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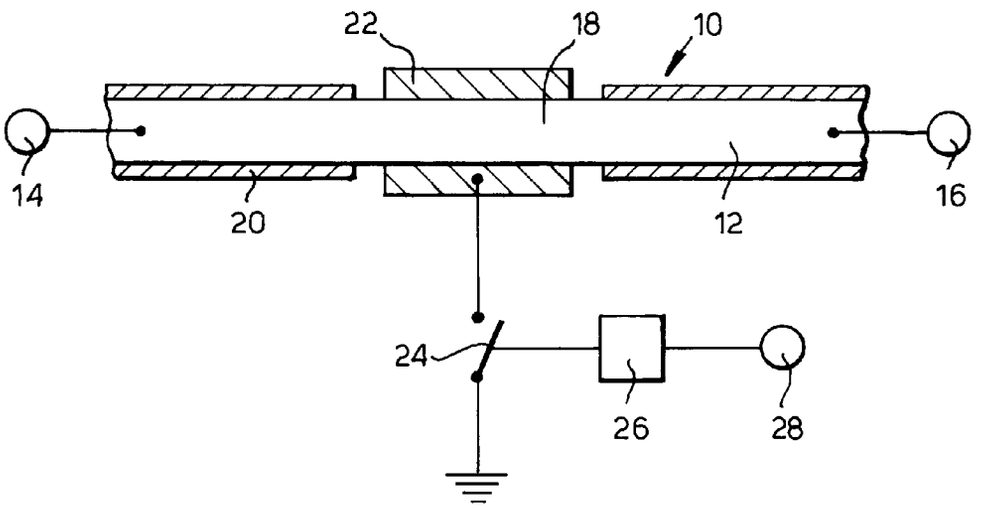
(54) A fuse arrangement

(57) A fuse arrangement in an electrical system of an motor vehicle comprising an electrical conductor (12) connectable between a power supply (14) and an electrical load (16), the electrical conductor having a portion (18) with a predetermined melting point; a heating element (22) attached to the portion of the electrical conductor, the heating element being capable of reaching a temperature above the predetermined melting point; a switch (24) connected between the heating element and electrical ground, the switch normally being open; and switch control means (26) for closing the switch means and heating the heating element on receipt of a predetermined signal from a sensor (28). Provides protection for electrical loads on detection of an adverse condition by the sensor.

Fig.1.



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Description

Technical Field

[0001] The present invention relates to a fuse arrangement, and in particular to a fuse arrangement in an electrical system of a motor vehicle.

Background of the Invention

[0002] Fuse arrangements are well known in electrical systems. In general, such fuse arrangements comprise an electrical conductor having a portion which melts when excessive current passes through the portion of the conductor. Whilst this type of fuse arrangement works well in preventing excessive currents reaching an electrical load, it has limitations in that it only operates when an excessive current passes through the conductor.

Summary of the Invention

[0003] It is an object of the present invention to provide a fuse arrangement which disconnects electrical power to an electrical load on detection of an adverse condition.

[0004] A fuse arrangement in accordance with the present invention in an electrical system of a motor vehicle comprises an electrical conductor connectable between a power supply and an electrical load, the electrical conductor having a portion with a predetermined melting point; a heating element attached to the portion of the electrical conductor, the heating element being capable of reaching a temperature above the predetermined melting point; a switch connected between the heating element and electrical ground, the switch normally being open; and switch control means for closing the switch means and heating the heating element on receipt of a predetermined signal from a sensor.

[0005] The present invention provides protection for electrical loads on detection of any sensed adverse condition, such an excessive high temperature, a vehicle crash (where the present invention is installed in a motor vehicle), overload current, or other sensed adverse condition.

Brief Description of the Drawings

[0006] The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a circuit diagram of a first embodiment of fuse arrangement in accordance with the present invention;

Figure 2 is a circuit diagram of a second embodiment of fuse arrangement in accordance with the present invention;

Figure 3 is a circuit diagram of a third embodiment of fuse arrangement in accordance with the present invention; and

Figure 4 is part of a circuit diagram of a fourth embodiment of fuse arrangement in accordance with the present invention.

Description of the Preferred Embodiment

[0007] Referring to Figure 1, the fuse arrangement 10 comprises an electrical conductor 12 which provides an electrical connection between a power supply 14 and an electrical load 16. A portion 18 of the conductor 12 is stripped of the conductor insulation 20. The portion 18 has a composition, shape and size such that the portion has a predetermined melting point. A heating element 22 is attached to the portion 18 of the conductor 12. The heating element 22 is capable of reaching temperatures in excess of the predetermined melting point. A switch 24 is connected between the heating element 22 and electrical ground. The switch 24 is actuated by switch control means 26. The switch control means 26 receives signals from one or more sensors 28.

[0008] The switch 24 is normally open and may be a relay operated switch or a semiconductor switch (such as a transistor). The sensors 28 monitor predetermined adverse conditions such as high temperature, overload current, and in respect of use on a motor vehicle, a vehicle crash. The switch control means 26 is an electronic circuit or microcomputer which receives signals from the sensor or sensors 28. On receipt of any adverse signal from the or one of the sensors 28, the switch control means 26 closes the switch 24. Closure of the switch 24 connects the heating element 22 between the power supply 14 and electrical ground and, as a consequence, heats the heating element. Heating of the heating element 22 causes the portion 18 of the conductor 12 to melt disconnecting the power supply 14 from the electrical loads 16.

[0009] Where the switch control means 26 is a microcomputer, preferably the microcomputer retains information concerning an adverse condition in a memory in the microcomputer for subsequent interrogation, for example, by a vehicle servicing person.

[0010] In the above described example, the heating element 22 is preferably an annular graphite element which is placed around the portion 18 of the conductor 12. In the alternative arrangements shown in Figures 2 and 3, the heating element is in the form of a heating coil 30 (Figure 2) or a substantially flat heating element 32 (Figure 3) with a heating catalyst 34 between the element and the portion 18 of the conductor 12.

[0011] A further alternative fuse arrangement 100 is shown in Figure 4 for use with electrical conductors 112 in the form of busbars which are connected to the power supply 114 by way of a single busbar 102. Each conductor 112 has a heating element 122 (with each heating element being individually operated by a switch and

switch control means as described above) attached thereto. Such an arrangement provides for selective disconnection of power to one or more of the electrical loads 116.

[0012] The present invention provides for protection of the electrical loads from additional adverse conditions (such as excessive high temperature) besides high or overload current. The present invention allows a normal electrical conductor to be used with a portion selected for melting if an adverse condition is detected. Such an arrangement overcomes problems associated with voltage drop across a fuse as no such voltage drop is generated with the present invention. The present invention is for use in a motor vehicle and can be used to disconnect the power supply from the vehicle battery in the event of the motor vehicle being involved in a crash.

Claims

1. A fuse arrangement in an electrical system of a motor vehicle comprising an electrical conductor connectable between a power supply and an electrical load, the electrical conductor having a portion with a predetermined melting point; a heating element attached to the portion of the electrical conductor, the heating element being capable of reaching a temperature above the predetermined melting point; a switch connected between the heating element and electrical ground, the switch normally being open; and switch control means for closing the switch means and heating the heating element on receipt of a predetermined signal from a sensor.

2. A fuse arrangement as claimed in Claim 1, wherein the heating element comprises an annular graphite element.

3. A fuse arrangement as claimed in Claim 1, wherein the heating element comprises a heating coil.

4. A fuse arrangement as claimed in Claim 1, wherein the heating element is substantially planar with a heating catalyst between the heating element and the portion of the electrical conductor.

5. A fuse arrangement as claimed in any one of Claims 1 to 4, wherein the switch is operated by a relay.

6. A fuse arrangement as claimed in any one of Claims 1 to 4, wherein the switch is a semiconductor device.

7. A fuse arrangement as claimed in any one of Claims 1 to 6, wherein the switch control means is a microcomputer.

8. A fuse arrangement as claimed in any one of Claims 1 to 6, wherein the switch control means is an electronic circuit.

9. A fuse arrangement as claimed in any one of Claims 1 to 8, wherein the sensor is a temperature sensor.

10. A fuse arrangement as claimed in any one of Claims 1 to 8, wherein the sensor is a crash sensor.

Fig.1.

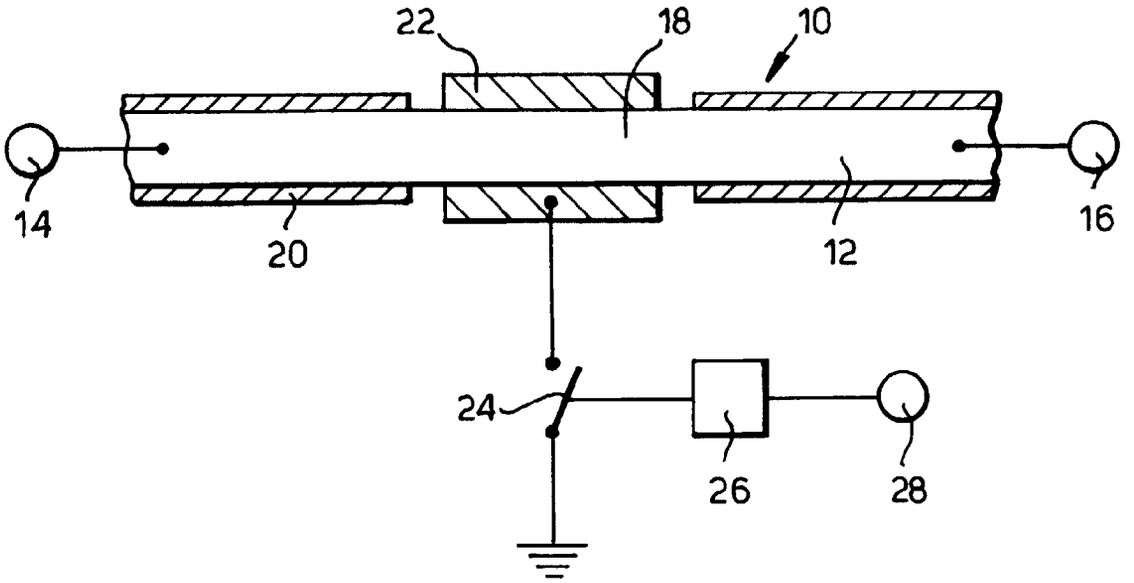

Fig.2.

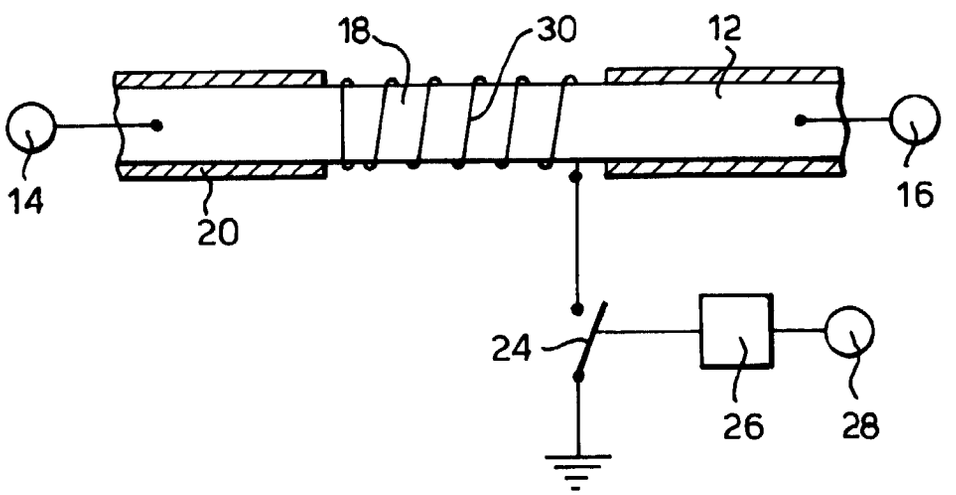

Fig.3.

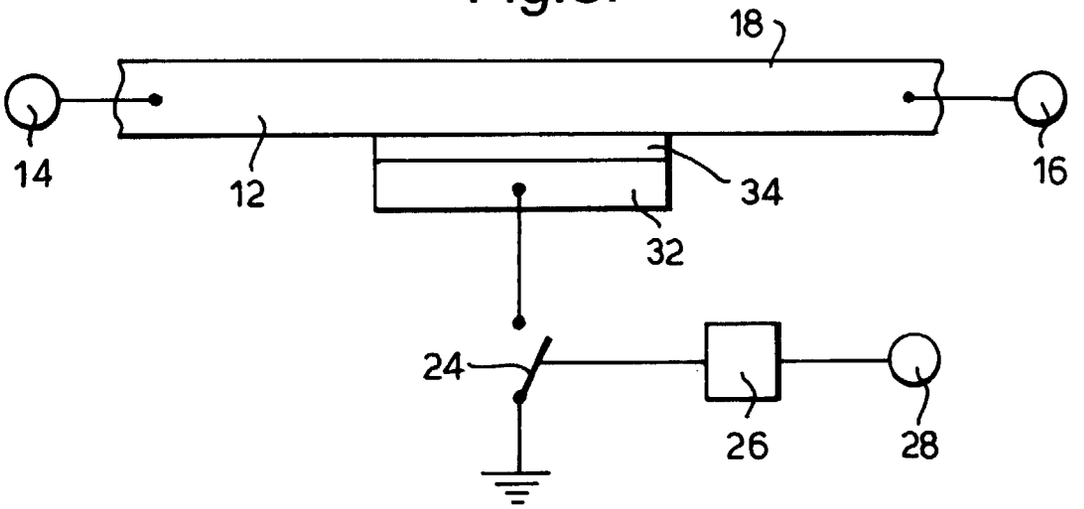

Fig.4.