

[54] **LOW VOLTAGE WARNING SYSTEM**
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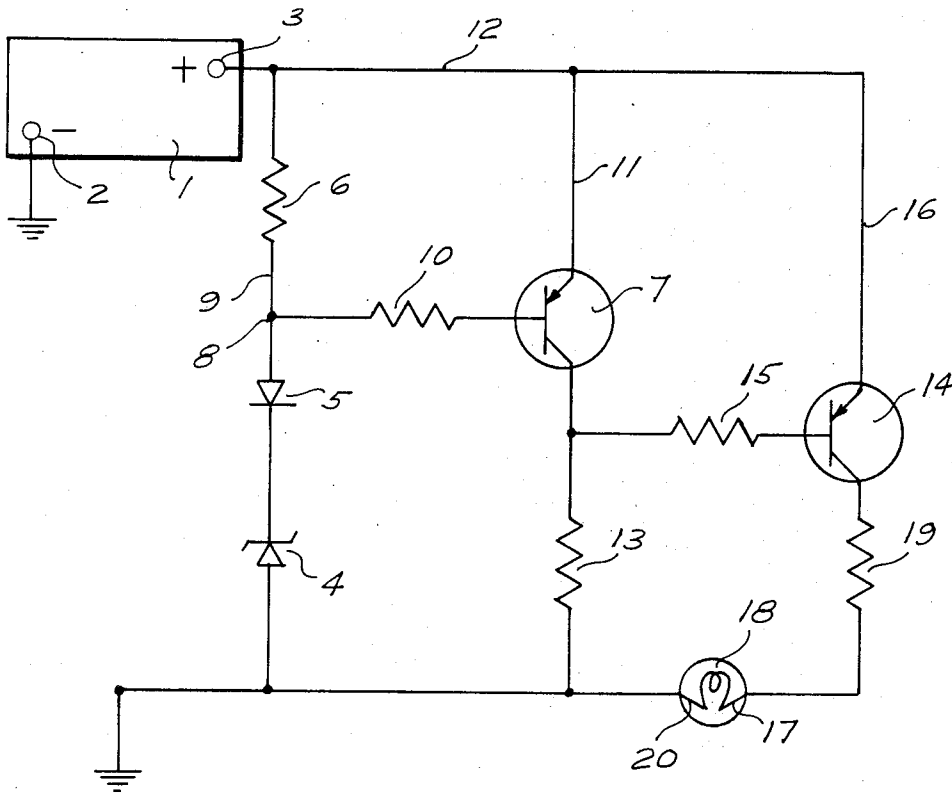
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340/253 A, 253 C, 256, 249; 324/29.5;
320/40, 48; 317/18 R, 27, 31, 16 R

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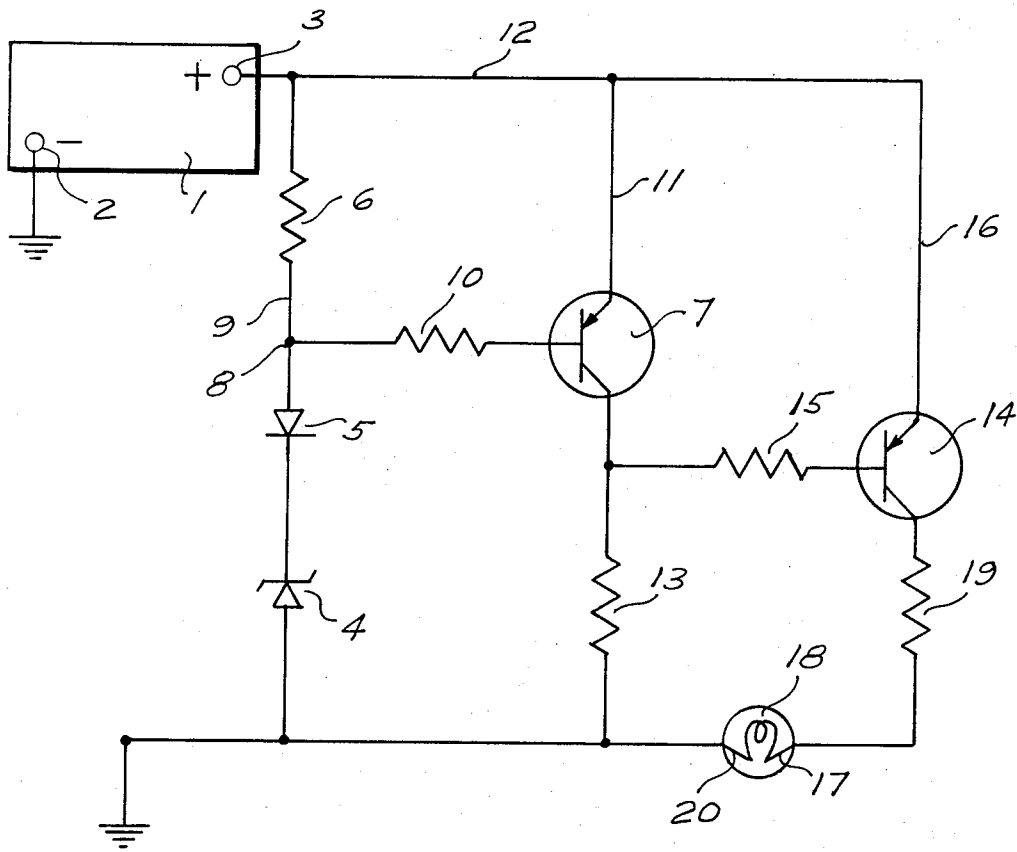
[57] **ABSTRACT**
A Zener diode is connected in series circuit arrangement with first resistor and a diode between the positive polarity terminal of a battery and a point at ground potential. A first transistor has an input connected to a common point in the connection between the first resistor and the diode. A second transistor has an input connected to the output of the first transistor. A signal lamp is connected to the outputs of the first and second transistors.

2 Claims, 1 Drawing Figure



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3,810,144



LOW VOLTAGE WARNING SYSTEM

DESCRIPTION OF THE INVENTION

The present invention relates to a low voltage warn- 5
ing system.

The principal object of the invention is to provide a low voltage warning system of simple structure which is inexpensive in manufacture and functions efficiently, effectively and reliably to indicate when the battery of 10
a vehicle is below a desired magnitude.

In order that the invention may be readily carried into effect, it will now be described with reference to the accompanying drawing, wherein the single FIG- 15
URE is a circuit diagram of an embodiment of the low voltage warning system of the invention.

The low voltage warning system of the invention indicates when the battery 1 of a vehicle such as, for example, an automobile, truck, bus, aircraft, boat, tractor, or the like (not shown in the FIGURE), is below a desired 20
magnitude. The battery 1 has a negative polarity terminal 2 connected to a point at ground potential and a positive polarity terminal 3.

A Zener diode 4 is connected in series circuit arrangement with a diode 5 and a first resistor 6 between 25
the positive polarity terminal 3 of the battery 1 and a point at ground potential. The anode of the diode 5 is connected to the first resistor 6 and the cathode of said diode is connected to the cathode of the Zener diode. 30
4. The anode of the Zener diode is connected to a point at ground potential.

A first transistor 7 has a base electrode connected to a common point 8 in the connection 9 between the first resistor 6 and the diode 5 via a second resistor 10. The emitter electrode of the first transistor 7 is connected 35
to the positive polarity terminal 3 of the battery 1 via leads 11 and 12. The collector electrode of the first transistor 7 is connected to a point of ground potential via a third resistor 13.

A second transistor 14 has a base electrode connected 40
to the collector electrode of the first transistor 7 via a fourth resistor 15. The emitter electrode of the second transistor 14 is connected to the positive polarity terminal 3 of the battery 1 via a lead 16 and the lead 12. The collector electrode of the second transistor 14 45
is connected to an electrode 17 of a signal lamp 18 via a fifth resistor 19. Another electrode 20 of the lamp 18 is connected to the collector electrode of the first transistor 7 via the third resistor 13.

When the voltage of the battery 1 drops below a desired predetermined magnitude such as, for example, 50
11 volts, the lamp 18 is energized and signals the operator of the vehicle that such is the fact.

The current floor requirements for operating the sys- 55

tem of the invention are negligible.

The complete system may be installed on a circuit board and in case of failure of any component a new circuit board would be installed with a minimum of maintenance and trouble shooting. The system of the invention may thus be mass produced with greater facility and less expense.

While the invention has been described by means of specific examples and in specific embodiments, I do not wish to be limited thereto, for obvious modifications will occur to those skilled in the art without departing from the spirit and scope of the invention.

I claim:

1. A low voltage warning system for indicating when the battery of a vehicle is below a desired magnitude, said battery having a negative polarity terminal connected to a point at ground potential and a positive polarity terminal, said low voltage warning system comprising

a first resistor;

a diode having an anode connected to the first resistor and a cathode;

a Zener diode connected in series circuit arrangement with the first resistor and the diode between the positive polarity terminal of the battery and a point at ground potential, the Zener diode having an anode connected to a point at ground potential and a cathode connected to the cathode of the diode;

a first transistor having an input connected to a common point in the connection between the first resistor and the diode and an output;

a second transistor having an input connected to the output of the first transistor and an output;

a signal lamp connected to the outputs of the first and second transistors;

second, third, fourth and fifth resistors, the first transistor having a base electrode connected to the common point in the connection between the first resistor and the diode via the second resistor, an emitter electrode connected to the positive polarity terminal of the battery and a collector electrode connected to a point at ground potential via the third resistor.

2. A low voltage warning system as claimed in claim 1, wherein the second transistor has a base electrode connected to the collector electrode of the first transistor via the fourth resistor, an emitter electrode connected to the positive polarity terminal of the battery and a collector electrode connected to an electrode of the lamp via the fifth resistor, the lamp having another electrode connected to the collector electrode of the first transistor via the third resistor.

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