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(54) **POWER TRAIN UNIT, METHOD FOR CONTROLLING SUCH A UNIT AND AUTOMOTIVE VEHICLE
EQUIPPED WITH SUCH A UNIT**

ANTRIEBSSTRANGEINHEIT, VERFAHREN ZUR STEUERUNG SOLCH EINER EINHEIT UND MIT
SOLCH EINER EINHEIT VERSEHENES KRAFTFAHRZEUG

UNITÉ DE TRANSMISSION, PROCÉDÉ POUR COMMANDER UNE TELLE UNITÉ ET VÉHICULE
AUTOMOBILE ÉQUIPÉ D'UNE TELLE UNITÉ

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] This invention concerns a power train unit for an automotive vehicle. It also concerns a method for controlling the working conditions of such a power train unit and an automotive vehicle equipped with such a power train unit.

BACKGROUND OF THE INVENTION

[0002] Automotive vehicles are usually provided with an internal combustion engine which belongs to a power train unit installed in an engine compartment of the vehicle. In such a power train unit, fluid under pressure, e.g. fuel or oil, flows from one part to another, in particular in order to feed the cylinders of the engine or to lubricate some moving parts. In case of a leak in a fuel or oil circuit, the leaking fluid might come into contact with a hot part of the engine, which might induce the beginning of a fire within the engine compartment. In most cases, this will destroy the power train unit, and potentially the whole vehicle.

[0003] US-6.215.407 discloses the use of hydrocarbon sensors for detecting the presence of hydrocarbon in the bilge area of a boat, either in view of stopping a bilge pump, in view of operating a blower, or in view of providing an alarm.

[0004] US-5.070.832 discloses a method for controlling an engine. The engine can be de-rated depending on a number of engine operating parameters controlled by sensors monitoring coolant level and temperature, oil pressure and temperature, and air temperature. The engine de-rating consists in changing the maximum operating speed of the engine and/or setting a maximum torque level for the engine.

SUMMARY OF THE INVENTION

[0005] The invention aims at providing a new power train unit for an automotive vehicle which takes into consideration a leak of fluid, like oil or fuel, early enough to take appropriate measures in order to avoid, as much as possible, any potentially dangerous situation.

[0006] The invention concerns a power train unit for an automotive vehicle, according to claim 1.

[0007] Thanks to the invention, the hydrocarbon sensor can detect a leak of oil or fuel and the control unit can immediately take appropriate measures to limit this leak and its consequences, without stopping the power unit, since an automotive vehicle like a truck cannot be suddenly stopped because the driver must be given an opportunity to park his vehicle aside from the ongoing traffic or to reach a garage or a maintenance facility. Indeed, contrarily to what could happen in a fixed installation like an air conditioning circuit known from JP-A-2001 208392, detection of a leak in an engine compartment of a vehicle

should not induce, except in extreme cases, an abrupt stop of the power train unit because this would immediately and assistance to the brake and steering systems of the vehicle. Moreover, abrupt stop of the power train unit could induce a sudden stop of the vehicle, which might be dangerous, depending on the traffic conditions.

[0008] According to further aspects of the invention, a power train unit might incorporate one or several of the following features:

- When the engine has at least a high pressure fuel line between a common rail and an injector rack, the sensor can be located next to this high pressure line.
- Several sensors can be located within the engine compartment.

[0009] The invention also concerns an automotive vehicle, in particular a truck, equipped with a power unit as mentioned here-above. Such a vehicle is safer than the ones of the prior art.

[0010] The invention also concerns a method which can be implemented with a power train unit as described here above and which comprises the steps enumerated in claim 6.

[0011] Thanks to the invention, one can take into account a possible leak of an hydrocarbon based fluid as soon as it occurs and take appropriate measures to limit the potentially dangerous consequences of such a leak.

[0012] According to further aspects of the invention, the following approaches might be followed when the signal provided to the control unit corresponds to hydrocarbon detection:

- An alarm message is emitted in the driver space of the vehicle or towards a remote receiving device. This message might include an invitation to reduce or limit engine torque and/or speed. This message might also include some information with respect to a time period after which the engine will be stopped.
- The control unit controls the engine in such a way that its rotation speed and/or the torque developed by this engine remains under a predetermined value.
- An electrical auxiliary equipment of the engine, such as an alternator, is stopped.
- At least one cylinder of the engine is not fed with fuel.
- The control unit pilots a gear box of the vehicle in order to keep it in one given gear, preferably a low gear, or in one of a predetermined set of gears.
- The control unit activates an electrical motor belonging to the power train unit and adapted to drive a transmission set of the vehicle, whereas the control unit stops the internal combustion engine.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention will be better understood on the basis of the following description which is given in correspondence with the annexed figures and as an illustrative

example, without restricting the object of the invention. In the annexed figures,

- figure 1 is a schematic longitudinal cut view of the front part of a truck according to the invention equipped with a power train unit according to the invention, and
- figure 2 is a block diagram of a method implemented with the power train unit of figure 1.

DETAILED DESCRIPTION OF SOME EMBODIMENTS

[0014] The invention will be described in the case of a truck 1 including for example a tractor 2 and a trailer 3 hooked onto a rear part of tractor 2. Tractor 2 includes a cabin 21 where a driver and, possibly, one or several passengers are seated when the truck is running. Cabin 21 is provided with a driver seat 22, a steering wheel 23 and a dashboard 24. Nevertheless, the invention could be implemented on other types of vehicles, and especially on other types of trucks such as rigid trucks.

[0015] Underneath cabin 21, tractor is provided with an engine compartment 25 where a Diesel internal combustion engine 4 is installed. This engine has several cylinders, five of which are shown on figure 1 with reference 41.

[0016] Cylinders 41 are fed with fuel under pressure from a common rail 42 located in an upper part of engine 4. Individual feed lines 43 connect rail 42 to each cylinder 41. Lines 43 connect rail 42 to fuel injectors located in the cylinder heads of cylinders 41.

[0017] Engine 4 belongs to a power train of tractor 2 which also includes a power transmission line 4' towards the rear wheels 21 of tractor 2.

[0018] An hydrocarbon sensor 5 is located within engine compartment 25, in the vicinity of rail 42 and lines 43. This sensor can be of the type marketed by Sensor Electronics Corp. of Minneapolis, MN (USA), under reference SEC Millennium Infrared Hydrocarbon Gas Detector. It can actually be of any other convenient type, e.g. the one mentioned in US-A-6,102,085.

[0019] Sensor 5 is connected to a control unit 6, which can be for example integrated to a dashboard area 24. An electric line 7 connects sensor 5 to unit 6 and allows to provide unit 6 with an output signal S_5 of sensor 5. Sensor 5 could also be connected to control unit 6 through a shared communication bus, e.g. a CAN-bus. Sensor 5 may be fed with electrical power, either from unit 6 or from a non represented main electrical circuit of tractor 2.

[0020] Sensor 5 permanently monitors hydrocarbon gases presence within compartment 25. Sensor 5 is located next to parts 42 and 43 which are parts of a fuel circuit which feeds cylinders 41 and which is formed externally with respect to the main body of engine 4. A leak of fuel under pressure is more likely to take place at the level of items 42 and 43. This is why sensor 5 is located in their vicinity.

[0021] In a first step 100 of a method according to the invention, sensor 5 is activated to sense the presence of hydrocarbon gases within compartment 25. In a subsequent step 102, sensor 5 provides unit 6 with signal S_5 . In a further step 104, unit 6 compares the level of hydrocarbon gases concentration C_H within compartment 25 to a predetermined value V_H . This value V_H is chosen so that one can consider that, if C_H is smaller than V_H , then no fuel leak occurs within compartment 25. On the contrary, when C_H is larger than V_H , one considers that a fuel leak takes place in or around engine 4 within compartment 25.

[0022] If C_H is smaller than V_H , one goes back to step 100.

[0023] If C_H is larger than V_H , that is if a leak is actually detected, a further step 106 is actuated to modify the working conditions of engine 4, without stopping this engine. In such a situation, that is when a risk of fire has been detected within compartment 25, it is essential to give to the driver an opportunity to move truck 1 outside the traffic and, if possible, to reach a garage or another maintenance facility. During this transitory phase, some power must be available from engine 4 in order to move truck 1. This is why the power train unit comprising items 4 and 4' is not stopped.

[0024] In step 106, unit 6 activates an emergency light 61 mounted on dashboard 24 in order to warn the driver of the potentially dangerous situation. In addition or alternatively, a speaker 62 speaks out a message within cabin 21 in order to inform the driver of the situation. In this message, the driver is invited to limit the rotation speed of engine 4 and the torque delivered by this engine. In other words, the driver is invited to drive slowly, in order not to request high power from engine 4. This induces that fuel flow to cylinders 41 will be limited, so that the leak should normally also be limited.

[0025] The driver can then drive truck 1 for a while, while essential safety features are active, in particular breaking and steering assistance.

[0026] According to an advantageous but non compulsory aspect of the invention, unit 6 might count the time from the instant where it receives a signal S_5 corresponding to an actual hydrocarbon detection within compartment 25. Then, unit 6 can compute a time period after which it will cut engine 4. In such a case, the message sent to the driver via speaker 62 also states the time left before the engine 4 is cut, which takes place in a further step 108.

[0027] In step 106, in addition to the message sent to the driver by items 61 and 62, unit 6 can activate a communication module 63 which can send to a remote operator a telecommunication signal S_{63} with the information that hydrocarbon gases have been detected within compartment 25. This gives to the remote operator the possibility to contact the driver, for example via his cellular phone, in order to check the situation and organize the necessary maintenance operations.

[0028] According to another approach of the invention,

in step 106, unit 6 can send to an electronic control unit 44 which controls operation of engine 4 a signal S_6 which activates unit 44 to limit the maximum rotation speed of engine 4 and/or a maximum torque delivered by this engine. In other words, according to this approach, one does not only rely on the driver to change the working conditions of engine 4 in order to limit the leak, but also on unit 6 which automatically adjusts the working conditions of engine 4, via unit 44, irrespective of the attitude of the driver. Another electric line 8 connects unit 6 to unit 44.

[0029] If the maximum rotation speed of engine 4 or its maximum torque is limited to 50% of the normally available speed or torque, this will in practice prevent the driver to run for a long distance, especially if the truck has to go uphill.

[0030] In step 106, unit 6 can also activate some external warning lights 64 of truck 1 in order to inform other drivers of the potentially dangerous situation.

[0031] Similarly, in step 106, unit 44 can be piloted to decrease fuel pressure within common rail 42 and/or feed lines 43 in order to limit the leak.

[0032] According to another aspect of the invention, if sensor 5 is precise enough to determine in which line 43 a leak occurs, then fuel supply to the corresponding cylinder 41 can be stopped and engine 4 can go on running on the other cylinders. This will also give to the driver an opportunity to move truck 1 to the next maintenance facility.

[0033] According to another approach, in case tractor 2 is provided with an electronic gearbox, if hydrocarbon presence has been detected by sensor 5, the gearbox can be blocked in one gear, e.g. the first or second gear, or in one of a predetermined set of gears, which implies that the truck can only be moved slowly. This prevents the driver from trying to drive on a long distance.

[0034] In step 106, another approach might be implemented, in addition or alternatively to the ones already considered: one or several auxiliary equipments, such as an alternator 45 or a motor for accessories, can be stopped or deactivated in order to avoid the creation of sparks which could ignite hydrocarbon gases within compartment 25.

[0035] In case engine 4 is provided with a Diesel particulate filter 46 used to temporarily store soot and non-burnt particulars present in the exhaust gases, such a filter must be regularly cleaned by oxidation of the particulate materials. To this purpose, a sub-assembly 47 is used to inject a small quantity of fuel before a catalyst module 48 in an exhaust line 49 of engine 4.

[0036] In case hydrocarbon gases have been detected within compartment 25, unit 6 can inhibit fuel supply to sub-assembly 47 so that no fuel is injected within the exhaust line 49 of engine 4. According to a non represented embodiment of the invention, another hydrocarbon sensor might be installed in the vicinity of sub-assembly 47.

[0037] According to another approach, if the power

train unit also includes an electrical motor meant to drive power transmission line 4', in a so-called hybrid structure, control unit 6 can be used to stop the electrical motor and to stop engine 4 as soon as sensor 5 senses hydrocarbon gases within compartment 25. In such a case, the power train unit remains active, even if engine 4 is stopped, since mechanical power is generated by the electric motor.

[0038] Depending on its location in compartment 25, sensor 5 can also detect a leak of oil, in particular in a part of lubricant circuit running on a side of engine 4. Since oil pressure within engine 4 is mainly dependent on engine speed, a limitation of the engine speed, either by action of the driver or directly via unit 44, should limit oil leaking.

[0039] Generally speaking, several sensors 5 can be installed within compartment 25, wherever hydrocarbon gases are likely to be present in case of a leak. A first advantage is that it will allow earlier detection of any leak. A second advantage is that, by comparing the signals delivered by the different sensors, it may be possible to perform a more refined determination of the leak source, so that the best corrective strategy can be chosen and implemented.

[0040] The alternative approaches considered here above in order to modify the working conditions of engine 4 once hydrocarbon gases have been detected can be implemented in the same method, either one after the other or simultaneously, in step 106.

[0041] Moreover, whatever the number of sensors, it is possible that the control unit 6 tests several of the above alternative approaches, and evaluates the impact of each of the corresponding corrective strategies to determine if it has an effect on the level of hydrocarbon concentration measured by the sensor(s). Depending on the determined impact, the control unit may choose to maintain one or several control strategies and to discard others.

LIST OF REFERENCES

[0042]

1	truck
2	tractor
21	cabin
22	driver seat
23	steering wheel
24	dashboard
25	engine compartment
3	trailer

4	internal combustion engine		Claims
41	cylinders		1. A power train unit (4, 4') for an automotive vehicle (1), said unit including an internal combustion engine (4) characterized in that said unit also includes at least one hydrocarbon sensor (5), located in the same compartment (25) as said engine for monitoring hydrocarbon gases presence within the compartment, and a control unit (6) receiving an output signal (S ₅) from said sensor and adapted, on the basis of said output signal, to modify the working conditions of said engine without stopping said power train unit, and in that said sensor (5) is located next to a part of a fuel circuit (42, 43) of said engine (4).
42	common rail	5	
43	feed line		
44	electronic control unit	10	
45	alternator		
46	Diesel particulate filter		
47	regeneration sub-assembly	15	2. Unit according to claim 1 characterized in that said engine (4) has at least a high pressure fuel line (43) between a common rail (42) and fuel injectors and in that said sensor (5) is located next to said high pressure line.
48	catalyst module		
49	exhaust line	20	
4'	power transmission line		
5	hydrocarbon sensor		3. Unit according to one of the previous claims, characterized in that it includes several sensors (5) located within said compartment (25).
6	control unit	25	
61	emergency light		4. Unit according to one of the previous claims, characterized in that the control unit (6) is adapted, on the basis of said output signal (S ₅) from said sensor, to send a warning message.
62	speaker	30	
63	communication module		5. An automotive vehicle, in particular a truck (1), equipped with a power train unit according to one of claims 1 to 4.
64	warning light		
7	electric line	35	6. A method for controlling the working conditions of a power train unit (4, 4') of an automotive vehicle (1), said method comprising the steps of:
8	electric line		
100	step	40	a) controlling (100) the presence of hydrocarbon gases in an engine compartment (25) of said vehicle,
102	step		b) providing (102) a control unit (6) with a signal (S ₅) representative of hydrocarbon detection (5), and
103	step		c) if said signal corresponds to the detection of hydrocarbon gases (C _H ≥ V _H), modify (106) the working conditions of an internal combustion engine (4) of said power train unit, in such a way that fuel pressure within a part (42, 43) of said engine remains under a predetermined value, without stopping said power train unit (4, 4').
104	step	45	
106	step		
108	step	50	
C _H	concentration of hydrocarbon gas within compartment 25		
S ₅	output signal of sensor 5		7. Method according to claim 6 characterized in that if said signal corresponds to hydrocarbon detection (C _H ≥ V _H), an alarm message is emitted in the driver space (21) of said vehicle or towards (S ₆₃) a remote receiving device.
S ₆	order signal from 6 to 44	55	
S ₆₃	telecommunication signal		
V _H	limit value of C _H		

8. Method according to claim 7 **characterized in that** said message includes an invitation to reduce or limit engine torque and/or speed.
9. Method according to one of claims 7 or 8, **characterized in that** said message includes some information with respect to a time period after which said engine (4) will be stopped.
10. Method according to one of claims 7 to 9, **characterized in that** if said signal corresponds to hydrocarbon detection ($C_H \geq V_H$), an electrical auxiliary equipment (45) of said engine (4) is turned off.
11. Method according to one of claims 6 to 10, **characterized in that** if said signal corresponds to hydrocarbon detection ($C_H \geq V_H$), at least one cylinder (41) of said engine is not fed with fuel.
12. Method according to one of claims 6 to 11 **characterized in that** if said signal corresponds to hydrocarbon detection ($C_H \geq V_H$), said control unit (6) pilots a gearbox of said vehicle in order to keep it in one given gear, preferably a low gear, or in one of a predetermined set of gears.
13. Method according to one of claims 6 to 12 **characterized in that** if said signal corresponds to hydrocarbon detection ($C_H \geq V_H$), said control unit (6) activates an electrical motor belonging to said power train unit (4, 4') and adapted to drive a transmission line (4') of said vehicle (1) and **in that** said unit stops said internal combustion engine (4).

Patentansprüche

1. Antriebsstrangeinheit (4, 4') für ein Kraftfahrzeug (1), wobei die Einheit einen Verbrennungsmotor (4) aufweist, **dadurch gekennzeichnet, dass** die Einheit auch wenigstens einen Kohlenwasserstoffsensor (5), der in dem gleichen Raum (25) wie der Motor zum Überwachen des Vorhandenseins von Kohlenwasserstoffgasen in dem Raum angeordnet ist, und eine Steuereinheit (6) aufweist, die ein Ausgangssignal (S_5) von dem Sensor empfängt und dazu ausgelegt ist, auf der Basis des Ausgangssignals die Arbeitsbedingungen des Motors ohne Anhalten der Antriebsstrangeinheit zu modifizieren, und dass der Sensor (5) in der Nähe eines Teils eines Kraftstoffkreises (42, 43) des Motors (4) angeordnet ist.
2. Einheit nach Anspruch 1, **dadurch gekennzeichnet, dass** der Motor (4) zwischen einem Common Rail (42) und Kraftstoffinjektoren wenigstens eine Hochdruck-Kraftstoffleitung (43) aufweist, und dass der Sensor (5) in der Nähe der Hochdruck-Kraftstoffleitung angeordnet ist.
3. Einheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie mehrere Sensoren (5) aufweist, die in dem Raum (25) angeordnet sind.
4. Einheit nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Steuereinheit (6) dazu ausgelegt ist, auf der Basis des Ausgangssignals (S_5) von dem Sensor eine Warnmeldung zu senden.
5. Kraftfahrzeug, insbesondere ein Lastwagen (1), der mit einer Antriebsstrangeinheit nach einem der Ansprüche 1 bis 4 ausgestattet ist.
6. Verfahren zum Steuern der Arbeitsbedingungen einer Antriebsstrangeinheit (4, 4') eines Kraftfahrzeugs (1), wobei das Verfahren die Schritte aufweist:
 - a) Kontrollieren (100) des Vorhandenseins von Kohlenwasserstoffgasen in einem Motorraum (25) des Fahrzeugs,
 - b) Bereitstellen (102) eines Erfassens (5) von Kohlenwasserstoff repräsentierenden Signals (S_5) an eine Steuereinheit (6), und
 - c) wenn das Signal dem Erfassen von Kohlenwasserstoffgasen ($C_H \geq V_H$) entspricht, Modifizieren (106) der Arbeitsbedingungen eines Verbrennungsmotors (4) der Antriebsstrangeinheit derart, dass der Kraftstoffdruck in einem Teil (42, 43) des Motors unter einem vorbestimmten Wert bleibt, ohne die Antriebsstrangeinheit (4, 4') anzuhalten.
7. Verfahren nach Anspruch 6, **dadurch gekennzeichnet, dass**, wenn das Signal dem Erfassen von Kohlenwasserstoffgasen ($C_H \geq V_H$) entspricht, eine Alarmmeldung im Fahrerraum (21) des Fahrzeugs oder an (S_{63}) eine entfernte Empfangsvorrichtung gesendet wird.
8. Verfahren nach Anspruch 7, **dadurch gekennzeichnet, dass** die Nachricht eine Einladung umfasst, das Motordrehmoment und/oder die -drehzahl zu reduzieren oder zu begrenzen.
9. Verfahren nach einem der Ansprüche 7 oder 8, **dadurch gekennzeichnet, dass** die Nachricht eine Information bezüglich eines Zeitraums umfasst, nach dem der Motor (4) angehalten wird.
10. Verfahren nach einem der Ansprüche 7 bis 9, **dadurch gekennzeichnet, dass**, wenn das Signal dem Erfassen von Kohlenwasserstoff ($C_H \geq V_H$) entspricht, eine elektrische Zusatzausstattung (45) des Motors (4) abgeschaltet wird.
11. Verfahren nach einem der Ansprüche 6 bis 10, **da-**

durch gekennzeichnet, dass, wenn das Signal dem Erfassen von Kohlenwasserstoff ($C_H \geq V_H$) entspricht, wenigstens ein Zylinder (41) des Motors nicht mit Kraftstoff versorgt wird.

12. Verfahren nach einem der Ansprüche 6 bis 11, **da-**
durch gekennzeichnet, dass, wenn das Signal
dem Erfassen von Kohlenwasserstoff ($C_H \geq V_H$) ent-
spricht, die Steuereinheit (6) ein Getriebe des Fahr-
zeugs steuert, um es in einem gegebenen Gang,
vorzugsweise einem niedrigen Gang, oder in einem
von einem vorbestimmten Satz von Gängen zu hal-
ten.
13. Verfahren nach einem der Ansprüche 6 bis 12, **da-**
durch gekennzeichnet, dass, wenn das Signal
dem Erfassen von Kohlenwasserstoff ($C_H \geq V_H$) ent-
spricht, die Steuereinheit (6) einen Elektromotor ak-
tiviert, der zur Antriebsstrangeinheit (4, 4') gehört
und dazu ausgelegt ist, einen Getriebestrang (4') des
Fahrzeugs (1) anzutreiben, und dass die Einheit den
Verbrennungsmotor (4) anhält.

Revendications

1. Unité de transmission de puissance (4, 4') pour un
véhicule automobile (1), ladite unité comprenant un
moteur à combustion interne (4), **caractérisée en**
ce que ladite unité comprend également au moins
un capteur d'hydrocarbure (5), positionné dans le
même compartiment (25) que ledit moteur pour sur-
veiller la présence de gaz d'hydrocarbure à l'intérieur
du compartiment, et une unité de commande (6) re-
cevant un signal de sortie (S_5) provenant dudit cap-
teur et conçue pour modifier, sur la base dudit signal
de sortie, les conditions de travail dudit moteur sans
arrêter ladite unité de transmission de puissance et
en ce que ledit capteur (5) est positionné à côté
d'une partie d'un circuit de carburant (42, 43) dudit
moteur (4).
2. Unité selon la revendication 1, **caractérisée en ce**
que ledit moteur (4) a au moins une conduite de
carburant sous haute pression (43) prévue entre un
rail commun (42) et des injecteurs de carburant et
en ce que ledit capteur (5) est positionné à côté de
ladite conduite de haute pression.
3. Unité selon l'une quelconque des revendications
précédentes, **caractérisée en ce qu'elle** comprend
plusieurs capteurs (5) positionnés à l'intérieur dudit
compartiment (25).
4. Unité selon l'une quelconque des revendications
précédentes, **caractérisée en ce que** l'unité de
commande (6) est conçue pour envoyer un message
d'avertissement sur la base dudit signal de sortie

(S_5) provenant dudit capteur.

5. Véhicule automobile, notamment camion (1), équipé
d'une unité de transmission de puissance selon l'une
quelconque des revendications 1 à 4.
6. Procédé pour commander les conditions de travail
d'une unité de transmission de puissance (4, 4') d'un
véhicule automobile (1), ledit procédé comprenant
les étapes consistant à :
- a) contrôler (100) la présence de gaz d'hydro-
carbure dans un compartiment de moteur (25)
dudit véhicule ;
- b) Délivrer à une unité de commande (6) un si-
gnal (S_5) représentatif de la détection d'hydro-
carbure (5) ; et
- c) si ledit signal correspond à la détection de
gaz d'hydrocarbure ($C_H \geq V_H$), modifier (106)
les conditions de travail d'un moteur à combus-
tion interne (4) de ladite unité de transmission
de puissance, de telle sorte que la pression de
carburant régnant à l'intérieur d'une partie (42,
43) dudit moteur reste en deçà d'une valeur pré-
déterminée, sans arrêter ladite unité de trans-
mission de puissance (4, 4').
7. Procédé selon la revendication 6, **caractérisé en ce**
que si ledit signal correspond à une détection d'hy-
drocarbure ($C_H \geq V_H$), un message d'alarme est en-
voyé dans l'espace conducteur (21) dudit véhicule
ou en direction (S_{63}) d'un dispositif de réception à
distance.
8. Procédé selon la revendication 7, **caractérisé en ce**
que ledit message comprend une invitation à réduire
ou limiter le couple et/ou la vitesse du moteur.
9. Procédé selon l'une quelconque des revendications
7 ou 8, **caractérisé en ce que** ledit message com-
prend certaines informations relatives à une période
de temps après laquelle ledit moteur (4) sera arrêté.
10. Procédé selon l'une quelconque des revendications
7 à 9, **caractérisé en ce que** si ledit signal corres-
pond à une détection d'hydrocarbure ($C_H \geq V_H$), un
équipement auxiliaire électrique (45) dudit moteur
(4) est éteint.
11. Procédé selon l'une quelconque des revendications
6 à 10, **caractérisé en ce que** si ledit signal corres-
pond à une détection d'hydrocarbure ($C_H \geq V_H$), au
moins un cylindre (41) dudit moteur n'est pas alimen-
té en carburant.
12. Procédé selon l'une quelconque des revendications
6 à 11, **caractérisé en ce que** si ledit signal corres-
pond à une détection d'hydrocarbure ($C_H \geq V_H$), la-

dite unité de commande (6) pilote une transmission dudit véhicule afin de la maintenir dans un rapport de transmission donné, de préférence un faible rapport de transmission dans un rapport de transmission donné parmi un ensemble de rapports de transmissions prédéterminé. 5

13. Procédé selon l'une quelconque des revendications 6 à 12, **caractérisé en ce que** si ledit signal correspond à une détection d'hydrocarbure ($C_H \geq V_H$), ladite unité de commande (6) active un moteur électrique appartenant à ladite unité de transmission de puissance (4, 4') et conçu pour entraîner une ligne de transmission (4') dudit véhicule (1) et **en ce que** ladite unité arrête ledit moteur à combustion interne (4). 10 15

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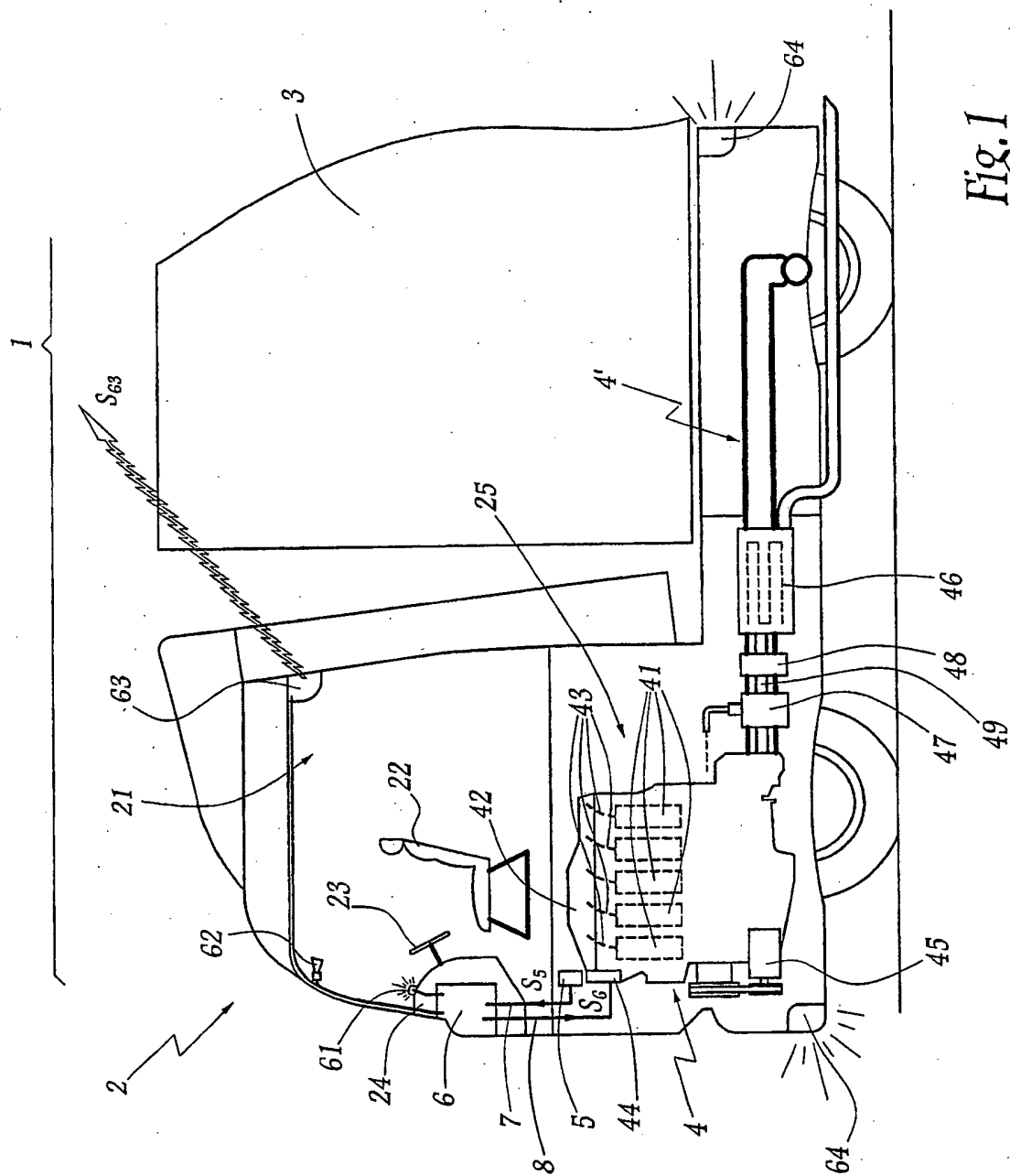
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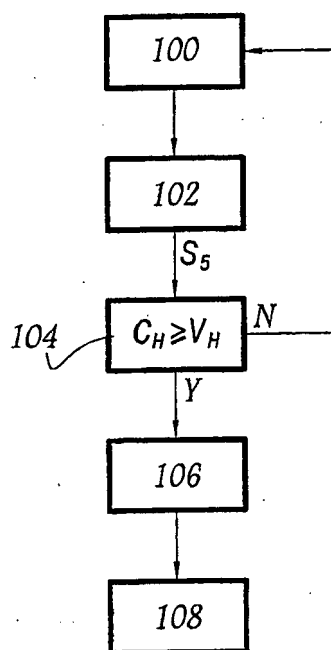


Fig.2

REFERENCES CITED IN THE DESCRIPTION

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