and limited by a series resistor 17 and a Zener diode 18 which via a
15 return wire 19 is connected to the connector 10 of the input. A capacitor 20 keeps a DC-voltage nearly constant at 10 V on a wire 21.

In the circuits shown in the Figure a current passes between the wires 21 and 19 through i.a. a resistor 22 and a transistor 23 which has a control current via a resistor 24 and a diode 25. A thyristor 26 is then connected between an LED 27 and
20 a connection 28 between the components 22 and 23. The LED lights when the thyristor is switched on by a current to its control electrode 29.

When the switch 14 is closed a voltage is supplied to the resistor 12 and applied via a rectifier 30 and a resistor 31 to the base of a transistor 32 and via a rectifier 33 and a so called E-cell 34 to the connection 28. When the cell is
25 discharged it has a high resistance which causes a control current to the transistor 32 which is switched on and causes a voltage drop in a resistor 35. In this way a control voltage will arise on a transistor 36 which then switches on and makes a voltage drop in a resistor 37, whereby a control voltage is put on the electrode 29, so that the thyristor switches on and the LED lights owing to a
30 current in the circuit 21, 27, 26, 28, 23, 19.

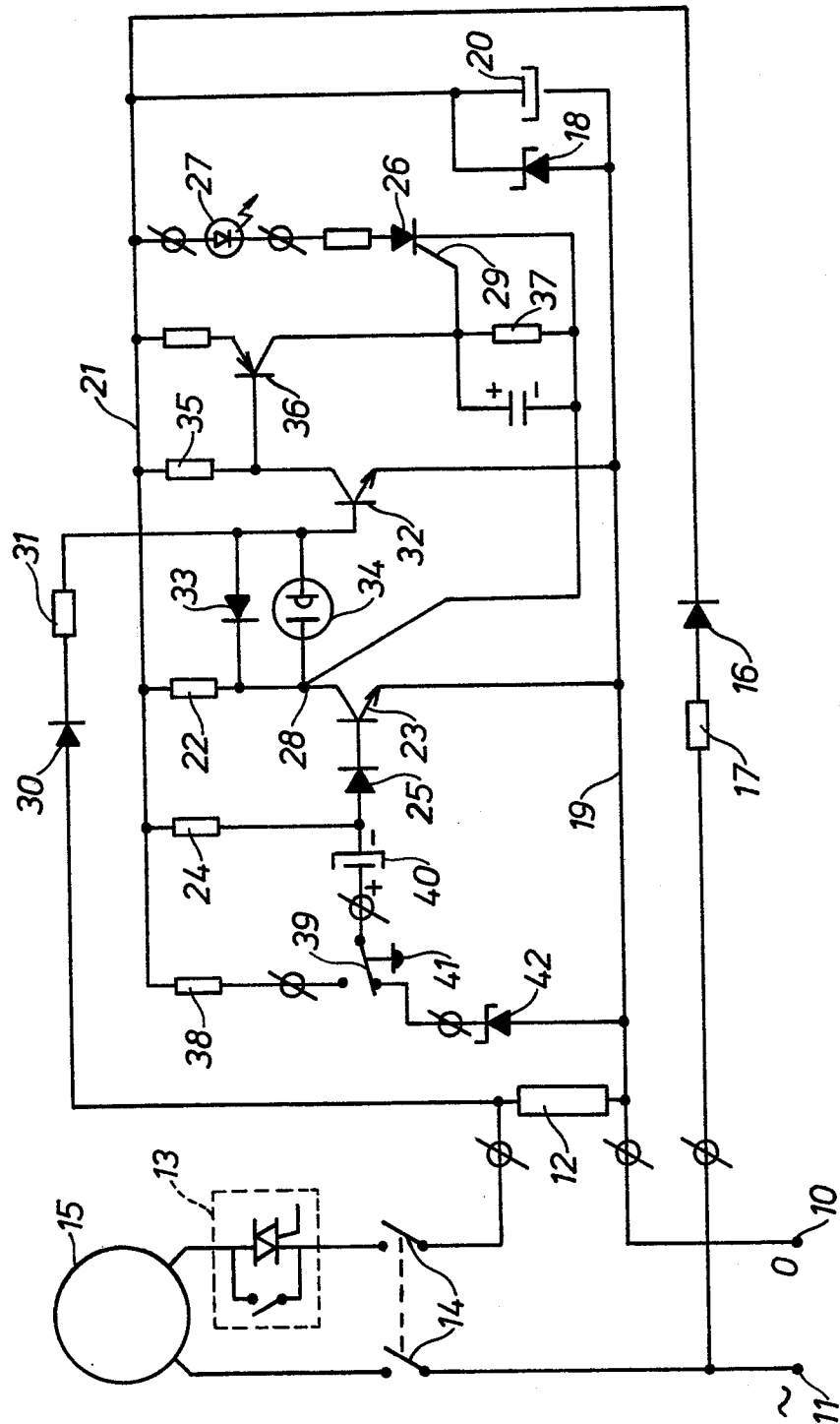
Another current circuit can be established through a resistor 38, a pulse switch 39 and a capacitor 40 when a push button 41 on the pulse switch is actuated. The current circuit is created from 21 to 38, 39, 40, 25, 23 and 19 making the capacitor 40 be charged in less than one second. After this the push button is
35 disengaged and the pulse switch is reset into the shown position. The transistor 23 will have a negative control voltage and breaks the circuits 22, 28, 23, 19 and 27, 26, 28, 23, 19. The LED 27 stops lighting. At breaking the first one of said circuits a voltage will arise in the E-cell from 28 to the base of 32. An engaging

current will pass from 21 to 22, 28, 34, 32, 19 during a period when the transistor 23 is off, i.e. while the capacitor 40 is discharged through a circuit comprising the resistor 24, capacitor 40, the pulse switch 39 and a Zener diode 42. Said period is some minutes, after which the transistor 23 is switched on and the activation
5 (charging) of the E-cell ceases. When the transistor 23 switches on and half-wave pulses corresponding to the current of the motor 15 are supplied to the E-cell via the rectifier 30, a current passes in the opposite direction through the cell which starts discharging. A certain base voltage appears on the transistor 32 which still does not conduct at this low base voltage. A condition for making the cell work is a
10 voltage in it, exceeding a step of some 1 V. This step is not reached when the ventilator works at its minimum rpm, whereby a cancellation of time summing at such rpm, as said in the introduction, will automatically occur. The discharging of the E-cell proceeds at a speed proportional to the rpm, and when the cell is totally discharged the current through it ceases and the voltage on the base of the
15 transistor 32 increases so that the transistor starts conducting in the circuit 21, 35, 32, 19. A voltage drop occurs in 35 and makes the transistor 36 switch on and, as described before, supplies a starting pulse to the thyristor 26, whereby the LED lights. This is a signal for the need of cleaning the filter, and when this is done, the push button 41 is re-activated, whereby the E-cell is re-charged, the LED put out
20 and another working period starts.

In a real embodiment of the invention applied in a stove hood the push button 41 and the LED 27 are positioned in a control panel where also other control members are gathered, however, the push button is separated so that it is not actuated during a working period by mistake. In the wiring diagram modifications
25 can, of course, be made without departing from the inventive idea. The shown circuits and components are only examples which shall not be considered definite.

Claims

1. An indicator in an air filter with a ventilator driven by an electric motor and time after time requiring cleaning and during the period between the cleanings working with a varying capacity which causes a pollution proportional to said capacity, characterized in that in the circuit of the electric motor a
5 resistor (12) forms a voltage which is a power input in a circuit of an electrolytic cell (34) having a higher voltage drop when discharged than what it has when charged and that a detecting circuit sensing said voltage drop is disposed to supply a signal when the cell is discharged.
2. An indicator according to Claim 1, characterized in that a second
10 circuit is connected in parallel with the circuit of said cell by a change-over switch (23,32) and constituting a second power input to the cell with an inversed polarity in relation to the said voltage drop.
3. An indicator according to Claim 2, characterized in that the detecting circuit is an amplifying circuit of a thyristor (26) connected in series with a
15 lamp (27) and with one branch of the change-over switch.
4. An indicator according to Claim 3, characterized in that the electrolytic cell (34) is connected to the input of the amplifying circuit.
5. An indicator according to Claim 2, characterized in that the said change-over switch is provided with a holding current circuit controlled by a
20 manually operated pulse switch (39) and a time circuit (40,24,42).





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EUROPEAN SEARCH REPORT

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Application number

EP 83 85 0114

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	DE-A-2 748 913 (NEFF) * Claim 1 *	1	F 24 C 15/20
A	DE-A-2 852 472 (SEUFFER) * Claim 1 *	1	
A	DE-A-2 816 406 (WEISS) * Claim 1 *	1	
A	CONTROL & INSTRUMENTATION, December 1972, pages 32-33, London, G.B. M.J. WOODBRIDGE: "The E-cell device - A coulometer for many applications" * Whole article *	1	
A	GB-A-2 064 104 (ELDER) * Abstract *	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
A	US-A-3 940 735 (H. KRONENBERG) * Abstract *	1	F 24 C G 01 R
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 17-08-1983	Examiner MIELKE W
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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	