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Jump stud fuse module

Abstract

A jump stud assembly including a housing, electrically conductive first and second studs extending through a floor of the housing into a compartment defined by the housing, and a fuse module including a mounting block having a through-hole extending therethrough, a fuse plate having an upper portion on a top of the mounting block and having a through-hole aligned with the through-hole of the mounting block, a lower portion on a bottom of the mounting block and having a through-hole aligned with the through-hole of the mounting block, and a fusible element adjacent a sidewall of the mounting block connecting the upper portion of the fuse plate to the lower portion of the fuse plate, wherein the fuse module is mounted on a portion of the first stud outside the compartment with the upper portion of the fuse plate in electrical communication with the first stud.

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References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
7192319	12/2006	Rahman	439/766	H01H 85/044
11636994	12/2022	Schwartz	N/A	N/A
2004/0018417	12/2003	Stack	429/61	H01M 50/552
2009/0023334	12/2008	Puschkat	439/590	H01H 85/2045
2011/0285496	12/2010	Urrea	337/188	H01H 85/12
2016/0071678	12/2015	Schwartz	361/115	H01H 85/2045
2017/0148600	12/2016	Carnick	N/A	H01H 85/0241
2018/0205188	12/2017	Urrea	N/A	H01H 85/0241

OTHER PUBLICATIONS

European Search Report for EP Application No. 24218051.1, dated Apr. 15, 2025, 7 pages. cited by applicant

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Background/Summary

FIELD OF THE DISCLOSURE

(1) The disclosure relates generally to the field of circuit protection devices and relates more particularly to a compact fuse module for providing overcurrent protection at a vehicle's jump studs.

BACKGROUND OF THE DISCLOSURE

(2) In some vehicles, and especially in large vehicles such as cargo trucks, vans, etc., the battery compartment of the vehicle may be difficult or inconvenient to access. This may pose a significant challenge in situations where access to the battery is required, such as for jump starting the vehicle. To alleviate this problem, vehicles are sometimes equipped with so-called “jump studs” (sometimes referred to as “junction posts” or “jump start battery feed studs”), which are electrically conducive posts or terminals that are connected to, but located remote from, the positive and negative terminals of a vehicle's battery and that are installed in a convenient, readily accessible location. For example, jump studs may be located within an easily accessible compartment located on an exterior of a vehicle or within a cabin of a vehicle.

(3) As with any exposed electrical junction, jump studs may be susceptible to overcurrent

conductions (e.g., short circuits, arc faults, etc.) which could cause significant damage to a vehicle's battery and/or to surrounding components if allowed to persist. It is therefore desirable to implement overcurrent protection at the jump studs to prevent or mitigate such damage. It is also desirable to implement such overcurrent protection in a robust, compact form factor. It is with respect to these and other considerations that the present improvements may be useful.

SUMMARY

(4) This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended as an aid in determining the scope of the claimed subject matter.

(5) A jump stud assembly in accordance with an exemplary embodiment of the present disclosure may include a housing, electrically conductive first and second studs extending through a floor of the housing into a compartment defined by the housing, and a fuse module including a mounting block having a through-hole extending therethrough, a fuse plate having an upper portion on a top of the mounting block and having a through-hole aligned with the through-hole of the mounting block, a lower portion on a bottom of the mounting block and having a through-hole aligned with the through-hole of the mounting block, and a fusible element adjacent a sidewall of the mounting block connecting the upper portion of the fuse plate to the lower portion of the fuse plate, wherein the fuse module is mounted on a portion of the first stud outside the compartment with the upper portion of the fuse plate in electrical communication with the first stud.

(6) A jump stud assembly in accordance with another exemplary embodiment of the present disclosure may include a housing, electrically conductive first and second studs extending through a floor of the housing into a compartment defined by the housing, a removable cover enclosing the compartment, a fuse module including a mounting block having a through-hole extending therethrough, a fuse plate having an upper portion on a top of the mounting block and having a through-hole aligned with the through-hole of the mounting block, a lower portion on a bottom of the mounting block and having a through-hole aligned with the through-hole of the mounting block, and a fusible element adjacent a sidewall of the mounting block connecting the upper portion of the fuse plate to the lower portion of the fuse plate, wherein the fuse module is mounted on a portion of the first stud outside of the compartment, with the first stud extending through the through-holes of the upper portion of the fuse plate, the mounting block, and the lower portion of the fuse plate, and with the upper portion of the fuse plate in electrical communication with the first stud, and a ring terminal of an electrical conductor disposed on the first stud in electrical contact with the lower portion of the fuse plate.

(7) A jump stud assembly in accordance with another exemplary embodiment of the present disclosure may include a housing, electrically conductive first and second studs extending through a floor of the housing into a compartment defined by the housing, and a fuse module including a mounting block having a through-hole extending therethrough, a fuse plate having an upper portion on a top of the mounting block and having a through-hole aligned with the through-hole of the mounting block, a lower portion on a bottom of the mounting block and having a through-hole aligned with the through-hole of the mounting block, and a fusible element adjacent a sidewall of the mounting block connecting the upper portion of the fuse plate to the lower portion of the fuse plate, wherein the fuse module is mounted to the first stud outside of the compartment, with an electrically insulated bolt extending through the through-holes of the lower portion of the fuse plate, the mounting block, and the upper portion of the fuse plate, and threadedly engaging a threaded aperture of the first stud, with the upper portion of the fuse plate in electrical communication with the first stud.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1**A is a perspective view illustrating a fuse module in accordance with an exemplary embodiment of the present disclosure;

(2) FIG. **1**B is an exploded view illustrating components of the fuse module shown in FIG. **1**;

(3) FIG. **1**C is a cross sectional view of the fuse module shown in FIG. **1** taken along plane C-C;

(4) FIG. **2**A is a top perspective view illustrating a jump stud assembly in accordance with an exemplary embodiment of the present disclosure;

(5) FIG. **2**B is a bottom perspective view illustrating the jump stud assembly shown in FIG. **2**A;

(6) FIG. **2**C is a top perspective view illustrating the jump stud assembly shown in FIG. **2**A with the cover omitted for clarity;

(7) FIG. **2**D is a cross sectional view illustrating the jump stud assembly shown in FIG. **2**A taken along plane D-D;

(8) FIG. **2**E is a detailed cross-sectional view illustrating the jump stud assembly shown in FIG. **2**A taken along plane D-D illustrating a current path through the jump stud assembly.

(9) FIG. **3** is a detailed cross-sectional view illustrating a jump stud assembly in accordance with an exemplary alternative embodiment of the present disclosure.

DETAILED DESCRIPTION

(10) A jump stud fuse module in accordance with the present disclosure will now be described more fully with reference to the accompanying drawings, in which preferred embodiments of the jump stud fuse module are presented. It will be understood, however, that the jump stud fuse module may be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will convey certain exemplary aspects of the jump stud fuse module to those skilled in the art.

(11) Referring to FIG. **1**, a perspective view illustrating a jump stud fuse module **10** (hereinafter "the fuse module **10**") in accordance with an exemplary, non-limiting embodiment of the present disclosure is shown. As will be described in greater detail below, the fuse module **10** may be coupled directly to a jump stud of a vehicle with no flexible electrical conductors extending therebetween and may provide overcurrent protection for a vehicle's battery. Advantageously, the fuse module **10** is provided in a compact, space-saving form factor that is amenable to convenient installation and removal.

(12) For the sake of convenience and clarity, terms such as "front," "rear," "top," "bottom," "above," "below," "vertical," "horizontal," etc. may be used herein to describe the relative placement and orientation of various components of the fuse module **10**, each with respect to the geometry and orientation of the fuse module **10** as it appears in FIG. **1**. Said terminology will include the words specifically mentioned, derivatives thereof, and words of similar import.

(13) Referring to the exploded and cross-sectional views shown in FIGS. **1**B and **1**C, respectively, the fuse module **10** may include a mounting block **12** and a fuse plate **14** that extends around several surfaces of the mounting block **12**. Particularly, the fuse plate **14** may include an upper portion **14***a* disposed on a top surface **12***a* of the mounting block **12**, a lower portion **14***b* disposed on a bottom surface **12***b* of the mounting block **12**, and a fusible element **14***c* disposed adjacent a sidewall **12***c* of the mounting block **12** and connecting the upper portion **14***a* to the lower portion **14***b*. The mounting block **12** may include a through-hole **16** extending vertically therethrough. The upper and lower portions **14***a*, **14***b* of the fuse plate **14** may each have through-holes **18**, **20** that are aligned with (e.g., concentric with) the through-hole **16** of the mounting block **12**. The mounting block **12** may be formed of an electrically insulative, preferably lightweight material (e.g., any suitable plastic, polymer, composite, etc.). The fuse plate **14** may be formed of any suitable electrically conductive material conventionally used in fuse applications (e.g., copper, tin, etc.).

(14) The fusible element **14***c* of the fuse plate **14** may be mechanically weakened relative to other portions of the fuse plate **14** so that the fusible element **14***c* will melt and separate upon the

occurrence of an overcurrent condition in the fuse module **10**. For example, the fusible element **14***c* may be narrower or thinner than other portions of the fuse plate **14**. The present disclosure is not limited in this regard. In various embodiments, the fusible element **14***c* may be perforated, notched, slotted, or otherwise structurally weakened to facilitate separation of the fusible element **14***c* if an amount of current flowing through the fuse plate **14** exceeds a predefined threshold ("current rating").

(15) The fuse module **10** may further include an electrically insulative cover **19** that fits over the fusible element **14***c* and that is affixed to the sidewall **12***c* of the mounting block **12**. The cover **19** may be provided for shielding the fusible element **14***c* from environmental contaminants (e.g., ambient particulate) and containing electrical arcing that may occur upon separation of the fusible element **14***c*. As illustrated, the cover **19** may include mounting holes **17***a*, **17***b* that are configured to matingly engage corresponding mounting posts **21***a*, **21***b* extending from the sidewall **12***c* (e.g., via friction fit, snap fit, etc.). The present disclosure is not limited in this regard. In various embodiments the cover **19** may be affixed to the mounting block **12** using any other suitable means, including, but not limited to, mechanical fasteners, adhesives, etc.

(16) The fuse module **10** may further include a torque limiting cuff **22** disposed within the through-hole **16** of the mounting block **12** in a substantially coaxial relationship therewith. The torque limiting cuff **22** may be a tubular member formed of a rigid, electrically insulative material (e.g., ceramic) that extends between the upper portion **14***a* and the lower portion **14***b* of the fuse plate **14**. The torque limiting cuff **22** may provide a hard stop to prevent the upper portion **14***a* and the lower portion **14***b* from being bent or deflected toward one another beyond a prescribed distance during installation of the fuse module **10** as further described below. In various embodiments, the opposing ends of the torque limiting cuff **22** may be substantially coplanar with the top surface **12***a* and bottom surface **12***b* of the mounting block **12**, respectively as shown in FIG. **1**C. The present disclosure is not limited in this regard, and in various embodiments the torque limiting cuff **22** may be entirely omitted from the fuse module **10**.

(17) Referring to FIGS. **2**A-**2**E, the fuse module **10** is shown operatively installed as part of a jump stud assembly **30**. Apart from the fuse module **10**, the jump stud assembly **30** may be of a conventional variety familiar to those of skill in the art and may include a housing **32**, electrically conductive first and second studs or posts **34***a*, **34***b* extending through a floor of the housing **32** and into a compartment **36** defined by the housing **32** (as best shown in FIGS. **2**C and **2**D), and a removable cover **38** enclosing the compartment **36** (the removable cover **38** is omitted from FIG. **2**C for clarity). Thus, when the cover **38** is opened or removed, the upper ends of the first and second studs **34***a*, **34***b* may be accessible via the open top of the compartment **36** for allowing jumper cables (not pictured) to be connected to the first and second studs **34***a*, **36***b*, for example. The housing **32** may include mounting flanges **40***a*, **40***b* with mounting holes formed therein for facilitating mounting of the jump stud assembly **30** to a vehicle with mechanical fasteners. The present disclosure is not limited in this regard.

(18) Referring to FIG. **2**D, the fuse module **10** may be installed on a lower portion of the first stud **34***a*, below the floor of the housing **32**, with the first stud **34***a* extending through the through-hole **16** of the mounting block **12**. An electrically conductive first nut **42** may be secured to the first stud **34***a* (e.g., via threaded engagement) and may be sandwiched between the housing **32** and the upper portion **14***a* of the fuse plate **14**. A ring terminal **44** of an insulated conductor **46** may be disposed in engagement with the lower portion **14***b* of the fuse plate **14** and may be sandwiched between the lower portion **14***b* and an electrically insulating ferrule **48**. The ferrule **48** may have a planar portion **49** disposed in flat engagement with the lower portion **14***b*, and a tubular shank **50** that extends axially through the ring terminal **44** and the lower portion **14***b* of the fuse plate **14** and into the torque limiting cuff **22**. The first nut **42**, the fuse module **10**, the ring terminal **44**, and the ferrule **48** may be secured together in a stacked arrangement in the aforementioned order by a second nut **52** that threadedly engages the lower end of the first stud **34***a*. The torque limiting cuff

22 of the fuse module **10** may prevent over-tightening of the second nut **52** that could otherwise crush or crack the mounting block **12**.

(19) With the jump stud assembly **30** arranged in the manner described above, a current path through the jump stud assembly **30** is established that is indicated by the arrows shown in FIG. **2**E. Specifically, current may flow into the first stud **34***a* (e.g., from a jumper cable clamped to the first stud **34***a*), through the upper portion **14***a* of the fuse plate **14**, through the fusible element **14***c*, though the lower portion **14***b* of the fuse plate **14**, into the ring terminal **44** of the insulated conductor **46**, and on to a load (e.g., a positive terminal **60** of a vehicle battery **62**, see FIG. **2**D) that may be connected to an opposing end of the insulated conductor **46**. Of course, current may flow in the opposite direction as well. Notably, the ferrule **48**, which is formed of an electrically insulating material (e.g., plastic, rubber, ceramic, etc.) may provide an electrically insulating barrier that prevents current from flowing from the first stud **34***a* or the second nut **52** into the lower portion **14***b* of the fuse plate **14** or the ring terminal **44**, thus forcing current to flow through the fusible element **14***c* instead of shorting through the first stud **34***a*. Thus, in the case of an overcurrent condition wherein an amount of current flowing through the fuse module **10** exceeds the current rating of the fuse module **10**, the fusible element **14***c* will melt and separate, thereby arresting current flowing through the jump stud assembly **30**. The fuse module **10** thereby protects a connected load from overcurrent conditions that could otherwise cause damage to the load if allowed to persist.

(20) In various embodiments, the insulated conductor **46** may extend to, and may be connected to, a positive terminal **60** of a vehicle battery **62** as schematically shown in FIG. **2**D. Though not shown, those of ordinary skill in the art will appreciate that another insulated conductor may be connected to the second stud **34***b* and may extend to, and may be connected to, a negative terminal **64** of the vehicle battery **62**. Additionally, various embodiments of the jump stud assembly **30** are contemplated in which another fuse module that is substantially identical to the fuse module **10** may be installed on the second stud **34***b*. The present disclosure is not limited in this regard.

(21) Referring to FIG. **3**, a detailed cross-sectional view illustrating an alternative embodiment of the jump stud assembly **30** is shown. The embodiment shown in FIG. **3** is generally similar to the jump stud assembly **30** described above and shown in FIGS. **2**A-**2**E but may include an insulated bolt **70** for fastening the ring terminal **44** and the fuse module **10** to the first stud **34***a*. Particularly, the first stud **34***a* may have a threaded aperture **72** formed in a lower end thereof. The insulated bolt **70** may extend through the ring terminal **44** and the fuse module **10** and may threadedly engage the threaded aperture **72**, thus holding the ring terminal **44** in secure engagement with the lower portion **14***b* of the fuse plate **14** and holding the upper portion **14***a* of the fuse plate **14** in secure engagement with the first stud **34***a*.

(22) The insulated bolt **70** may include a head portion **74** and a shank portion **76** formed of metal (e.g., steel, titanium, etc.). A sleeve **78** formed of an electrically insulating material (e.g., plastic, ceramic, etc.) may surround a non-threaded portion of the shank portion **76** proximate the head portion **74**, and a washer **80** formed of an electrically insulating material (e.g., plastic, ceramic, etc.) may surround the shank portion **76** and may flatly abut the head portion **74**. In various embodiments the sleeve **78** and the washer **80** may be separate components or, alternatively, may be constituent parts of a single, unitary member (i.e., formed as a single piece of material). The sleeve **78** and the washer **80** may provide an electrically insulating barrier between the ring terminal **44** and the metal portions of the insulated bolt **70** and between the lower portion **14***b* of the fuse plate **14** and the metal portions of the insulated bolt **70**. This may prevent electrical shorting between the ring terminal **44** furreule and the first stud **34***a* and establishes a current path through the fusible element **14***c* that is substantially similar to that shown in FIG. **2**E.

(23) Those of ordinary skill in the art will appreciate that the above-described embodiments of the fuse module **10** provide numerous advantages in the art. For example, the fuse module **10** may be connected directly to a jump stud of a vehicle with no flexible electrical conductors extending

therebetween and may provide overcurrent protection for a vehicle's battery. Moreover, the fuse module **10** may provide such protection in a robust, compact form factor. Moreover, the fuse module **10** may be associated with relatively low manufacturing costs may therefore be implemented relatively inexpensively.

(24) As used herein, an element or step recited in the singular and proceeded with the word “a” or “an” should be understood as not excluding plural elements or steps, unless such exclusion is explicitly recited. Furthermore, references to “one embodiment” of the present disclosure are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features.

(25) While the present disclosure makes reference to certain embodiments, numerous modifications, alterations and changes to the described embodiments are possible without departing from the sphere and scope of the present disclosure, as defined in the appended claim(s). Accordingly, it is intended that the present disclosure not be limited to the described embodiments, but that it has the full scope defined by the language of the following claims, and equivalents thereof.

Claims

1. A jump stud assembly comprising: a housing; electrically conductive first and second studs extending through a floor of the housing and into a compartment defined by the housing; a fuse module comprising: a mounting block having a through-hole extending therethrough; a fuse plate comprising: an upper portion disposed on a top of the mounting block and having a through-hole aligned with the through-hole of the mounting block; a lower portion disposed on a bottom of the mounting block and having a through-hole aligned with the through-hole of the mounting block; and a fusible element disposed adjacent a sidewall of the mounting block and connecting the upper portion of the fuse plate to the lower portion of the fuse plate; an electrically conductive first nut threadedly engaging the first stud between the housing and a first side of the fuse module, the first nut disposed in electrical contact with the upper portion of the fuse plate; and an electrically conductive second nut threadedly engaging the first stud on a second side of the fuse module opposite the first side; wherein the fuse module is mounted on a portion of the first stud outside of the compartment, with the first stud extending through the through-holes of the upper portion of the fuse plate, the mounting block, and the lower portion of the fuse plate, and with the upper portion of the fuse plate in electrical communication with the first stud.

2. The jump stud assembly of claim 1, further comprising a removable cover enclosing the compartment.

3. The jump stud assembly of claim 1, further comprising an electrically insulating ferrule disposed on the first stud between the lower portion of the fuse plate and the second nut, the ferrule having a planar portion disposed adjacent the lower portion and a tubular shank extending through the through-hole of the lower portion and into the through-hole of the mounting block.

4. The jump stud assembly of claim 1, further comprising a tubular, torque limiting cuff disposed within the through-hole of the mounting block and extending between the upper portion of the fuse plate and the lower portion of the fuse plate, wherein the first stud extends through the torque limiting cuff.

5. The jump stud assembly of claim 4, wherein the torque limiting cuff is formed of an electrically insulating material.

6. The jump stud assembly of claim 5, wherein the torque limiting cuff is formed of ceramic.

7. A jump stud assembly comprising: a housing; electrically conductive first and second studs extending through a floor of the housing and into a compartment defined by the housing; a removable cover enclosing the compartment; a fuse module comprising: a mounting block having a through-hole extending therethrough; a fuse plate comprising: an upper portion disposed on a top

of the mounting block and having a through-hole aligned with the through-hole of the mounting block; a lower portion disposed on a bottom of the mounting block and having a through-hole aligned with the through-hole of the mounting block; and a fusible element disposed adjacent a sidewall of the mounting block and connecting the upper portion of the fuse plate to the lower portion of the fuse plate; wherein the fuse module is mounted on a portion of the first stud outside of the compartment, with the first stud extending through the through-holes of the upper portion of the fuse plate, the mounting block, and the lower portion of the fuse plate, and with the upper portion of the fuse plate in electrical communication with the first stud; a ring terminal of an electrical conductor disposed on the first stud in electrical contact with the lower portion of the fuse plate; an electrically conductive first nut threadedly engaging the first stud between the housing and a first side of the fuse module, the first nut disposed in electrical contact with the upper portion of the fuse plate; and an electrically conductive second nut threadedly engaging the first stud on a second side of the fuse module opposite the first side, the second nut holding the ring terminal in engagement with the lower portion of the fuse plate.

8. The jump stud assembly of claim 7, further comprising an electrically insulating ferrule disposed on the first stud between the ring terminal and the second nut, the ferrule having a planar portion disposed in flat engagement with the ring terminal and a tubular shank extending through the ring terminal, the through-hole of the lower portion, and into the through-hole of the mounting block.

9. The jump stud assembly of claim 7, further comprising a tubular, torque limiting cuff disposed within the through-hole of the mounting block and extending between the upper portion of the fuse plate and the lower portion of the fuse plate, wherein the first stud extends through the torque limiting cuff.

10. The jump stud assembly of claim 9, wherein the torque limiting cuff is formed of an electrically insulating material.

11. The jump stud assembly of claim 10, wherein the torque limiting cuff is formed of ceramic.

12. A jump stud assembly comprising: a housing; electrically conductive first and second studs extending through a floor of the housing and into a compartment defined by the housing; and a fuse module comprising: a mounting block having a through-hole extending therethrough; a fuse plate comprising: an upper portion disposed on a top of the mounting block and having a through-hole aligned with the through-hole of the mounting block; a lower portion disposed on a bottom of the mounting block and having a through-hole aligned with the through-hole of the mounting block; and a fusible element disposed adjacent a sidewall of the mounting block and connecting the upper portion of the fuse plate to the lower portion of the fuse plate; wherein the fuse module is mounted to the first stud outside of the compartment, with an electrically insulated bolt extending through the through-holes of the lower portion of the fuse plate, the mounting block, and the upper portion of the fuse plate, and threadedly engaging a threaded aperture of the first stud, with the upper portion of the fuse plate in electrical communication with the first stud.

13. The jump stud assembly of claim 12, further comprising a removable cover enclosing the compartment.

14. The jump stud assembly of claim 12, wherein the insulated comprises: a head portion; a shank portion extending from the head portion; a sleeve formed of an electrically insulating material surrounding a non-threaded portion of the shank portion proximate the head portion; and a washer formed of an electrically insulating material surrounding the shank portion and flatly abutting the head portion.

15. The jump stud assembly of claim 12, further comprising a tubular, torque limiting cuff disposed within the through-hole of the mounting block and extending between the upper portion of the fuse plate and the lower portion of the fuse plate, wherein the first stud extends through the torque limiting cuff.

16. The jump stud assembly of claim 15, wherein the torque limiting cuff is formed of an

electrically insulating material.

17. The jump stud assembly of claim 16, wherein the torque limiting cuff is formed of ceramic.