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(54) A pulse generator for electrical fences

(57) A pulse generator for electrical fences of the type comprising a capacitor (6), which can be charged from a supply voltage and discharged through a thyristor (11) by means of a controllable change-over switch (9), such as in form of a diac. The discharging signal is transmitted to the fence through a transformer (T), and then to a pulse-forming element (14) in a control circuit. The pulse-forming element (14) emits a well-defined pulse each time it is supplied with a signal. This pulse is transmitted to an integrating element in form of an RC-element, which can interrupt the pulse generator when the integrated value exceeds a preset value. The resulting control circuit is more reliable than the hitherto known circuits, and it is not affected by a few error pulses because it is a question of an analogous solution.

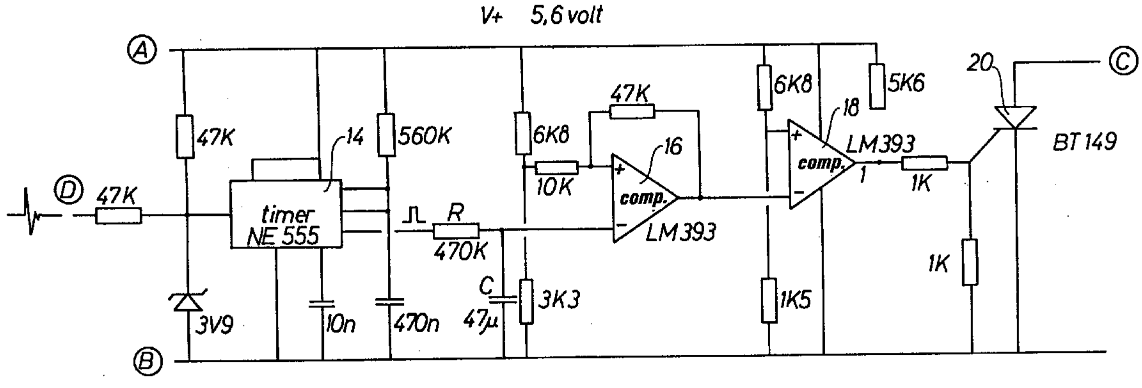

Fig. 2

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Description

The invention relates to a pulse generator for electrical fences of the type comprising a capacitor which can be charged from a supply voltage and discharged through a thyristor-like element by means of a controllable change-over switch. By a thyristor-like element is for instance meant a thyristor, a triac or a relay.

The latest provisions for fence apparatuses stipulate, however, a restriction of the number of joules allowed to be transmitted through the fence wire when the apparatus starts to emit pulses at an increased frequency. The latter can for instance be the case when a triac or a thyristor starts to trigger automatically, for instance when it has been damaged, but it may, however, also be caused by a resistance, a capacitor or another element.

A possible solution of this problem has been described in DK-PS No. 157,280 dealing with a voltage source for electrical fences. The control voltage for the thyristor element originates in this case from an oscillator with a frequency of approximately 1 Hz. This control signal can for instance be derived from the frequency of the mains by means of a suitable frequency division. Suitable measures have been taken for stopping the operation of the apparatus when the pulse frequency exceeds a predetermined value. The circuits for this purpose are digital. A digital circuit can, however, be sensitive to error pulses optionally due to strokes of lightning with the result that the apparatus may stop without suffering from a defect.

The object of the present invention is therefore to provide a pulse generator of the above type which is not sensitive to a few error pulses.

A pulse generator of the above type is according to the invention characterised in that the discharging signal is emitted to a pulse-forming circuit (one shot) which emits a well-defined pulse each time it receives a signal, said pulse being transmitted to an integrating element and a succeeding comparator which can switch off the pulse generator when the integrated value exceeds a pre-set value. The resulting control circuit is more reliable than the hitherto known circuits, and it is not affected by a few error pulses because it is a question of an analogous solution.

Moreover, according to the invention the integrating element may be formed by an RC-element. Based on the time constant of this RC-element it is possible to determine the inertia of the circuit and consequently also the necessary degree of insensitivity thereof towards external pulses, such as strokes of lightning.

According to a particularly advantageous embodiment, the RC-element is formed by a resistance of 470 kΩ and a capacitor of 47 μ.

The invention is explained in greater detail below with reference to the accompanying drawings, in which

Figure 1 illustrates a known pulse generator for electrical fences, and

Figure 2 illustrates an associated control circuit.

The pulse generator shown in Figure 1 is supplied from the mains with an AC-voltage of 230 V. This AC-voltage is transmitted to a voltage doubler stage employing a capacitor 1 of 3 μ and two diodes 3, 4. The voltage doubler stage emits a DC-voltage of 650 V across a capacitor 6 of 35 μ.

An associated pulse control circuit is formed by a capacitor 7 of 10 μ connected to the voltage doubler stage. The capacitor 7 is charged through a potentiometer 8 and a controllable change-over switch in form of a diac 9. The diac 9 detects the voltage across the capacitor 7 and triggers when said voltage has reached 32 V. The trigger voltage is transmitted to the gate electrode of a thyristor 11, which in turn discharges the capacitor 6 through the primary side of a transformer T and a coil L. A triggering is performed approximately 1 time per sec. Subsequently, a transformed voltage pulse is transmitted through the secondary side of the transformer T to the fence wire, while the coil L merely serves to attenuate the noise. Based on the voltage across the thyristor 11 it is possible to detect the operating frequency of the pulse generator. When the thyristor 11 starts to trigger automatically, such as when it has been damaged, pulses of a higher frequency appear in the point D at the output across the thyristor 11. A faulty thyristor 11 may, however, cause damages. Although it starts to trigger too soon, the capacitor 6 is nevertheless completely charged from the mains due to the rather low impedance. Therefore the capacitor 6 is nevertheless almost completely charged. In other words, the fence can be supplied with too much energy, which is no longer allowed. A pulse depending on the fence load is, however, not well-defined and cannot be integrated. Such a pulse depends on how the fence is loaded, whether it short-circuits to ground or whether much grass causes the leakage. A further factor is the capacitive load caused by the length of the connected fence wire. According to the invention the pulse element is connected to a timer 14 (one shot) in the control circuit, cf. Figure 2. The timer 14 can for instance be a NE555 and emits a well-defined square pulse each time a signal appears at D. These pulses are integrated by means of a succeeding RC-element. Based on the time constant of this RC-element it is possible to determine the inertia of the circuit and consequently the necessary degree of insensitivity thereof towards external pulses. According to a particularly advantageous embodiment, the resistance R is 470 kΩ, whereas the capacitor C is 47 μ. The latter corresponds to a time constant of 22 sec. These components render it possible to adjust the time necessary for the control circuit to react. This time determines the inertia of the control circuit and consequently the degree of insensitivity towards external pulses, such as pulses deriving from strokes of lightning which also cause pulses at D. As it is a question of an integration, extra pulses cannot have a damaging effect. Nothing but continuous alterations imply that the control circuit reacts. The integrated voltage is transmitted to a succeeding comparator 16 in form of an operational amplifier, where it is compared with a preset value determined by means of a resistance network. A hysteresis is provided in connection with this operational amplifier 16 by means of a feedback resistance in such a manner that the output of the operational amplifier is not flickering and is thereby stabilised. The output of the operational amplifier 16 communicates with a succeeding comparator 18 inverting the signal in such a manner that it is provided with the correct polarity so as to be able to trigger a succeeding thyristor 20. A triggering of this thyristor 20 communicating with the point C in Figure 1 has the effect that the network is short-circuited through a resistance 22 of 680 Ω. This resistance 22 is thermally coupled to a temperature control 24, which then interrupts the voltage supply from the mains to the pulse generator.

The control circuit is run by means of a DC-voltage of 5.6 V supplied at the connecting points A and B and resulting from a half-wave rectification of a portion of the voltage from the mains. The rectifying circuit includes a series connection of a resistance of 100 Ω, a capacitor of 100 n, a diode and a capacitor of 1000 μ, the voltage across the capacitor of 1000 μ being taken and stabilised by means of a zener diode 26 with a zener voltage of 5.6 V. The controllable change-over switch can alternatively be performed by other electronic discharging means presenting well-defined ignition or glow potentials or striking voltages.

The pulse generator is not necessarily completely interrupted when the integrated value exceeds a preset value. It is sufficient when the emitted energy per time unit is brought below a predetermined value.

Claims

1. A pulse generator for electrical fences of the type comprising a capacitor (6) which can be charged from a supply voltage and discharged through a thyristor-like element (11) by means of a controllable change-over switch (9), characterised by the discharging signal being transmitted to a pulse-forming circuit (14) (one shot), which emits a well-defined pulse each time a signal is transmitted, said pulse being transmitted to an integrating element (RC) and a succeeding comparator (16), which can interrupt the pulse generator when the integrated value exceeds a preset value.

2. A pulse generator as claimed in claim 1, characterised by the integrating element being formed by an RC-element.

3. A pulse generator as claimed in claim 2, characterised by the RC-element comprising a resistance (R) of 470 kΩ, and a capacitor (C) of 47 μ.

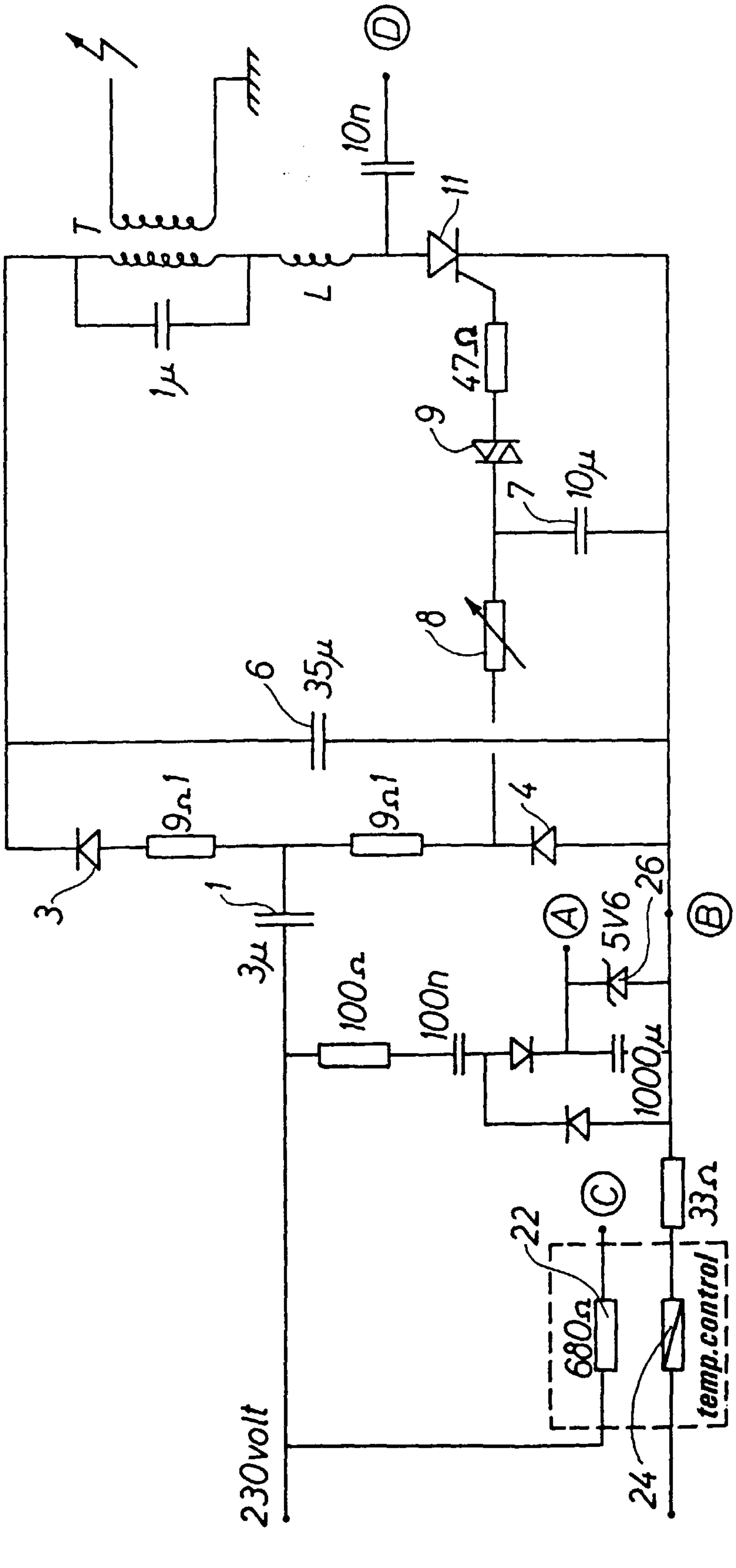
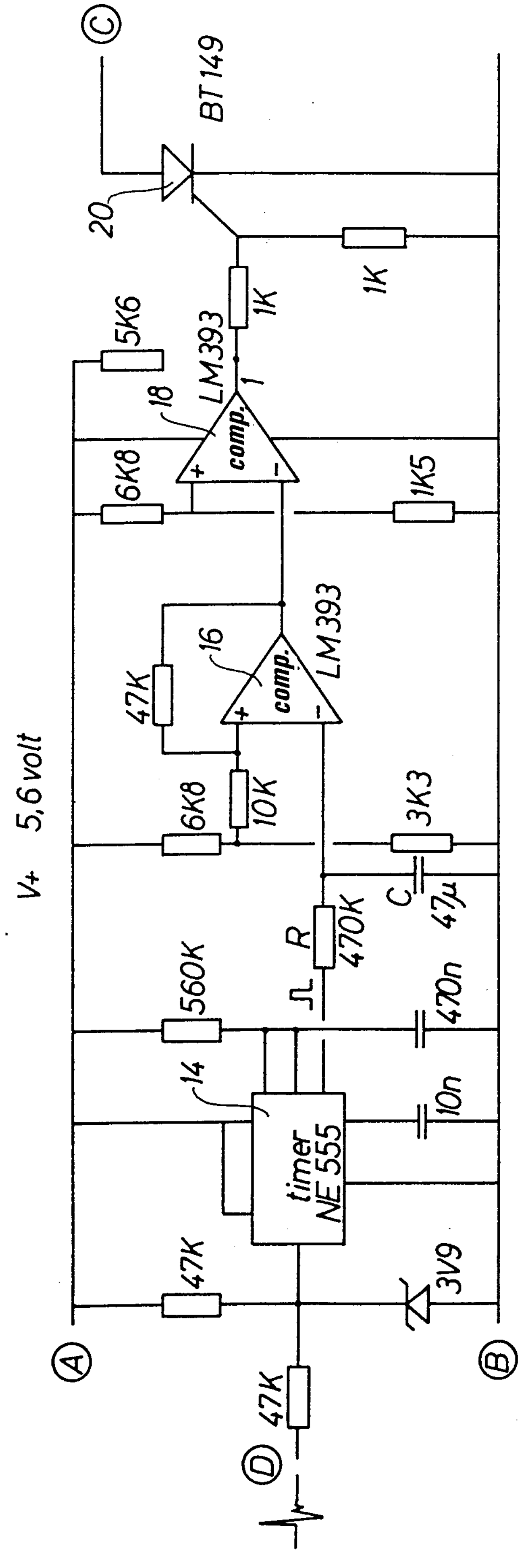

D
10n
11
T
L
1µ
47Ω
9
7
10µ
8
6
35µ
9Ω1
9Ω1
3
4
1
3µ
A
5V6
26
B
100Ω
100n
1000µ
C
22
680Ω
33Ω
temp.control
24
230volt

Fig. 1



A
B
C
D
V+ 5,6 volt
BT 149
20
5K6
6K8
18
comp.
LM393
1
1K
1K
1K5
47K
16
comp.
LM393
10K
6K8
3K3
C 47µ
R 470K
560K
470n
14
timer NE 555
10n
47K
3V9
47K

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 97 61 0051

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.6)
A	AU 574 492 B (VNI I PK I) * page 4, line 8 - line 21; figure 1 * ---	1	H05C1/04
D,A	GB 2 004 426 A (GALLAGHER ELECTRONICS LTD) * page 1, line 30 - line 78; figure 1 * ---	1	
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 101 (E-1327), 2 March 1993 & JP 04 290383 A (ROHM CO LTD), 14 October 1992, * abstract * ---	1,2	
A	DE 43 27 572 C (HORIZONT GERAETEWERK) * claim 1; figure 4 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 January 1998	Marti Almeda, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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