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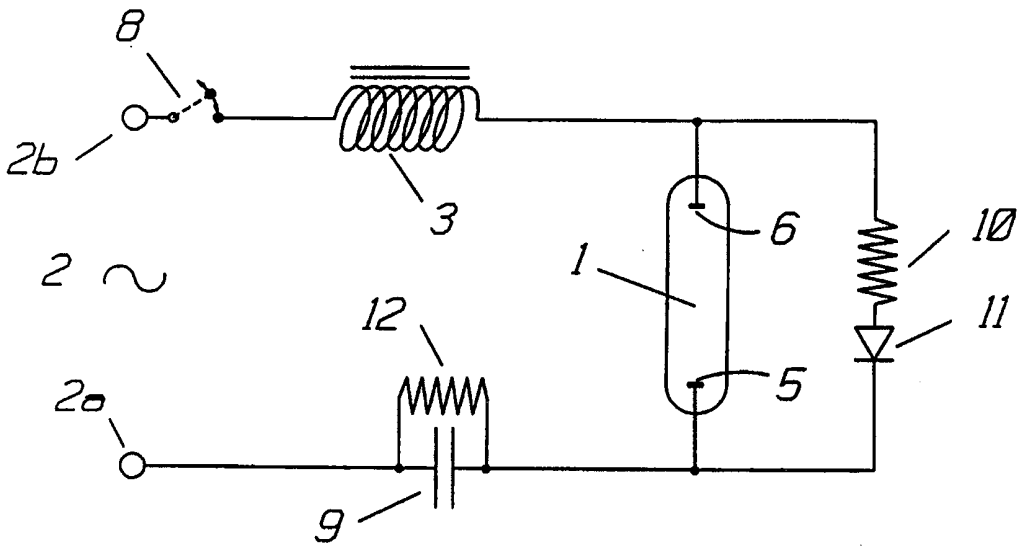
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(54) Title: IGNITOR FREE DISCHARGE TUBE LIGHTING APPARATUS



(57) Abstract

An apparatus for providing an ignition, without the use of a conventional so called "ignitor", of a discharge lamp or a discharge tube (1) of the type which comprises two spaced contact poles (5, 6) and which, for being ignited, requires that a light arc is built up between said contact poles (5, 6), in which apparatus the discharge tube (1) is connected in series in an electric circuit comprising a choke coil (3), the discharge lamp (1) and a capacitor (9), and in which the apparatus, parallely over the contact poles (5, 6) of the discharge tube (1), has a circuit which, in series, comprises a resistance (10) and a diode (11). The resistance connected parallely over the discharge tube (1) has a very high resistance, for instance between (1) and 20 kΩ. The diode (11) can be of about 1 mA. A resistance (12) can be connected parallely over the capacitor (9).

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IGNITOR FREE DISCHARGE TUBE LIGHTING APPARATUS

The present invention generally relates to a lighting apparatus of the type which is formed as a lighting source having two contact poles provided spaced from each other and between which contact poles a light arc is transmitted, generally in a gaseous medium. Lighting apparatus of the said type can be in the form of a discharge tube or a discharge lamp, like a sodium discharge lamp, a mercury discharge lamp, a fluorescent lamp, a metal halide lamp or a metal halogen lamp. The invention has been developed especially for use in discharge tubes or discharge lamps of metal halogen type, since such tubes or lamps give a light which, to a high degree, imitates natural day light, and in the following the invention will mainly be described for use in such metal halide lamps. It is, however, to be understood that the invention may as well be used in other types of discharge tubes or discharge lamps.

Lamps or tubes of the types which are of interest in the present case have so far generally been formed with an ignitor apparatus, for instance a glow discharge starter as disclosed in US 3,740,609. In many cases the starter is a transistor type ignitor, or another type of ignitor arranged to provide the high voltage which required for creating the light arc providing the lighting of the discharge lamp or the discharge tube.

The lighting voltage generally is very high, often 5.000 V or more. The ignitor apparatus generally have been formed as an ignitor comprising one or more transistors and transistorized couplings, for instance an opposite twin diode starter as shown in US 2,871,409, or an opposite zener diode starter as disclosed in US 3,986,076. The high ignition voltages may lead to damages in such transistorized ignitor apparatus, and the ignitors therefore have to be substituted rather frequently.

In order to remedy said inconvenience modified ignitors have been developed, which are formed as electronic ignitors. Such modified ignitors, however are complex and are expensive to manufacture. Therefore, there has been a need for apparatus for automatically and in a non-expensive way providing an ignition of a discharge lamp of the said type.

Thus, the object of the invention has been to solve the problem of developing an apparatus for providing an ignition of a discharge lamp or a discharge tube, which apparatus is reliable and durable, which apparatus can stand the high ignition voltages without being damaged, and which apparatus is, in front of all, simple and cheap to manufacture.

Surprisingly it has been found that a starter can be formed by a circuit which is connected directly and parallelly over the contact poles of the discharge tube and which comprises, in series with each other, a resistor having a very high resistance and a diode having a very low amperage (in its pressurised position).

According to the invention the ignitor apparatus is an electric circuit, which is series comprises a choke coil, a discharge tube or a discharge lamp and a capacitor, which ignitor apparatus is connected parallelly over the poles of the discharge lamp or the discharge tube, and which comprises a strong resistance and, in series therewith, a diode. For a discharge lamp or a discharge tube driven at an alternate voltage of 230 V the resistance can have a strength of 1 - 20 kΩ, or more. The diode can be of, for instance, 1 mA.

The present invention is special in the ignition (lighting) circuit comprises a resistor having a very high resistance and a diode having a very low amperage. When igniting the discharge tube there is created a high voltage by the ignition circuit which provides a starting discharge between the poles of the discharge tube. As soon as the tube has been started there flows a voltage through the tube, and a very little voltage, if any, is received in the ignition circuit, and therefore, said circuit becomes disconnected. No heat is developed in said ignition circuit, and there is no risque for fire; there is no need for controlling flickering; the apparatus of the invention is simple, and effective and can be manufactured at low costs.

Further characteristics and details of the apparatus according to the invention will be evident from the following detailed specification in which reference will be made to the accompanying drawing. In the drawing figure 1 shows a lighting apparatus according to prior art comprising a priorly known type of ignitor, for instance a transistorized ignitor. Figure 2 shows a lighting apparatus according to the invention formed with a new type of apparatus for providing an ignition of the discharge lamp or discharge tube.

In the prior art apparatus which is shown in figure 1 a discharge tube 1 is connected in an electric circuit which is loaded with an alternate voltage 2 of for instance 240 V. The apparatus consists of a circuit which, in series, comprises a choke coil 3 and an ignitor 4, and the discharge tube 1 is formed with spaced contact poles 5 and 6. Parallelly over the mains poles 2a and 2b a capacitor 7 is connected.

When the voltage is connected by means of a switch 8 the

transistorized ignitor 4 provides a high voltage at the contact pole 5 of the discharge tube or lamp, which high voltage provides a discharge to the second contact pole 6 and thereby an ignition of the discharge tube. The high ignition voltage causes damages in the ignitor, so that said ignitor has to be substituted after a certain number of ignition operations.

According to the invention, which is shown in figure 2, the discharge tube 1 is connected in a series circuit from the mains poles 2a and 2b, which circuit comprises a choke coil 3, the discharge lamp or tube 1 and a capacitor 9. For providing the high voltage in the apparatus according to the invention which is needed for igniting the discharge tube 1 a circuit is connected parallelly over the contact poles 5 and 6 of the discharge tube 1, which circuit comprises a strong resistance 10 and, in series therewith, a diode 11. The resistance should have a very high resistance, for instance 1 - 20 kΩ. The diode can be weak, for instance 1 mA. The capacitor 9 acts as a current restricting means which contributes to creating a high voltage of the discharge tube 1.

When the voltage is connected, which is made by means of the current switch 8, a very high voltage is built up over the circuit comprising the resistance 10 and the diode 11 in combination with the capacitor 9, which high voltage is applied to the contact pole 5 of the discharge tube 1, and which provides an ignition of the discharge tube. Thus, an ignition is accomplished without the use of an ignitor of the above mentioned type.

As soon as the discharge tube has been ignited the ignition circuit 10-11 is disconnected, and the current only passes through the choke coil 3, the discharge tube 1 and the capacitor 9.

For draining remaining voltage over the capacitor when the current over the discharge tube 1 has been disconnected, which is done by means of the current switch 8, a resistance 12 is preferably connected over the capacitor 9.

CLAIMS

1. Apparatus for providing a lighting, without the use of a conventional so called "discharge starter" of a discharge bulb or tube (1) of the type comprising two spaced contact poles (5, 6), and for which it is necessary to build up an electric light arc between said contact poles (5, 6) in order to provide a lighting of said bulb or tube, and in which apparatus the discharge tube (1) is connected in an electric primary circuit comprising, in series with each other, a choke coil (3), the discharge tube (1) and a capacitor (9), **characterized** in that the apparatus, for providing a lighting of the discharge bulb or tube (1) is formed with a a secondary curcuit in the form of lighting circuit which is connected directly and parallelly over the contact poles (5, 6) of the tube (1) and which comprises, in series with each other, a resistor (10) having a very high resistance and a diode (11) having a very low amperage (in its pressurised position).

2. Apparatus according to claim 1, **characterized** in that the resistance of the lighting circuit, for a tube having an operation voltage of 240V, has a resistance of, for instance, between 1 and 20 kΩ.

3. Apparatus according to claim 1 or 2, **characterized** in that the diode (11) of the lighting circuit, for a tube having an operation voltage of 240V, has an amperage of about 1 mA.

4. An apparatus according to claim 1, 2 or 3, **characterized** in that a resistance (12) is connected parallelly over the capacitor (9).

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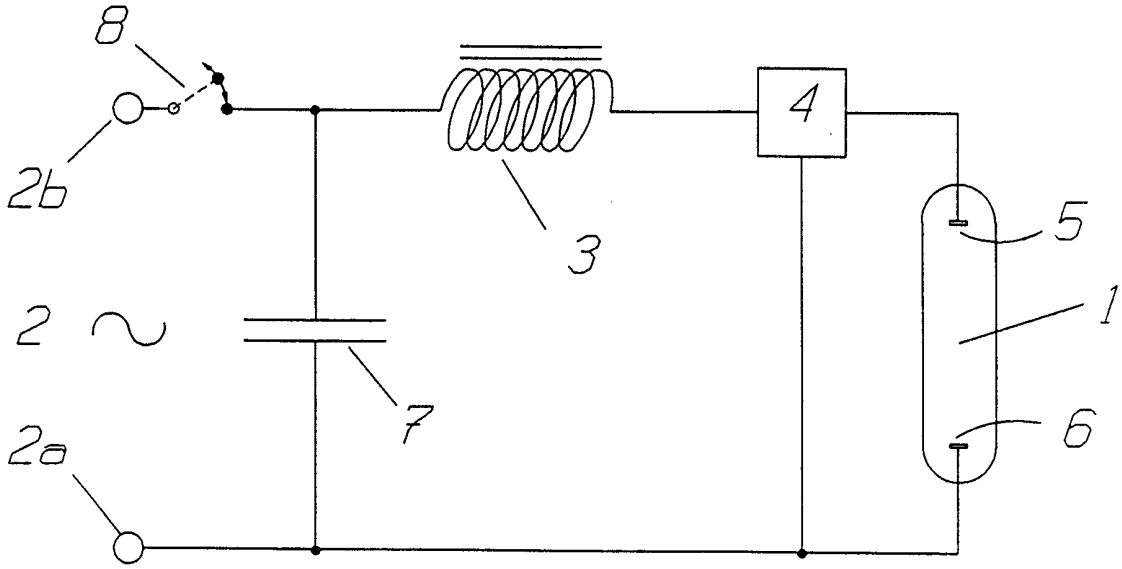


Fig. 1

(prior art)

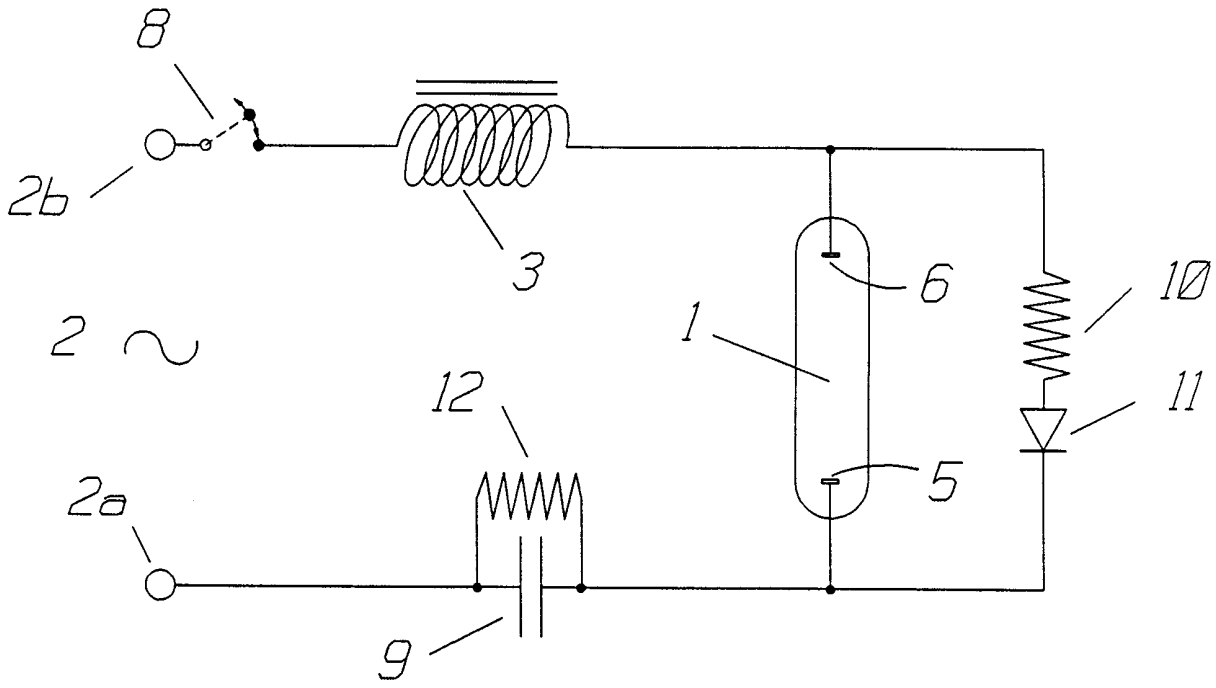


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 98/01246

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H05B 41/23
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2134439 A (E.G. DORGELO), 25 October 1938 (25.10.38), page 1, column 2, line 35 - page 2, column 2, line 62, figures 1-4 --	1-4
A	US 3740609 A (J.C. MOERKENS), 19 June 1973 (19.06.73), column 4, line 18 - column 6, line 2, figures 1,3 --	1-4
A	US 2871409 A (D.D. ALDRICH ET AL.), 27 January 1959 (27.01.59), column 2, line 27 - column 4, line 63, figures 1-3 --	1-4

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
30 November 1998	03 -12- 1998
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

03/11/98

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