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(54) **VEHICLE WITH A FIRE EXTINGUISHUNG SYSTEM**

FAHRZEUG MIT FEUERLÖSCHANLAGE

VÉHICULE ÉQUIPÉ D'UN SYSTÈME DE LUTTE CONTRE L'INCENDIE

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Description

TECHNICAL FIELD

[0001] The present invention relates to a fire extinguishing system for a vehicle, in particular an emergency cooling system for an alternative drive vehicle, such as an electric vehicle or a gas/hydrogen powered vehicle.

STATE OF THE KNOWN ART

[0002] As is known, the need to reduce the environmental impact of transport vehicles is increasingly felt, especially heavy vehicles, such as public transport vehicles.

[0003] To this end, electric or alternative fuels such as gas, LNG (Liquid Natural Gas) or CNG (Compressed Natural Gas) vehicles, which can be used on internal combustion engines, or hydrogen, which can be used on fuel cell engines, are increasingly used.

[0004] As is known, electric vehicles comprise battery packs configured to provide a sufficient source of electrical energy to allow traction of the vehicle as well as the operation of other auxiliary comfort devices such as the air conditioning system or functional devices, such as screens for displaying information useful to passengers.

[0005] Also as known, the electric batteries used in said vehicles are electrochemical storage devices which, during use in charging and discharging, tend to heat up.

[0006] It is possible that the heating reaches levels such as to generate a phenomenon called "thermal runaway" in which the temperature triggers exothermic reactions that further raise the temperature and therefore consequently leading to disastrous consequences such as explosions or fires that can involve the entire vehicle and its occupants.

[0007] In the case of gas or hydrogen vehicles, the fuel is normally housed in pressurized tanks carried by the vehicle itself and made of steel or composite material to allow the same to be sealed at high pressure, for example at a pressure greater than 100 bar.

[0008] However, it is known that hydrogen is an extremely volatile element, light and reactive with the other elements of the atmosphere, mainly oxygen. Similarly, it is known that the gas is susceptible to explosion.

[0009] In the event of an accident involving a vehicle comprising a pressurized gas or hydrogen tank, a fire of such magnitude could occur that could cause the tank to explode and/or the fire could spread to the rest of the vehicle, with consequent damage to property or people in the immediate vicinity.

[0010] The need is therefore felt to provide, both in the case of electric vehicles and in the case of gas/hydrogen vehicles, to suddenly cool the battery packs or the pressurized tanks in order to avoid fire in the vehicle 1 and/or potential explosions.

[0011] However, especially in the case of public transport vehicles, said battery packs/pressurized tanks are

normally housed on the roof of the vehicle in order not to limit the space suitable for passenger transport.

[0012] Said positioning makes it extremely difficult for rescuers to be able to effectively cool the battery packs/pressurized tanks.

[0013] Known fire extinguishing systems are disclosed in published documents US2016346573 A1, US2018289996 A1, FR2991258 A1, CN 111017024 A or DE102012208000 A1.

[0014] The need is therefore felt to provide fire extinguishing systems that can allow sudden and easy cooling of the battery packs and/or pressurized tanks.

[0015] The object of the present invention is to satisfy the above requirements in an optimized and inexpensive way.

SUMMARY OF THE INVENTION

[0016] The aforesaid object is achieved by a vehicle provided with a fire extinguishing system as claimed in the attached claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] For a better understanding of the present invention, a preferred embodiment is described in the following, by way of non-limiting example and with reference to the attached drawings in which:

- Figure 1 is a perspective view illustrating a vehicle provided with a fire extinguishing system according to the present invention;
- Figure 2 is a schematic perspective view illustrating a portion of the fire extinguishing system of Figure 1 according to a first embodiment of the present invention; and
- Figure 3 is a schematic perspective view illustrating a portion of the fire extinguishing system of Figure 1 according to a first embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0018] Figure 1 illustrates a vehicle 1, such as a vehicle for the public transport of people, provided with a plurality of walls 2 defining an internal volume suitable for the transport of passengers. As is known, said walls comprise a floor, not shown, a plurality of side walls 2a, a front/rear wall 2b and a roof 2c.

[0019] In particular, the vehicle 1 comprises a plurality of energy storage means 4 carried by the vehicle 1 itself and configured to define an energy source usable by driving means (not illustrated) of the vehicle 1 allowing the operation thereof. Said energy storage means 4 can be packs of electric batteries or compressed gas tanks such as hydrogen or liquid natural gas, LNG (Liquid Natural Gas) or compressed natural gas, CNG (Compressed Natural Gas).

[0020] In the accompanying illustrative figures, the vehicle 1 is an electric bus and the energy storage means 4 comprise battery packs 5, however, as is clear from the following, the present invention can be validly used if the energy storage means 4 were pressurized tanks and the vehicle was of a different type.

[0021] As illustrated, the battery packs 5 are housed inside respective casing 6 fixed on the roof 2c of the vehicle 1. Preferably, each casing 6 can be enclosed within a space 7 delimited by a lid 8 enclosing the various casings 6 so as to separate them from the external environment.

[0022] In particular, each casing 6 can house inside the same, as is known, in addition to the battery packs 5, relative cables and electronic elements necessary for the transfer of electrical energy between the batteries and the driving means of the vehicle 1, not illustrated.

[0023] According to the invention, the vehicle 1 comprises a fire extinguishing system 10 comprising at least one hydraulic interface 11 configured to couple with a pipe configured to inject a fire extinguishing fluid into the system 10, diffuser means 12 configured to spray towards the energy storage means 4 the fluid injected by means of the hydraulic interface 11 and a hydraulic distribution circuit 13 configured to fluidically connect the hydraulic interface 11 with the diffuser means 12.

[0024] In greater detail, the fire extinguishing system 10 comprises a plurality of hydraulic interfaces 11 advantageously obtained in the side walls 2a of the vehicle 1, preferably, as in the case described, in the front and rear portion of the vehicle 1.

[0025] Preferably, these hydraulic interfaces 11 are made at a height close to the wheels of the vehicle 1, advantageously between the wheels of the vehicle 1 and windows of the vehicle in order to be at human height so as to allow rescuers to easily connect a pipe with the hydraulic interface 11.

[0026] Specifically, each hydraulic interface 11 comprises an opening configured to allow the insertion of a fire extinguishing type pipe or any pipe suitable for inserting pressurized liquid. The fluid inserted can be water or any mixture of water and fire extinguishing agents of a known type.

[0027] The hydraulic distribution circuit 13 advantageously comprises a network of pipes 14, made with a heat and combustion resistant material and configured to fluidically connect the hydraulic interfaces 11 with the diffuser means 12.

[0028] Therefore, in the example illustrated, vertical pipes 14 are provided, carried by the side walls 2a and connected directly to a respective hydraulic interface 11 and horizontal pipes 14 carried by the roof 2c connected to the vertical pipes 14 and to each diffuser means 12.

[0029] The diffuser means 12 according to the invention comprise at least one nozzle 16, 17, as described in the following and selectively connectable to an end portion of a pipe 14 and facing a respective casing 6 of a battery pack 5.

[0030] Figure 2 illustrates an embodiment of the diffuser means 12 according to the invention. In this embodiment the diffuser means 12 comprise a nozzle 16 configured to define a direct jet of refrigerant fluid focusing on a limited area of the casing 6 of the battery packs 5.

[0031] Consequently, to said shape of diffuser means 12, the casing 6 according to the invention defines an opening 6a provided with a meltable element 15 configured to close the opening 6a when the temperature of the battery pack 5 is lower than a predetermined threshold temperature. If the temperature of the battery pack 5 is higher than the predetermined threshold temperature, said meltable element 15 is configured to melt and leave the opening 6a free so as to allow the latter to communicate with the space 7. In this way, the jet of refrigerant fluid coming from the nozzle 16 can penetrate inside the battery pack 5 by passing through the opening 6a.

[0032] Figure 3 illustrates a second embodiment of the diffuser means 12. In said embodiment the diffuser means 12 comprise a nozzle 17 configured to define a jet of diffused fluid (also called mist or fog) configured to spray a large area of the outer surface of the casing 6. Said configuration provides a screen of fluid for thermal protection capable of confining the energy storage means 4 involved from the rest of the vehicle 1.

[0033] According to a further embodiment, not illustrated and usable on a casing 6 provided with a meltable element 15, the diffuser means 12 can comprise a variable jet nozzle configured to vary the shape of the jet from closed, to full to a fog jet.

[0034] For example, said nozzle is a motorized nozzle that can comprise a lever mechanism, operated by a specialized actuator, configured to vary the opening of the nozzle in order to vary according to the types described above.

[0035] Advantageously, the vehicle 1 comprises temperature sensor means, not illustrated, configured to detect the temperature of each of the energy storage means 4. In particular, said sensors can be of any type and be placed in the immediate vicinity, for example on the casing 6 or inside the battery packs 5.

[0036] The vehicle 1 comprises, furthermore, an electronic unit electrically connected to the temperature sensor means and comprising processing means configured to process the signal detected by the temperature sensor means and compare it with a threshold temperature stored in the electronic unit. Preferably, said electronic unit can be the ECU of the vehicle 1.

[0037] If said temperature is higher than said threshold, the driver of the vehicle 1 is warned of the danger of fire due to overheating of the energy storage means 4, by visual or acoustic signalling means such as, for example, a warning light and/or an acoustic signal. In this way, the driver can alert the emergency vehicles and ask for assistance.

[0038] The vehicle 1 can further comprise telecommunication means, not illustrated, electronically connected to the electronic unit and configured to communicate with

one or more known emergency stations, for example the fire department, the need for fire rescue and essential vehicle data stored in the electronic unit of the vehicle, such as the position (for example GPS) of the same, the type of vehicle, the licence plate number, the presence of the fire extinguishing system 10 according to the present invention, etc. In this way, if there is an overheating condition of the energy storage means 4, emergency assistance is automatically requested.

[0039] Advantageously, if a nozzle of the variable jet type as described above is present, the control of the actuator means can be carried out by the aforementioned electronic unit or remotely by short-range remote control means, for example WiFi.

[0040] Said remote control means can comprise a remote control, provided on the vehicle and usable by the driver or integrated by way of an app that can be downloaded on any smartphone.

[0041] The operation of the vehicle 1 provided with a fire extinguishing system 10 as described above is as follows.

[0042] If the electronic unit detects that the temperature of the energy storage means 4 exceeds the predetermined threshold, it will generate an overheating warning signal to the driver of the vehicle 1 and, if foreseen, it will send an intervention request signal to the nearest emergency station.

[0043] Whenever possible, the rescuers will be able to connect their pipes directly into the openings of the hydraulic interfaces 11 so as to insert the fluid into the circuit 13. Inside the latter, the fluid will rise to the roof 2c and will be conveyed to each diffuser means 12.

[0044] The casing 6 is provided with a meltable element 15 and the jet provided by the nozzle 16 will be direct and therefore will be sent directly to the battery pack 5, flooding the same.

[0045] In the event that a casing 6 is provided which is totally isolated from the external environment, the jet provided by the nozzle 17 will be spread over a large portion of the casing 6 itself, thus directly cooling the battery pack on the inside thereof.

[0046] Obviously, the operation is similar when referring to pressurized gas tanks or if the energy storage means 4 are not housed on the roof but in other inaccessible parts of the vehicle 1.

[0047] If a variable flow nozzle is provided, the electronic unit or remotely the driver of the vehicle 1 or a rescuer can adjust the shape of the jet of the diffuser means 12 according to the type of overheating/fire present in the energy storage means 4.

[0048] From the foregoing, the advantages of a vehicle 1 provided with a fire extinguishing system 10 according to the invention are evident.

[0049] Thanks to the fire extinguishing system 10 it is possible to cool/extinguish a possible ignition of fire relating to the energy storage means 4, thus avoiding an explosion or the spreading of phenomena such as thermal runaway.

[0050] In particular, thanks to the fire extinguishing system 10 described, the driver and/or the rescuers can be promptly notified in order to act as soon as possible.

[0051] Furthermore, rescuers are greatly facilitated because they can act at human height to insert the fire extinguishing fluid that will reach the energy storage means 4, even if placed at heights that are difficult to reach or inside panels of the vehicle 1.

[0052] The use of nozzles 16, 17 of different types makes it possible to obtain a versatile fire extinguishing system 10 which can be used on energy storage means 4 provided with closed casings or provided with a fire extinguishing access, such as that by way of the described meltable element.

[0053] The use of heat and flame resistant pipes 14 allows the fire extinguishing fluid to reach, even if it has already spread, various parts of the vehicle 1.

[0054] The use of a variable flow nozzle, possibly remotely controlled, allows to implement an overheating/fire containment strategy optimized according to the specific situation of the energy storage vehicles 4 in total safety.

[0055] Finally, it is clear that modifications and variations can be made to the vehicle 1 provided with a fire extinguishing system 10 according to the present invention, which, however, do not depart from the scope defined by the claims.

[0056] As already mentioned, the energy storage means 4 can be of various types (electric or explosive fluid) and can be enclosed in casings of different shape and position in the vehicle 1.

[0057] Furthermore, the number of hydraulic interfaces, of energy storage means 4 and the type of the hydraulic circuit 13 can vary as a result of the type of vehicle 1.

[0058] Finally, it is clear that the nozzles 16, 17 can be used in combination with one another.

Claims

1. Vehicle (1) comprising at least one energy storage means (4) and driving means configured to use the energy stored in said at least one energy storage means (4) to allow the operation of said vehicle (1), said vehicle (1) comprising a fire extinguishing system (10) comprising:

- at least one hydraulic interface (11) configured to allow the insertion of fire extinguishing fluid into said fire extinguishing system (10);
- diffuser means (12) configured to spray said fire extinguishing fluid towards the at least one energy storage means (4); and
- a hydraulic circuit (13) fluidically connecting said at least one hydraulic interface (11) with said diffuser means (12), wherein said diffuser means (12) comprise at

- least one nozzle (16, 17) configured to spray said fluid from said hydraulic circuit (13) towards said energy storage means (4),
characterized in that said energy storage means (4) comprises a casing (6), said casing_(6) defining an opening (6a) configured to house a meltable element (15), said meltable element (15) being configured to melt when said energy storage means (4) reaches a predetermined threshold temperature, said diffuser means (12) comprising a direct jet nozzle (16) configured to spray said fluid inside said casing (6) through said opening (6a).
2. Vehicle according to claim 1, wherein said hydraulic circuit (13) comprises pipes (14) connecting said at least one hydraulic interface (11) with said diffuser means (12).
 3. Vehicle according to claim 2, wherein said pipes (14) are made of heat and combustion resistant material.
 4. Vehicle according to one of the preceding claims, comprising a plurality of hydraulic interfaces (11), said plurality of hydraulic interfaces (11) being placed at the front and the rear of said vehicle (1).
 5. Vehicle according to one of the preceding claims, wherein said at least one energy storage means (4) is placed on a roof (2c) of said vehicle (1) and wherein said at least one hydraulic interface (11) is placed on a side wall (2a) of said vehicle (1).
 6. Vehicle according to claim 5, wherein said at least one hydraulic interface (11) is placed at human height.
 7. Vehicle according to claim 5 or 6, wherein said at least one hydraulic interface (11) is placed at a height between the wheels and windows of said vehicle (1) on said side wall (2a).
 8. Vehicle according to any of the preceding claims, wherein said energy storage means (4) comprises a casing (6), said diffuser means (12) comprising a diffuser jet nozzle (17) configured to spray said fluid on said casing (6).
 9. Vehicle according to any of the preceding claims, wherein said nozzle is a variable jet nozzle, said vehicle (1) comprises actuator means configured to vary said jet of said nozzle.
 10. Vehicle according to claim 9, wherein said actuator means are controlled remotely.
 11. Vehicle according to claim 10, said remote control is established by electromagnetic signals configured to control said actuator means, said electromagnetic signals being generated by a remote control dedicated to said actuator means, or by a smartphone provided with an app configured to control said actuator means.
 12. Vehicle according to any one of the preceding claims, comprising temperature sensor means configured to detect the temperature of said at least one energy storage means (4) and an electronic unit electronically connected to said temperature sensor means and comprising processing means configured to acquire a temperature signal detected by said sensor means, said electronic unit being configured to process said detected temperature signal and to compare it with a stored threshold temperature value, if said detected temperature value is greater than said stored threshold temperature value, signaling to a driver of said vehicle (1) an overheating condition of said at least one energy storage means (4).
 13. Vehicle according to claim 12, comprising visual and/or sound signalling means, electrically connected to said electronic unit and configured to visually and/or sonically signal an overheating condition to said driver.
 14. Vehicle according to claim 12 or 13, wherein said electronic unit is the ECU of said vehicle (1).
 15. Vehicle according to one of the preceding claims, wherein said at least one energy storage means (4) comprises a pack of electric batteries (5) or a pressurized fuel gas tank.
 16. Vehicle according to one of the claims from 12 to 14, comprising telecommunication means electronically connected to said electronic unit, said telecommunication means being configured to send a signal to a remote emergency station if said temperature detected by said sensor means is greater than said stored threshold temperature value.
 17. System comprising a remote emergency station and a vehicle (1) according to one of the claims from 12 to 16, said vehicle (1) and said remote emergency station comprising telecommunication means configured to allow signalling from said vehicle (1) to said remote emergency station in order to communicate an overheating condition of said at least one energy storage means (4).
 18. System comprising a vehicle (1) according to claim 10 or 11 and remote control means configured to control the jet of said nozzle.

Patentansprüche

1. Fahrzeug (1), umfassend zumindest ein Energiespeichermittel (4) und Antriebsmittel, ausgebildet zur Nutzung der in dem zumindest einen Energiespeichermittel (4) gespeicherten Energie zum Betrieb des Fahrzeugs (1), welches Fahrzeug (1) ein Feuerlöschsystem (10) umfasst, umfassend:
 - zumindest hydraulischen Anschluss (11), ausgebildet, um die Einleitung eines Feuerlöschfluids in das Feuerlöschsystem (10) zu ermöglichen;
 - Diffusionsmittel (12), ausgebildet, um das Feuerlöschfluid in Richtung des zumindest einen Energiespeichermittels (4) zu sprühen; und
 - einen hydraulischen Kreislauf (13), der den zumindest einen hydraulischen Anschluss (11) mit dem Diffusionsmittel (12) fluidtechnisch verbindet,
 wobei die Diffusionsmittel (12) zumindest eine Düse (16, 17) umfassen, ausgebildet, um das Fluid aus dem hydraulischen Kreislauf (13) in Richtung des Energiespeichermittels (4) zu sprühen,
dadurch gekennzeichnet, dass das Energiespeichermittel (4) ein Gehäuse (6) umfasst, welches Gehäuse (6) eine zur Aufnahme eines schmelzbaren Elements (15) ausgebildete Öffnung (6a) begrenzt, welches schmelzbare Element (15) dazu ausgebildet ist, zu schmelzen, wenn das Energiespeichermittel (4) eine vorbestimmte Schwelltemperatur erreicht, wobei das Diffusionsmittel (12) eine Direktstrahldüse (16) umfasst, ausgebildet zum Sprühen des Fluids in das Gehäuse (6) durch die Öffnung (6a).
2. Fahrzeug gemäß Anspruch 1, bei welchem der Hydraulikkreislauf (13) Leitungen (14) umfasst, die den zumindest einen hydraulischen Anschluss (11) mit dem Diffusionsmittel (12) verbinden.
3. Fahrzeug gemäß Anspruch 2, bei welchem die Leitungen (14) aus hitze- und feuerbeständigem Material bestehen.
4. Fahrzeug gemäß einem der vorhergehenden Ansprüche, umfassend eine Mehrzahl hydraulischer Anschlüsse (11), welche Mehrzahl hydraulischer Anschlüsse (11) vorn und hinten am Fahrzeug angeordnet sind.
5. Fahrzeug gemäß einem der vorhergehenden Ansprüche, bei welchem das zumindest eine Energiespeichermittel (4) auf einem Dach (2c) des Fahrzeugs angeordnet ist und wobei der zumindest eine hydraulische Anschluss (11) an einer Seitenwand (2a) des Fahrzeugs angeordnet ist.
6. Fahrzeug gemäß Anspruch 5, bei welchem der zumindest eine hydraulische Anschluss (11) auf menschlicher Körperhöhe angeordnet ist.
7. Fahrzeug gemäß Anspruch 5 oder 6, bei welchem der zumindest eine hydraulische Anschluss (11) auf einer Höhe zwischen den Rädern und den Fenstern des Fahrzeugs (1) an einer Seitenwand (2a) angeordnet ist.
8. Fahrzeug gemäß einem der vorhergehenden Ansprüche, bei welchem das Energiespeichermittel (4) ein Gehäuse (6) umfasst und das Diffusionsmittel (12) eine Diffusionsstrahldüse (17) umfasst, die zum Sprühen des Fluids auf das Gehäuse (6) ausgebildet sind.
9. Fahrzeug gemäß einem der vorhergehenden Ansprüche, bei welchem die Düse eine variable Strahldüse ist und das Fahrzeug (1) Betätigungsmittel umfasst, die zur Veränderung des Strahls der Düse ausgebildet sind.
10. Fahrzeug gemäß Anspruch 9, bei welchem die Betätigungsmittel ferngesteuert betätigt werden.
11. Fahrzeug gemäß Anspruch 10, bei welchem die Fernsteuerung durch elektromagnetische Signale realisiert wird, die zur Steuerung der Betätigungsmittel ausgebildet sind, welche elektromagnetischen Signale durch eine Fernsteuerung erzeugt werden, die für die Betätigungsmittel vorgesehen ist, oder durch ein Smartphone, das mit einer Applikation versehen ist, die zur Steuerung der Betätigungsmittel ausgebildet ist.
12. Fahrzeug gemäß einem der vorhergehenden Ansprüche, umfassend Temperatursensormittel, ausgebildet zur Messung der Temperatur des zumindest einen Energiespeichermittels (4), und eine elektronische Einheit, die elektronisch mit dem Temperatursensormittel verbunden ist und Verarbeitungsmittel umfasst, die zum Empfang eines Temperatursignals, das durch die Sensormittel gemessen wird, ausgebildet sind, wobei die elektronische Einheit dazu ausgebildet ist, das gemessene Temperatursignal zu verarbeiten und es mit einem gespeicherten Schwelltemperaturwert zu vergleichen, und dann, falls die gemessene Temperatur höher ist als der gespeicherte Schwelltemperaturwert, einem Fahrer des Fahrzeugs (1) einen Überhitzungszustand des zumindest einen Energiespeichermittels (4) zu signalisieren.
13. Fahrzeug gemäß Anspruch 12, umfassend visuelle und/oder akustische Signalmittel, die elektrisch mit der elektronischen Einheit verbunden sind und dazu ausgebildet sind, dem Fahrer visuell und/oder akus-

tisch einen Überhitzungszustand zu signalisieren.

14. Fahrzeug gemäß Anspruch 12 oder 13, bei welchem die elektronische Einheit die elektronische Steuereinheit (ECU) des Fahrzeugs (1) ist. 5
15. Fahrzeug gemäß einem der vorhergehenden Ansprüche, bei welchem das zumindest eine Energiespeichermittel (4) ein Pack elektrischer Batterien (5) oder einen mit Druck beaufschlagten Treibstoffgastank umfasst. 10
16. Fahrzeug gemäß einem der Ansprüche 12 bis 14, umfassend Telekommunikationsmittel, die elektronisch mit der elektronischen Einheit verbunden sind, welche Telekommunikationsmittel dazu ausgebildet sind, ein Signal an eine entfernte Notfallstation zu senden, falls die von den Sensormitteln gemessene Temperatur höher ist als der gespeicherte Schwelltemperaturwert. 15 20
17. System, umfassend eine entfernte Notfallstation und ein Fahrzeug (1) gemäß einem der Ansprüche 12 bis 16, wobei das Fahrzeug (1) und die entfernte Notfallstation Telekommunikationsmittel umfassen, ausgebildet, um eine Signalübertragung vom Fahrzeug (1) zu der entfernten Notfallstation zu ermöglichen, um einen Überhitzungszustand des zumindest einen Energiespeichermittels (4) mitzuteilen. 25 30
18. System, umfassend ein Fahrzeug (1) gemäß einem der Ansprüche 10 oder 11 und Fernsteuerungsmittel, ausgebildet zur Steuerung des Strahls der Düse. 35

Revendications

1. Véhicule (1) comprenant au moins un moyen de stockage d'énergie (4) et des moyens d'entraînement configurés pour utiliser l'énergie stockée dans ledit au moins un moyen de stockage d'énergie (4) pour permettre le fonctionnement dudit véhicule (1), ledit véhicule (1) comprenant un système d'extinction d'incendie (10) comprenant : 40
 - au moins une interface hydraulique (11) configurée pour permettre l'insertion d'un fluide d'extinction d'incendie dans ledit système d'extinction d'incendie (10) ;
 - des moyens de diffusion (12) configurés pour pulvériser ledit fluide d'extinction d'incendie vers l'au moins un moyen de stockage d'énergie (4) ; et
 - un circuit hydraulique (13) connectant de manière fluïdique ladite au moins une interface hydraulique (11) auxdits moyens de diffusion (12), dans lequel lesdits moyens de diffusion (12) comprennent au moins une buse (16, 17) con-

figurée pour pulvériser ledit fluide depuis ledit circuit hydraulique (13) vers ledit moyen de stockage d'énergie (4),

caractérisé en ce que ledit moyen de stockage d'énergie (4) comprend un boîtier (6), ledit boîtier (6) définissant une ouverture (6a) configurée pour loger un élément fusible (15), ledit élément fusible (15) étant configuré pour fondre lorsque ledit moyen de stockage d'énergie (4) atteint une température seuil prédéterminée, lesdits moyens de diffusion (12) comprenant une buse (16) à jet direct configurée pour pulvériser ledit fluide à l'intérieur dudit boîtier (6) à travers ladite ouverture (6a).

2. Véhicule selon la revendication 1, dans lequel ledit circuit hydraulique (13) comprend des tuyaux (14) connectant ladite au moins une interface hydraulique (11) auxdits moyens de diffusion (12).
3. Véhicule selon la revendication 2, dans lequel lesdits tuyaux (14) sont réalisés en un matériau résistant à la chaleur et à la combustion.
4. Véhicule selon l'une des revendications précédentes, comprenant une pluralité d'interfaces hydrauliques (11), ladite pluralité d'interfaces hydrauliques (11) étant placée à l'avant et à l'arrière dudit véhicule (1).
5. Véhicule selon l'une des revendications précédentes, dans lequel ledit au moins un moyen de stockage d'énergie (4) est placé sur un toit (2c) dudit véhicule (1), et dans lequel ladite au moins une interface hydraulique (11) est placée sur une paroi latérale (2a) dudit véhicule (1).
6. Véhicule selon la revendication 5, dans lequel ladite au moins une interface hydraulique (11) est placée à hauteur d'homme.
7. Véhicule selon la revendication 5 ou 6, dans lequel ladite au moins une interface hydraulique (11) est placée à une hauteur entre les roues et les fenêtres dudit véhicule (1) sur ladite paroi latérale (2a).
8. Véhicule selon l'une des revendications précédentes, dans lequel ledit moyen de stockage d'énergie (4) comprend un boîtier (6), lesdits moyens de diffusion (12) comprenant une buse (17) à jet à diffusion configurée pour pulvériser ledit fluide sur ledit boîtier (6).
9. Véhicule selon l'une des revendications précédentes, dans lequel ladite buse est une buse à jet variable, ledit véhicule (1) comprend des moyens d'actionnement configurés pour faire varier ledit jet de ladite buse.

10. Véhicule selon la revendication 9, dans lequel lesdits moyens d'actionnement sont commandés à distance.
11. Véhicule selon la revendication 10, où ladite commande à distance est établie par des signaux électromagnétiques configurés pour commander lesdits moyens d'actionnement, lesdits signaux électromagnétiques étant générés par une commande à distance dédiée auxdits moyens d'actionnement, ou par un téléphone intelligent pourvu d'une application configurée pour commander lesdits moyens d'actionnement. 5 10
12. Véhicule selon l'une des revendications précédentes, comprenant des moyens capteurs de température configurés pour détecter la température dudit au moins un moyen de stockage d'énergie (4), et une unité électronique connectée électroniquement auxdits moyens capteurs de température et comprenant des moyens de traitement configurés pour acquérir un signal de température détecté par lesdits moyens capteurs, ladite unité électronique étant configurée pour traiter ledit signal de température détecté et le comparer à une valeur de température seuil stockée, si ladite valeur de température détectée est supérieure à ladite valeur de température seuil stockée, signaler à un conducteur dudit véhicule (1) un état de surchauffe dudit au moins un moyen de stockage d'énergie (4). 15 20 25 30
13. Véhicule selon la revendication 12, comprenant des moyens de signalisation visuelle et/ou sonore connectés électriquement à ladite unité électronique et configurés pour signaler de manière visuelle et/ou sonore un état de surchauffe audit conducteur. 35
14. Véhicule selon la revendication 12 ou 13, dans lequel ladite unité électronique est l'ECU dudit véhicule (1). 40
15. Véhicule selon l'une des revendications précédentes, dans lequel ledit au moins un moyen de stockage d'énergie (4) comprend un bloc-batterie électrique (5) ou un réservoir de combustible gazeux sous pression. 45
16. Véhicule selon l'une des revendications de 12 à 14, comprenant des moyens de télécommunication connectés électriquement à ladite unité électronique, lesdits moyens de télécommunication étant configurés pour envoyer un signal à un poste d'urgence à distance si ladite température détectée par lesdits moyens capteurs est supérieure à ladite valeur de température seuil stockée. 50 55
17. Système comprenant un poste d'urgence à distance et un véhicule (1) selon l'une des revendications de 12 à 16, ledit véhicule (1) et ledit poste d'urgence à distance comprenant des moyens de télécommunication configurés pour permettre la signalisation dudit véhicule (1) audit poste d'urgence à distance afin de communiquer un état de surchauffe dudit au moins un moyen de stockage d'énergie (4). 18. Système comprenant un véhicule (1) selon la revendication 10 ou 11 et des moyens de commande à distance configurés pour commander le jet de ladite buse.

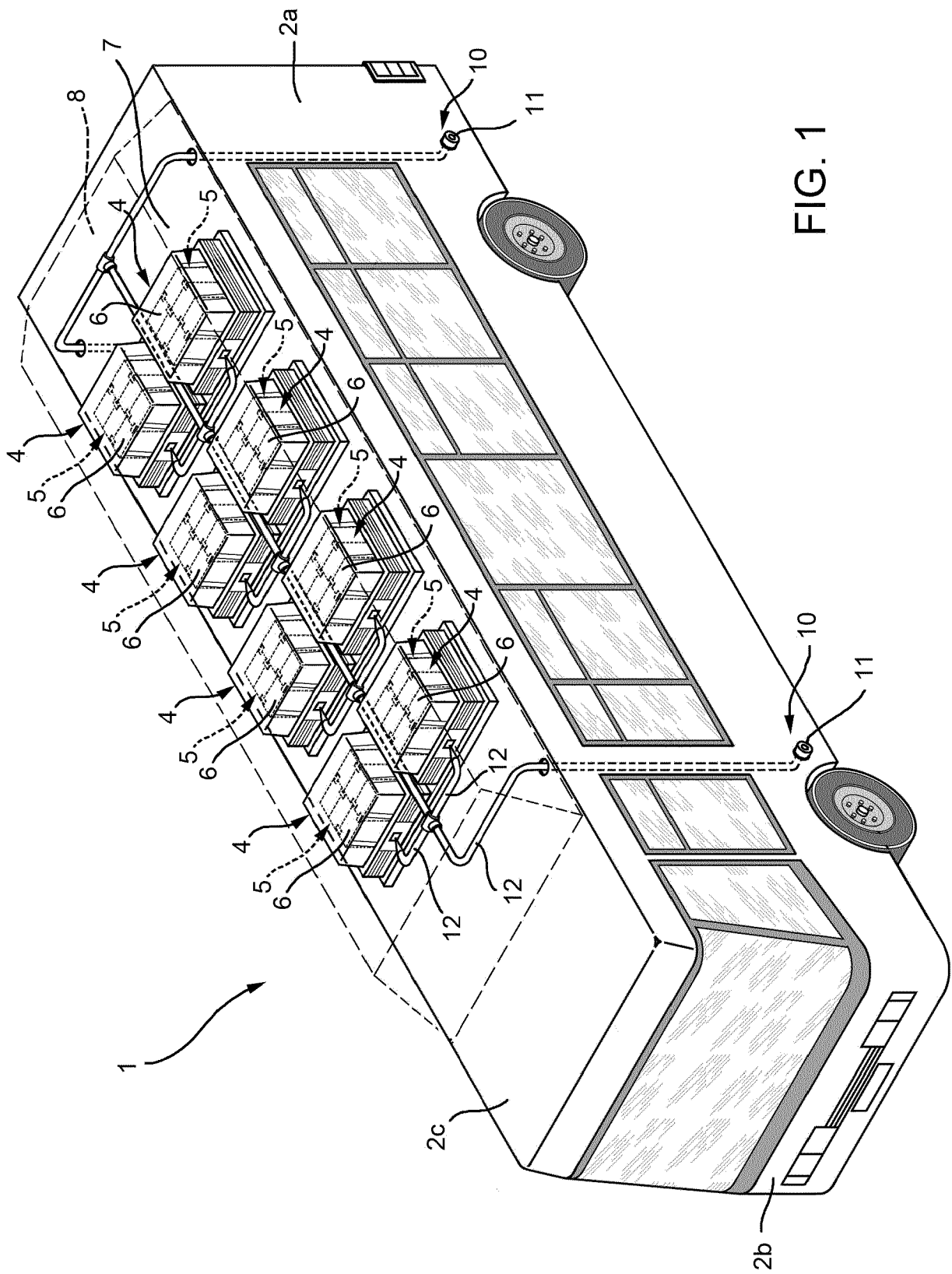


FIG. 1

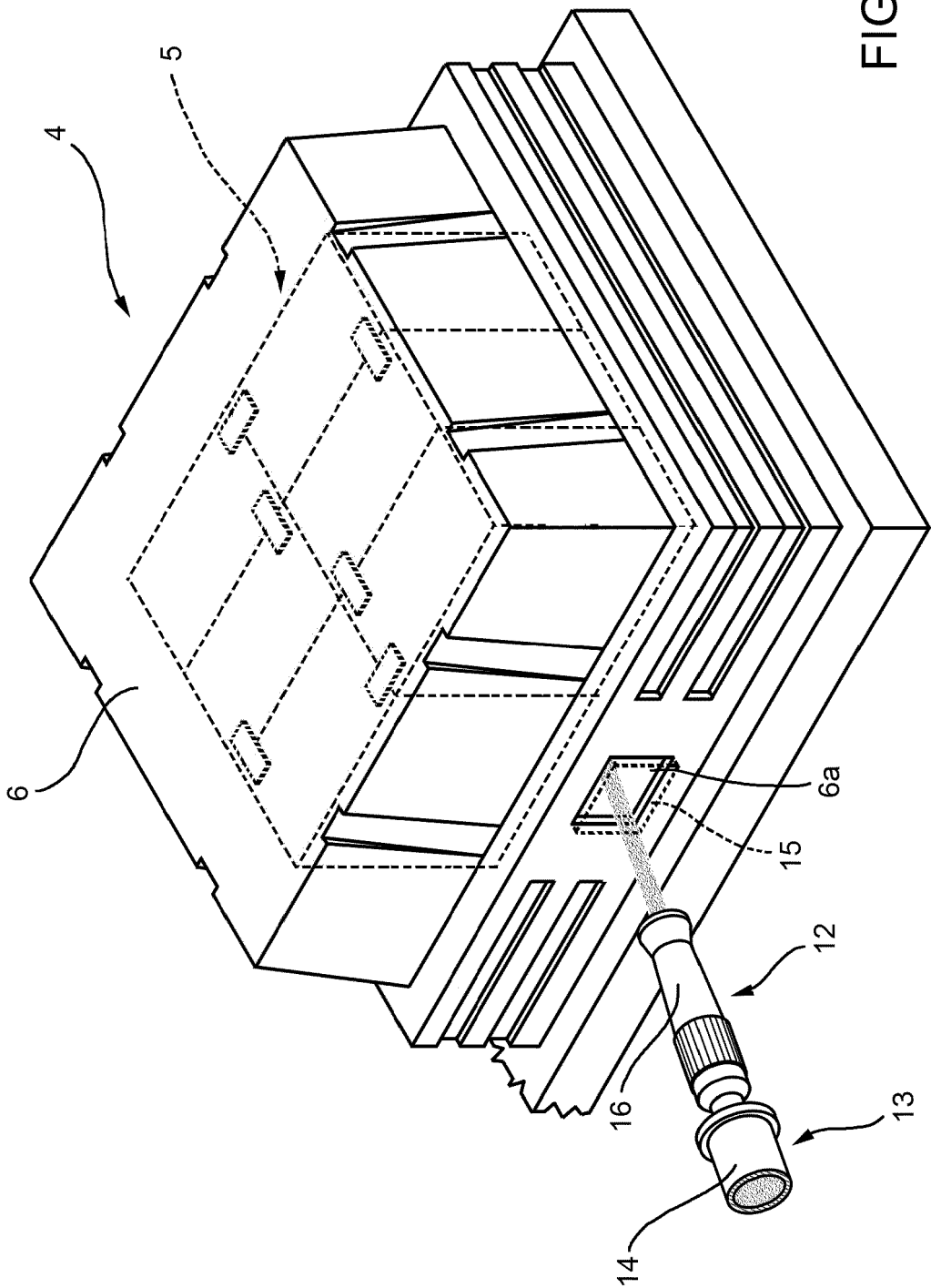


FIG. 2

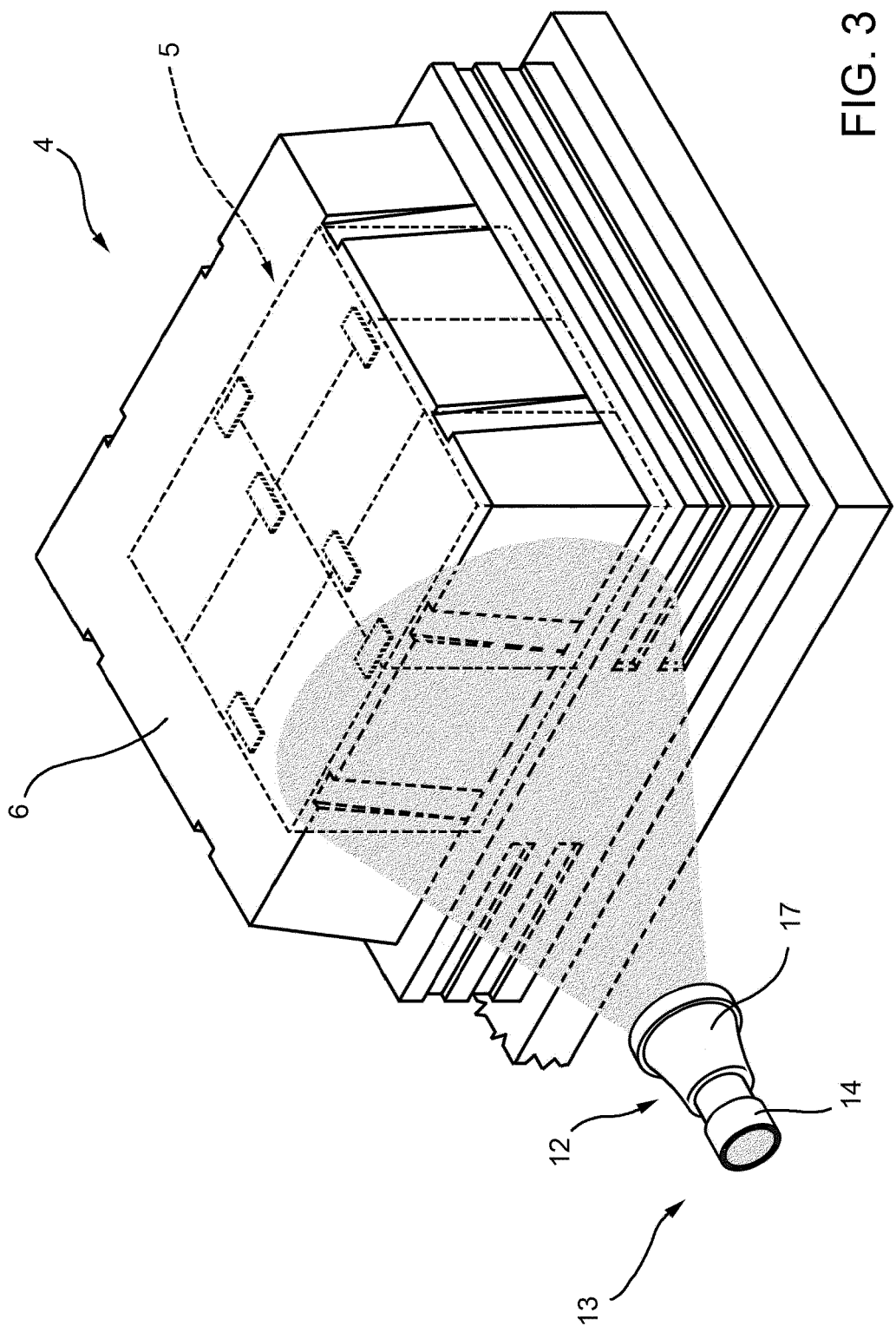


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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