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(54) **Electronic ballast and starter circuit.**

(57) An electronic ballast (2) for a low pressure discharge lamp (1) has a stabilizer load (3) for series connection with said lamp and an electronic starter circuit (7) for parallel connection with the said lamp and for series connection with the heater electrodes (8, 9) of said lamp. The starter circuit (7) has three parallel elements, the first of said parallel elements comprising a triac (10), the second (11) of said parallel elements comprising a twin branch voltage divider with a resistive element (12) in the first of said branches and a capacitive element (13) in the second of said branches, the third of said parallel elements comprising a series connection of a diode element (15) and a resistive element (14). The capacitive element (13) of said second branch is connected across the gate (16) of the said triac (10) by means of a diode or diac (17).

Description

ELECTRONIC BALLAST AND STARTER CIRCUIT

This invention relates to a ballast and electronic starting circuit for a low pressure discharge lamp such as a fluorescent lamp.

Previous starting circuits have been overly complex and thus are expensive to manufacture and consume excess power in relation to the amount of light delivered by the lamp.

It is an object of the invention to provide a simplified electronic starter circuit by which a low pressure discharge lamp such as a fluorescent lamp is started quickly and reliably in which the starting of the lamp causes reliable prevention of further starting attempts. It is a further object that the current drawn by the starter should be low and the starting voltage high so that the stabilizing load may be minimized thereby providing a low power loss, less heat, less magnetic field effect and relatively more available power for light output.

Accordingly it is an object of the present invention to provide a new and improved low pressure discharge tube ballast and electronic starter circuit.

The present invention provides an electronic ballast for a low pressure discharge lamp such as a fluorescent lamp comprising a stabilizer load for series connection with said lamp and an electronic starter circuit for parallel connection with the said lamp and for series connection with the heater electrodes of said lamp, said starter circuit comprising 3 parallel elements, the first of said parallel elements comprising a triac, the second of said parallel elements comprising a twin branch voltage divider with a resistive element in the first of said branches and a capacitive element in the second of said branches, the third of said parallel elements comprising a series connection of a diode element and a resistive element, wherein said capacitive element of said second branch is connected across the gate of the said triac by means of a diode or diac.

Preferably the stabilizer load may comprise an inductive element in series with a capacitive element bridged by a resistive element.

Also the electronic ballast of the invention may include a variable resistive element in the second of said parallel elements which acts as a dimmer.

The invention also provides an electronic starter circuit for parallel connection with a low pressure discharge lamp such as a fluorescent lamp and for series connection with the heater electrodes of said lamp, said starter circuit comprising three parallel elements, the first of said parallel elements comprising a triac, the second of said parallel elements comprising a twin branch voltage divider with a resistive element in the first of said branches and a capacitive element in the second of said branches, the third of said parallel elements comprising a series connection of a diode element and a resistive element, wherein said capacitive element of said second branch is connected across the gate of the said triac by means of a diode or diac.

By way of example only, a specific embodiment of the present invention will now be described, with

reference to the accompanying drawing, which is a schematic diagram of an embodiment of electronic ballast and starter circuit in accordance with the present invention.

Referring to the drawing, the Figure shows a low pressure discharge lamp such as a fluorescent lamp 1 in place with the ballast and starter circuit of the invention generally designated 2.

Stabilizing load 3 is connected in series between the mains voltage 18 (which may include a switch, not shown) and the lamp 1. Stabilizing load 3 consists of an inductive portion 4 and a capacitive portion 5 which latter portion is bridged by resistive element 6.

Electronic starter circuit 7 is connected in parallel with the lamp 1 and in series with the heater electrodes designated 8 and 9 respectively. Starter circuit 7 consists of 3 parallel elements:

- 1) firstly, triac 10, and
- 2) secondly, voltage divider 11 comprising resistive element 12 and capacitor 13, and
- 3) thirdly, resistor 14 and diode 15.

Voltage divider 11 is connected to gate 16 of triac 10 by means of diode or diac 17.

One example of a circuit as shown in Figure 1 for operation on 120 volts a.c. at 60 hertz with a 4 foot 60 watt fluorescent lamp has the following components:

inductors	1	0.27 henry
capacitors	5	6 micro f
	13	333 micro f
resistors	6	750 k ohms
	12	750 k ohms
	14	47 k ohms
triac	10	
diac	17	
diode	15	In4004

In an alternative arrangement, the above-mentioned components have the following values:

inductors	1	0.27 henry
capacitors	5	5 micro f
	13	0.033 micro f
resistors	6	750 k ohms
	12	680 k ohms
	14	47 k ohms
triac	10	1 amp 600V piv
diac	17	st-2
diode	15	In4004

In another embodiment resistor 12 may be variable in order to provide a dimming effect.

Additionally, additional light intensity can be achieved by increasing the value of capacitor 5.

Although the invention has been described with reference to particular illustrative circuits, it will be understood that further variations and modifications

are possible within the inventive concept.

Claims

1. An electronic ballast (2) for a low pressure discharge lamp (1) comprising a stabilizer load (3) for series connection with said lamp and an electronic starter circuit (7) for parallel connection with the said lamp and for series connection with the heater electrodes (8, 9) of said lamp, said starter circuit (7) comprising three parallel elements, the first of said parallel elements comprising a triac (10), the second (11) of said parallel elements comprising a twin branch voltage divider with a resistive element (12) in the first of said branches and a capacitive element (13) in the second of said branches, the third of said parallel elements comprising a series connection of a diode element (15) and a resistive element (14), wherein said capacitive element (13) of said second branch is connected across the gate (16) of the said triac (10) by means of a diode or diac (17).

2. An electronic ballast as claimed in claim 1, wherein the stabilizer load (3) comprises an inductive element (4) in series with a capacitive

element (5) bridged by a resistive element (6).

3. An electronic ballast as claimed in claim 1 or claim 2, wherein the resistive element (12) in the second of said parallel elements (11) is a variable resistive element.

4. An electronic starter circuit (7) for parallel connection with a low pressure discharge lamp (1) and for series connection with the heater electrodes (8, 9) of said lamp, said starter circuit (7) comprising three parallel elements, the first of said parallel elements comprising a triac (10), the second (11) of said parallel elements comprising a twin branch voltage divider with a resistive element (12) in the first of said branches and a capacitive element (13) in the second of said branches, the third of said parallel elements comprising a series connection of a diode element (15) and a resistive element (14), wherein said capacitive element (13) of said second branch is connected across the gate (16) of the said triac (10) by means of a diode or diac (17).

5. An electronic starter circuit as claimed in claim 4, wherein the resistive element (12) in the second of said three parallel elements (11) is a variable resistive element.

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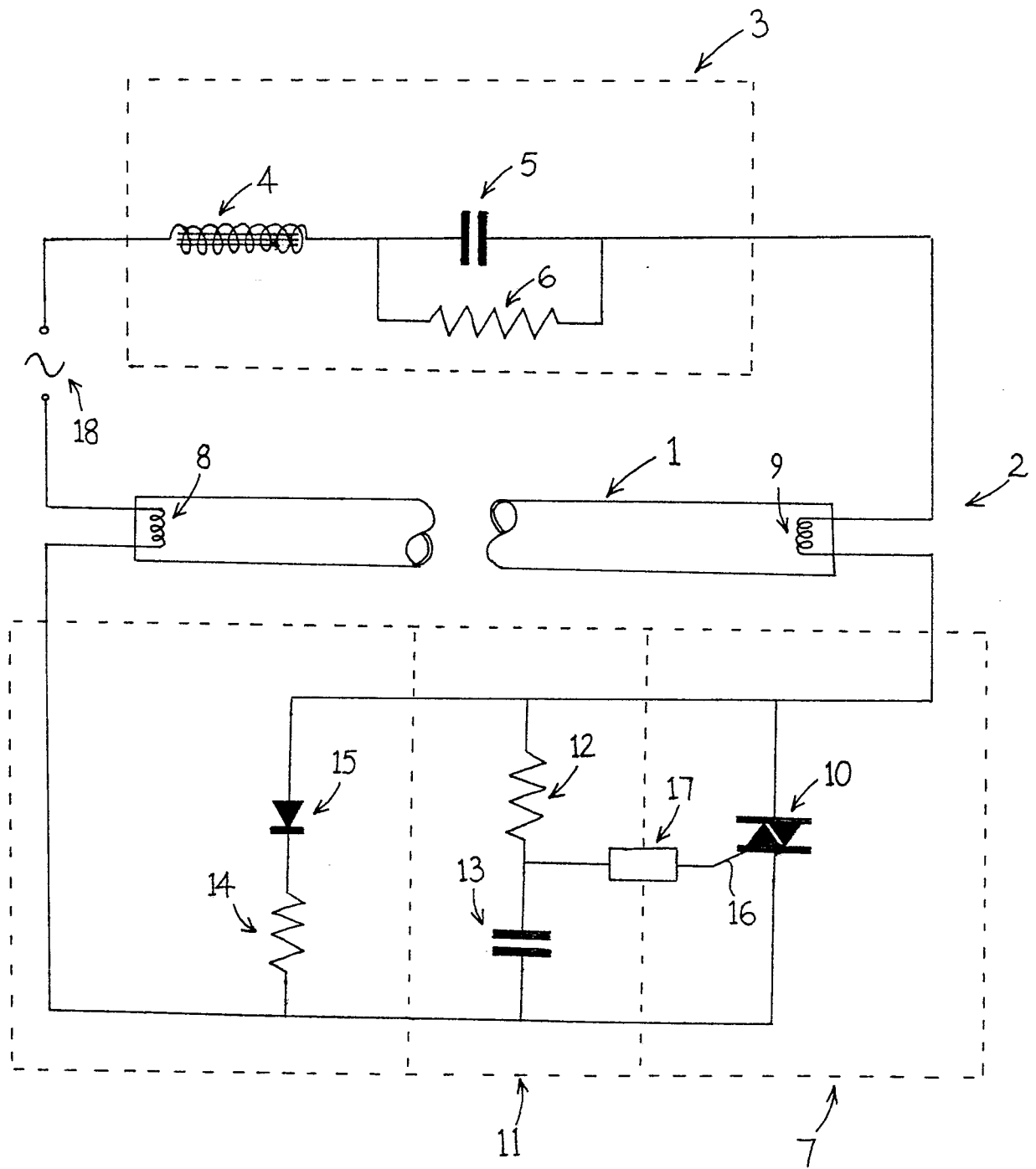
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European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 89 30 1116

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.4)
A	FR-A-2441990 (COMPAGNIE DES LAMPES) * the whole document *	1-5	H05B41/04 H05B41/18
A	US-A-4406976 (WISBEY) * the whole document *	1-5	
A	US-A-4145638 (KANEDA) * figure 1 *	1, 2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			H05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 APRIL 1989	Examiner SPEISER P.
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	