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(54) System for selective emergency signalling between vehicles suitable for avoiding false alarms

(57) A system is provided (1) including in each vehicle (2) a transmitter device (3) suitable for sending alarm signals (3a) and a receiver device (4) suitable for perceiving the alarm signals (3a), the devices (3, 4) being selectively suitable for emitting and receiving alarm signals (3a) in a pre-set alarm area (7), and comprising exclusion components (10) suitable for de-activating in each vehicle (2) the transmitter device (3) in the presence of an alarm signal (3a) coming from another vehicle in order to prevent re-transmission of the alarm signal.

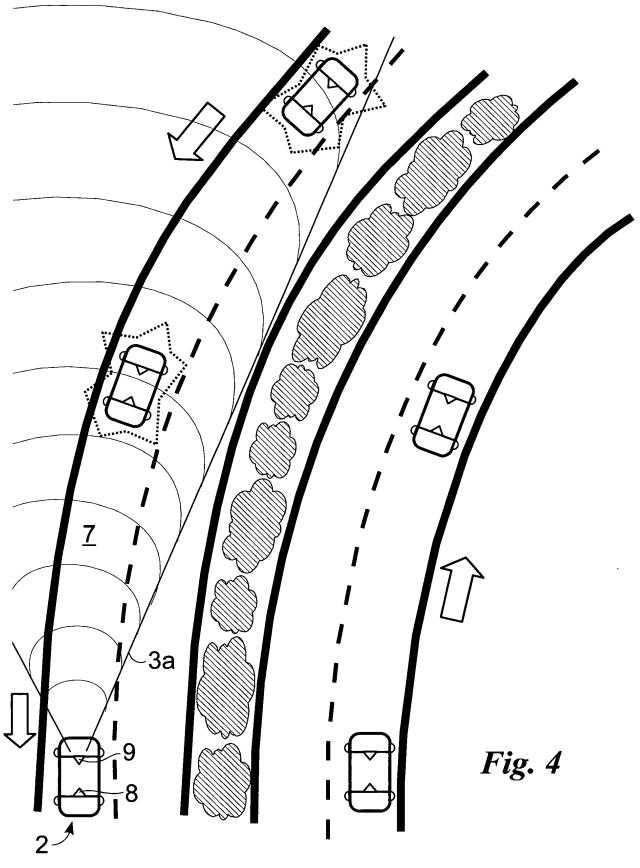


Fig. 4

EP 1 953 727 A1

Description

TECHNICAL FIELD

[0001] The present invention concerns a system for selective emergency signalling between vehicles, suitable for avoiding false alarms.

[0002] The system comprises both a device for transmitting alarm signals and a device for receiving alarm signals reciprocally correlated, and is provided with command and control means to activate signals towards other vehicles and to highlight signals emitted by other vehicles, as specified in the preamble of the first claim.

DESCRIPTION OF PRIOR ART

[0003] As it is known, the safety of vehicles on the road is an extremely important problem in view of the huge number of cars, lorries, motorcycles and other in circulation.

[0004] To protect persons and avoid damage to vehicles, new safety devices are being continuously designed and produced.

[0005] Among these, signalling systems that can be activated directly by the driver and are provided both with components for transmitting alarm signals and components for receiving said alarm signals are potentially very useful and effective.

[0006] They are therefore dedicated systems, which have the advantage of being independent of the presence or otherwise of an ordinary radio system on board the vehicle.

[0007] Various emergency signalling devices have been studied, based on dedicated radio communications and operating directly between the vehicles on the road.

[0008] The European patent applications EP 631267 and EP 1260954, for example, describe systems of this type, also introducing anomaly sensors, automatic alarm signals and coded signals.

[0009] The big advantages of these systems are that they can be integrated in the vehicles by the manufacturers or applied directly by the users, as happens in practice with satellite navigators.

[0010] Any vehicle, therefore, even without a radio system, can be equipped with said system and can promptly transmit the signals immediately after occurrence of an event, with the certainty of these signals being received also by vehicles with ordinary radio systems switched off or not applied.

[0011] They are in practice an important aid to the signals provided by means of flashing emergency lights, used for example to indicate sudden stoppages, slowdowns, obstacles or hazards on roads with heavy traffic.

[0012] Alongside these advantages, said systems currently also have significant drawbacks.

[0013] In particular, one drawback is linked to the fact that the signals transmitted, which already have a relatively wide operating range, can be re-transmitted by the various vehicles that receive them, therefore extending the alarm area out of all proportion and creating unnecessary traffic slowdowns and impediments over a wide area.

[0014] A radio signal is in fact diffused at distances greater then those that can be optically controlled and the person who receives the signal is very often not able to assess its importance.

[0015] Since there is no way of accurately assessing the situation or knowing the distance of the emergency, the person who receives the alarm is induced, spontaneously and to improve safety, and also to avoid collision from vehicles behind, to retransmit the same alarm.

[0016] A radio alarm signal is therefore easily and rapidly diffused over huge areas out of all proportion to actual needs.

[0017] Repetition of the signal is a phenomenon that already commonly occurs in the case of flashing emergency lights, which are repeated and transmitted by chain effect between the various vehicles on the same road, to avoid the danger of collision at all points of a traffic jam or tailback. In the case of the use of emergency lights, however, they are effective in an area that can be optically inspected and therefore the transmission is always limited by the control of each driver.

[0018] In areas where there are many roads, or one-way roads, a radio signal can be diffused to nearby roads not affected by the phenomenon signalled.

[0019] Generally speaking, false alarms are easily generated which lead to mistrust of the signals received, therefore making said signals partly ineffective.

[0020] It is possible to limit these drawbacks by means of very local short range radio signals, using for example signals of the type emitted between cordless or wireless telephone and electronic equipment.

[0021] In this way, however, the alarm signalling already provided via the emergency lights is widened only to a relatively limited extent and furthermore may be insufficient in the case of high-speed roads and the presence of static obstacles. There is always the possibility of diffusion of the alarm to areas not involved, in addition - above all - to an unnecessarily wide-ranging chain-effect retransmission of the alarm.

[0022] Said drawbacks can be limited also by means of detailed radio signalling.

[0023] For example, by means of indication of the place and type of alarm, or the distance at which the alarm is generated and/or by indication of whether the vehicle receiving it is moving towards or away from said signal.

[0024] If the person receiving the signal sees that it is emitted a long way away or that he/she is driving away from it, then he/she will probably refrain from re-transmitting said signal.

[0025] However, said signals are not always expedient or possible, whether based on a voice contact or on specific signals that are automatic or activated manually.

[0026] In particular, when the signals that involve a

voice type radio contact, such as those used by the police or emergency services, or the usual signals between lorries and large transport vehicles, are used by the drivers of ordinary vehicles, the immediacy of the signal, which can be of vital importance, is reduced.

[0027] Furthermore the place of alarm may not be known by the person transmitting the alarm or the same may not be known to or significant for a person who is at a distance. Above all, a person who is suddenly involved in an alarm or emergency situation is not always able to transmit an elaborate signal.

[0028] If, on the other hand, the alarm is determined by an automatic or simple manual command with signalling of the distance from and/or closeness to the point of the alarm, as in the international applications WO 98/09264 and WO 03/049061, there is no sense of immediacy for the person receiving the alarm.

[0029] In fact, the driver who receives the alarm must verify the data and how the distances vary during movement of the vehicles.

[0030] Several seconds are therefore lost which, in certain situations, can be important. In addition, the equipment to be installed is fairly complex and costly.

[0031] It is also important to remember that if an alarm signal is diffused over a wide area, due to the power of the original signal or re-transmission of the same by a chain of other drivers, the distance indications and/or the indications concerning whether the vehicle is travelling towards or away from the alarm can create further problems.

[0032] It is in fact possible for a vehicle to receive almost simultaneously several signals from various places or from various vehicles in the same tailback and in this case the driver has to check and comprehend the characteristics of the various signals, before actually understanding the situation.

[0033] In other words a situation of confusion easily occurs due to overlapping of several signals that may only be apparently different from one another, if originated by various re-transmissions of the same alarm.

[0034] In short, despite the various methods and types of signal that can be transmitted, the technical problem of how to make signals based on the use of on-board devices that receive and emit radio signals rapid, effective and not subject to false alarms has still not been solved.

SUMMARY OF THE INVENTION

[0035] In this situation the technical purpose of the present invention is to conceive a system for selective emergency signalling between vehicles which is able to substantially overcome the above-mentioned drawbacks.

[0036] Within said technical aim, an important object of the invention is to conceive a system able to avoid undue transmission of the alarm signal.

[0037] Another important object of the invention is to conceive a system which, while defining a sufficiently large alarm and signal transmission area, avoids sending the alarm to vehicles not involved.

[0038] A further object of the invention is to conceive a system which permits transmission with immediacy of signals clearly indicating the specific data of the alarm and the cause of it.

[0039] The technical purpose and the objects specified are substantially achieved by a system for selective emergency signalling between vehicles, suitable for avoiding false alarms, characterised in that it comprises one or more of the technical solutions described, claimed and shown below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040] The accompanying drawings illustrate by way of example a preferred embodiment of the invention. In particular:

Fig. 1 shows a control unit of the system according to the invention;
Fig. 2 illustrates a vehicle equipped with the system;
Fig. 3 highlights a block diagram indicating the structure of the system, in functional terms; and
Fig. 4 indicates how the system operates between vehicles on the road, shown schematically from above.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0041] With reference to the figures cited, the system according to the invention is indicated overall by the reference number **1.**

[0042] It is positioned or can be positioned entirely on a vehicle **2** of any type, also not provided with radio system, and is preferably powered by the vehicle electrical system, so that it switches on when the engine is started. A battery or autonomous power supply is not excluded, however.

[0043] The system 1 comprises both a transmitter device **3** suitable for sending alarm signals **3a** and a receiver device **4** suitable for perceiving said alarm signals.

[0044] The devices 3 and 4 are correlated so that the alarm signals 3a are received and highlighted automatically.

[0045] The system 1 is provided with command and control means **5** which can be activated manually or automatically to send danger or alarm signals to other vehicles 2 and to highlight the signals emitted by other vehicles equipped with said system.

[0046] Preferably said command and control means 5 are positioned at the level of a viewer **6,** which can be positioned near the driving seat of the vehicle 2.

[0047] According to the invention, the transmitter device 3 and the receiver device 4 are selectively suitable for emitting and receiving alarm signals 3a having preset characteristics in terms of both direction and power,

so that said signals are diffused over a pre-established alarm area **7,** with reference to the position of the vehicle 2.

[0048] From above, the alarm area 7 (figure 3) has a maximum ground dimension of between three hundred and one thousand metres and preferably a maximum dimension of between five hundred and six hundred metres.

[0049] It is therefore a much larger area than the area typical of the so-called cordless or wireless systems, and also of the optically controllable area in conditions of normal visibility. It is also a large enough area to permit stopping of vehicles travelling at high speed, and is considered to provide sufficient safety for all events.

[0050] Preferably said maximum extent of the alarm area 7 is defined by the emission power of the transmitter device 3, but can also be defined by the receiving capacity of the receiver device 4, or by a combination of the characteristics of the same.

[0051] Furthermore, advantageously, the transmitter device 3 is suitable for emitting alarm signals 3a in an alarm area 7 positioned at the rear of the vehicle 2, with respect to the direction in which said vehicle is travelling, as indicated in the figures.

[0052] While the sensitive element **8** of the receiver device 4 can even be a simple telescopic antenna, the transmitter element **9** of the transmitter device 3 is preferably a parabolic signal projector or in any case a device able to direct in a pre-established manner the alarm signal 3a in a direction opposite to that in which the vehicle is travelling.

[0053] More specifically, the alarm area 7, from above, has a substantially circular sector profile with vertex corresponding to the vehicle 2. Corresponding to the vehicle 2, said circular sector has an angle substantially between 30 and 90 degrees and preferably between 40 and 60 degrees.

[0054] This prevents - at least generally speaking - the alarm signal 3a being transmitted outside the area where the vehicles concerned may be present, as shown in figure 4.

[0055] Also in this case the receiver device 4 can cooperate variously in definition of the alarm area 7, if it too is at least partly of the directional type. At the outside, the alarm signal can be diffused in a circular manner around the vehicle 2, for said maximum distance from the vehicle, and the receiver device 4 can be sensitive only to the signals emitted by the preceding vehicles.

[0056] Furthermore the system 1 can have transmitter device 3 and receiver device 4 of the type suitable, in a per se known manner, for communicating with a satellite and therefore operating via the same in the predefined alarm area.

[0057] Another important aspect of the present invention is defined by the fact that the system 1 comprises exclusion components **10** connected to the receiver device 4 and acting on the transmitter device 3.

[0058] In particular, in each vehicle 2 these exclusion components 10 are suitable for de-activating the transmitter device 3 in the presence of an alarm signal 3a picked up by the receiver device 4, and coming from another vehicle.

[0059] This prevents re-transmission of the alarm signal 3a.

[0060] The transmitter device 3 can be de-activated in two ways, for example.

[0061] According to the first method, the alarm signal 3a persists for a pre-set period, regardless of whether activation is instantaneous or brief.

[0062] This persistent alarm signal 3a is sent via the first connection **10a** to the exclusion components 10, which interrupt the transmitter device 3 for the entire duration of the signal.

[0063] In this way the transmitter device of a vehicle that receives an alarm signal is blocked for an exclusion period corresponding to said pre-set alarm signal duration period.

[0064] According to the second method, the exclusion components 10 are timed or connected via the second connection **10b** to a timing device **11,** which directly receives a command, which can be an instantaneous command, from the receiver device 4 and which determines said exclusion period.

[0065] The exclusion period can be between ten seconds and one minute, for example, and is preferably between twenty and thirty seconds.

[0066] Structurally, the system 1 is made of parts known per se and - as shown in figure 3 - develops between said sensitive element 8 and transmitter element 9 defined by an antenna and a parabolic projector, and the command and control means 5 including a viewer 6, as specified in further detail below. The signals are selected, processed and amplified by first processing circuits **12,** known per se, for the transmitter device 3, and by second processing circuits **13,** also known per se, for the receiver device 4.

[0067] The exclusion components 10 can be provided by an electromagnetic switch positioned for example between the first processing circuits 12 and the transmitter device 9; the timer device 11 can be a simple timer that can be activated electrically and in turn acts continuously - for the time programmed - on the exclusion components 10. The signals directly to the exclusion components 10 or to the timer device 11 are sent by the second processing circuits 13.

[0068] It should also be noted that the system 1 comprises, in the embodiment shown, directional sensors **14** suitable for detecting the direction of an alarm signal, connected to the second signalling circuits 13 of the receiver device 4.

[0069] The directional sensors 14 are for example positioned at the base of the sensitive element or antenna 8 and the signal picked up by them is transmitted, after being processed by the second signalling circuits 13, to the viewer 6. According to a preferred embodiment, the directional sensors 14 are acoustic sensors suitable for

detecting the direction of acoustic signals such as sirens.

[0070] A further aspect of the invention consists in the fact that the command and control means 5 positioned at the level of the viewer 6 can be activated in a plurality of ways and are suitable for selectively highlighting a plurality of different alarm signals.

[0071] In particular in the viewer 6 each specific signal is combined with a dedicated element **15** characterised at least by the colour and type of acoustic warning. On each dedicated element, or near it, a word or an icon can also be stamped further highlighting the type of alarm.

[0072] In figure 1, which shows the viewer 6 from the outside and in a preferred final embodiment, the dedicated elements 15 bear the generic word "alarm", but the same can be selectively replaced.

[0073] Preferably, furthermore, each dedicated element 15 is suitable for providing both a warning **15a** and a manual alarm control **15b** and for this purpose consists of a dedicated button.

[0074] In particular, dedicated elements 15 are provided in the viewer 6 selectively suitable for highlighting an accident (alarm 1), the presence of fog (alarm 2), the presence of ice (alarm 3) and the presence of a traffic jam (alarm 4). The latter signal can be advantageously split into two elements to indicate jams on the right or on the left of the vehicle.

[0075] Preferably the viewer 6 will comprise indicator elements **16** suitable for highlighting the direction of an alarm signal, if the system is provided with directional sensors 14. More specifically, the indicator elements 16 are suitable for highlighting the direction of an acoustic alarm signal such as a siren, if the system is provided with directional sensors 14 of the acoustic type.

[0076] Operation of the system 1, described above mainly in the structural sense, is as follows.

[0077] When the engine is switched on, the system 1 is also automatically switched on together with the transmitter device 3 and receiver device 4 comprised in it.

[0078] The driver of the vehicle is therefore able both to transmit and receive an alarm. The alarm transmitted can be activated by means of simple and immediate devices such as dedicated buttons. In this way both immediacy and simplicity of transmission, necessary conditions in an emergency, and an outline indication of the type of alarm signalled can be combined.

[0079] The alarm is received immediately highlighting the type of event, and perception is aided by the dedicated buttons, which differ due to colour, type of acoustic emission and also graphic elements.

[0080] The alarm received is immediately perceived as important due to the fact that the scheduled alarm area 7 comprises only the vehicles potentially involved in the event (accident or fog or ice or traffic jam) that has generated the alarm.

[0081] In fact, the alarm is transmitted and received only in an alarm area which is sufficiently long but limited in breadth and located to the rear of the vehicle that has emitted the alarm.

[0082] Furthermore the certainty of the relevance of the alarm is determined by the fact that the alarm cannot be repeated in a chain effect and therefore the person receiving it is certain of being in the alarm area connected with the first vehicle that signalled it.

[0083] When directional sensors 14 are provided, it is also possible to accurately view the direction of an alarm signal, also of the acoustic type.

[0084] Re-transmission of the alarm is prevented by the fact that the reception of a signal temporarily de-activates the transmitter device 3 and therefore even though the driver instinctively tends to repeat the signal, as happens with the flashing emergency lights, re-transmission is momentarily prevented.

[0085] The invention therefore also comprises a new procedure for management of emergency signalling between vehicles provided with a device for transmitting alarm signals and a device for receiving said signals.

[0086] The procedure consists in diffusing alarm signals over a pre-established delimited alarm area, and in de-activating in each vehicle the transmitter device in the presence of an alarm signal picked up by the receiver device in order to prevent the retransmission of said signal.

[0087] In particular, the transmitter device can be de-activated for a pre-set exclusion period by the provision of a persistent alarm signal for a pre-set period of time.

[0088] Alternatively, the transmitter device can be de-activated for a pre-set exclusion period or time by the provision of timed exclusion components activated by the reception of an alarm signal.

[0089] The invention offers important advantages.

[0090] A simple effective device has been developed, applicable to all vehicles and independent of the usual radio systems.

[0091] The alarm can be transmitted to a limited alarm area which, at the same time, is large enough for the purpose.

[0092] Furthermore, all the false alarms due, for example, to dispersion of the signal or unnecessary transmission of the same are substantially avoided.

[0093] Confused or unclear signalling is also avoided, without compromising on the immediacy of the alarm.

[0094] The invention is subject to modifications and variations falling within the scope of the inventive concept.

[0095] For example, the device can be activated also by means of the button for the flashing emergency lights. Furthermore, sensors can be provided for automatic activation of the transmitter device in the event of collisions of the vehicle having a predefined level of impact. The transmitter device can be suitable for providing voice communication.

[0096] All the details can be replaced by equivalent elements and the materials, forms and dimensions can be of any type.

Claims

1. System for selective emergency signalling between vehicles, suitable for avoiding false alarms, including in each vehicle both a transmitter device suitable for sending alarm signals and a receiver device suitable for perceiving said alarm signals, said devices being correlated and said system being provided with command and control means to activate said alarm signals towards other vehicles and to highlight the signals emitted by other vehicles,

   - **characterised in that** said transmitter device and said receiver device are selectively suitable for emitting and receiving alarm signals in a pre-set alarm area, with reference to said vehicle,
   - and **in that** exclusion components are scheduled suitable for de-activating said transmitter device in the presence of an alarm signal picked up by said receiver device and coming from another vehicle, so as to prevent retransmission of said alarm signal.

2. System according to Claim 1, wherein said transmitter device is suitable for emitting an alarm signal persisting for a pre-set period so as to de-activate for a corresponding exclusion period the transmitter devices of the vehicles that receive said alarm signal.

3. System according to Claim 1, wherein said exclusion components are timed and are suitable for de-activating said transmitter device for a pre-set exclusion period, from receipt of an alarm signal.

4. System according to one or more of the preceding claims, wherein said exclusion period is between ten seconds and one minute.

5. System according to one or more of the preceding claims, wherein said exclusion period is between twenty and thirty seconds.

6. System according to one or more of the preceding claims, in particular Claim 1, wherein said alarm area has a maximum ground dimension of between three hundred and one thousand metres.

7. System according to one or more of the preceding claims, wherein said alarm area has a maximum ground dimension of between five hundred and six hundred metres.

8. System according to one or more of the preceding claims, in which said transmitter device is suitable for emitting signals in the direction of the area to the rear of the vehicle.

9. System according to one or more of the preceding claims, wherein said alarm area, from above, is substantially a circular sector with vertex corresponding to said vehicle.

10. System according to one or more of the preceding claims, wherein said circular sector has an angle substantially between 30 and 90 degrees.

11. System according to one or more of the preceding claims, wherein said circular sector has an angle substantially between 40 and 60 degrees.

12. System according to one or more of the preceding claims, wherein said transmitter and receiver devices are suitable for making a satellite connection and operating via the same.

13. System according to one or more of the preceding claims, wherein said receiver device comprises directional sensors suitable for identifying the direction of an alarm signal.

14. System according to one or more of the preceding claims, wherein said receiver device comprises directional acoustic sensors suitable for identifying the direction of acoustic signals such as sirens.

15. System according to one or more of the preceding claims, wherein said command and control means can be activated in a plurality of ways and are suitable for highlighting a plurality of different alarm signals.

16. System according to one or more of the preceding claims, comprising a viewer suitable for highlighting different alarm signals, each specific signal being associated with a dedicated element distinguished at least by colour and acoustic warning.

17. System according to one or more of the preceding claims, wherein each of said dedicated elements is suitable for providing a signaller or a manual alarm control.

18. System according to one or more of the preceding claims, wherein said viewer comprises dedicated elements selectively suitable for highlighting an accident, the presence of fog, ice or a traffic jam.

19. System according to one or more of the preceding claims, wherein a viewer is scheduled comprising indicator elements suitable for highlighting the direction of an alarm signal.

20. System according to one or more of the preceding claims, wherein a viewer is scheduled comprising indicator elements suitable for highlighting the direction of an acoustic alarm signal such as a siren.

21. **System according to one or more of the preceding claims, wherein said** transmitter device and said receiver device are connected to the engine electrical supply, so that they are automatically activated when the engine is switched on.

22. System according to one or more of the preceding claims, wherein said transmitter device is activated by means of the button for the flashing emergency lights.

23. System according to one or more of the preceding claims, wherein sensors are scheduled for automatic activation of said transmitter device in the event of collisions of the vehicle having a predefined level of impact.

24. System according to one or more of the preceding claims, wherein said transmitter device is suitable for permitting voice communication.

25. Process for the provision of selective emergency signalling between vehicles, each vehicle being provided with an alarm signal transmitter device and a receiver device suitable for perceiving said alarm signals, said devices being correlated,

    - **characterised in that** it consists in diffusing said alarm signals in a pre-set delimited alarm area, and in de-activating in each vehicle said transmitter device in the presence of an alarm signal picked up by said receiver device in order to prevent the re-transmission of said signal.

26. Process according to Claim 25, wherein said transmitter device is de-activated for a pre-set exclusion period by emission of a persistent alarm signal for a pre-set period.

27. Process according to Claim 25, wherein said transmitter device is de-activated for a pre-set exclusion period by the provision of timed exclusion components and activated by the receipt of an alarm signal.

28. System and process for selective emergency signalling between vehicles, suitable for avoiding false alarms, **characterised in that** it comprises any one combination of the technical solutions described and claimed.

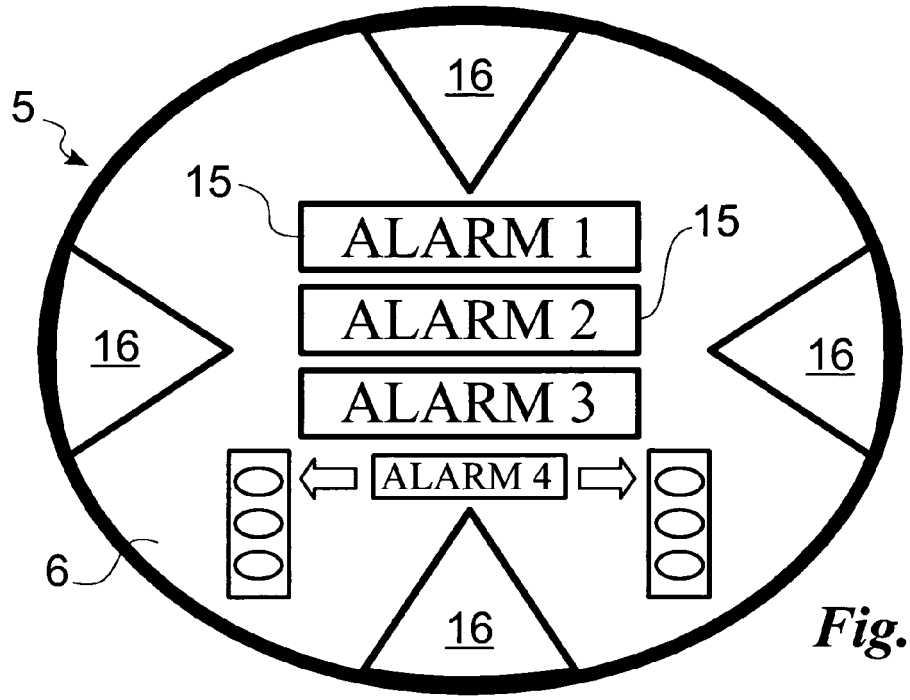


Fig. 1

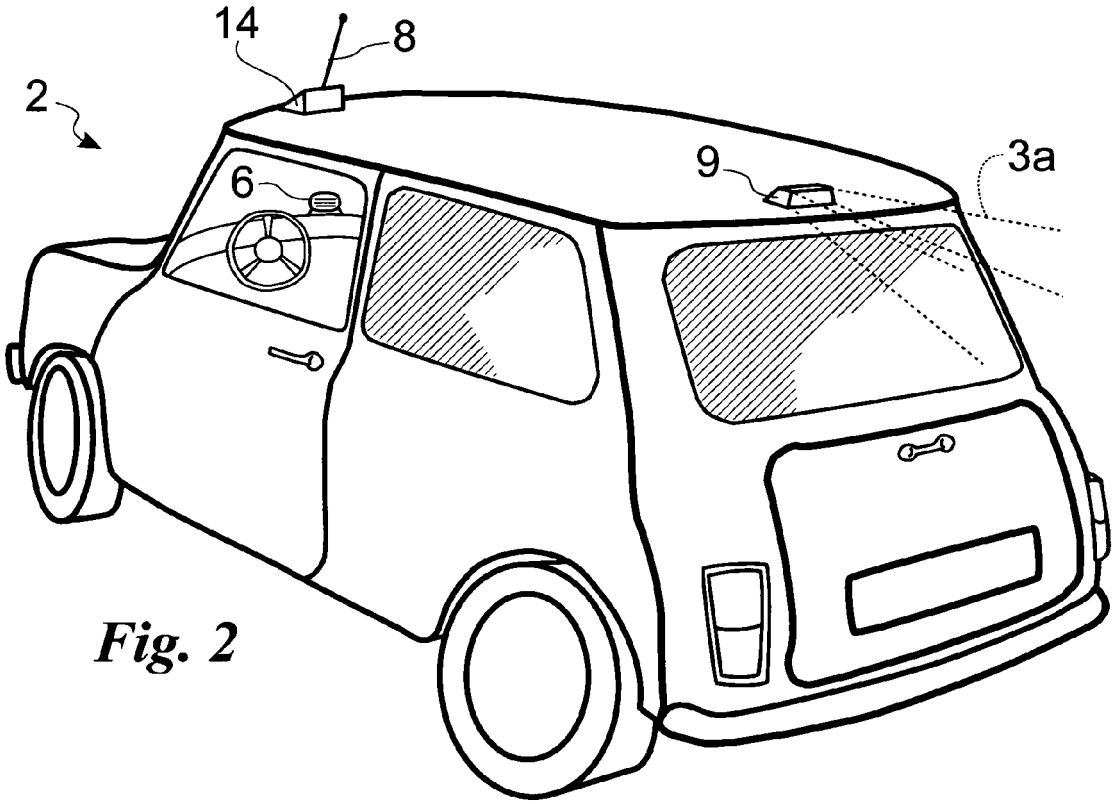
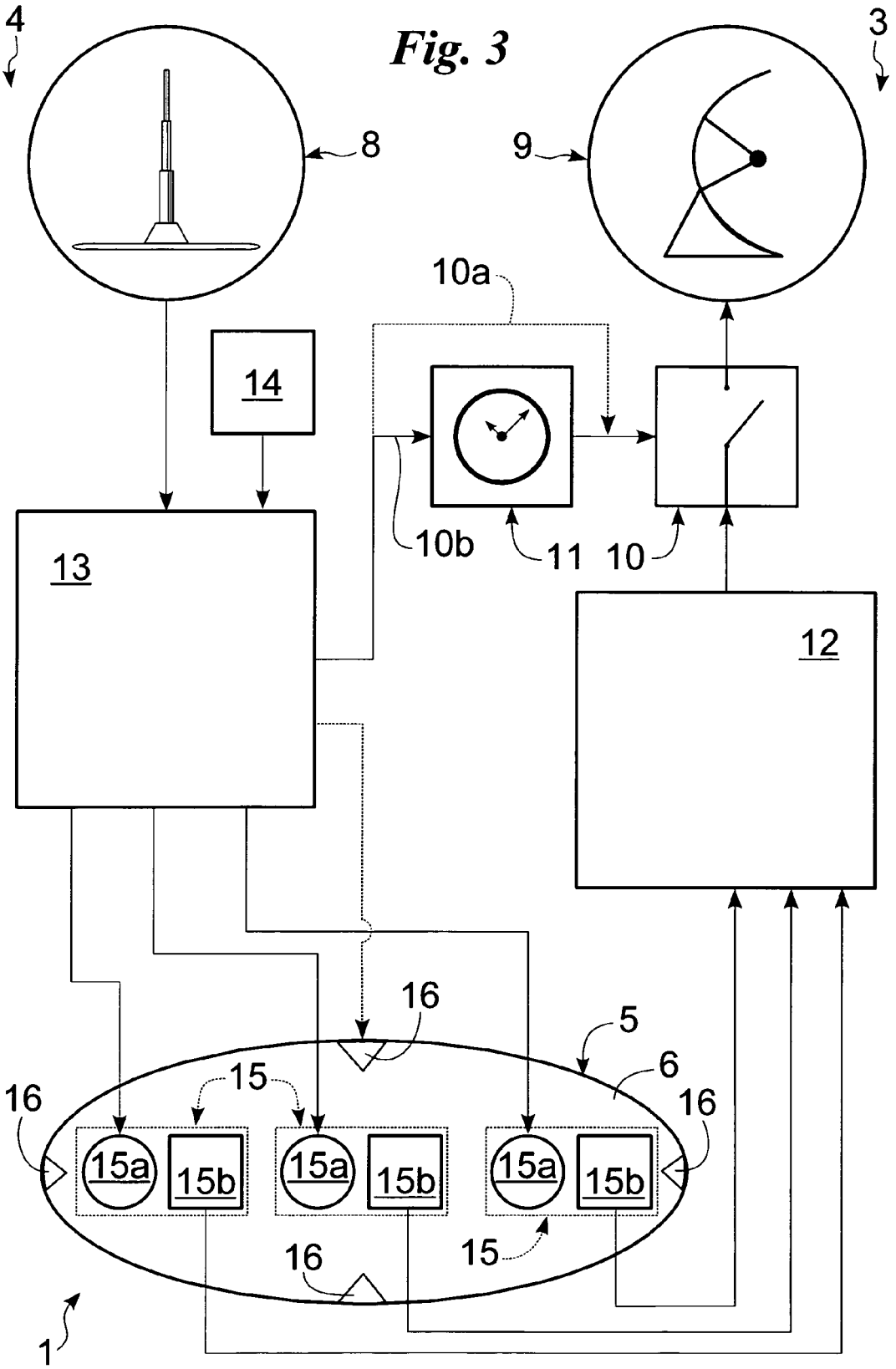


Fig. 2

Fig. 3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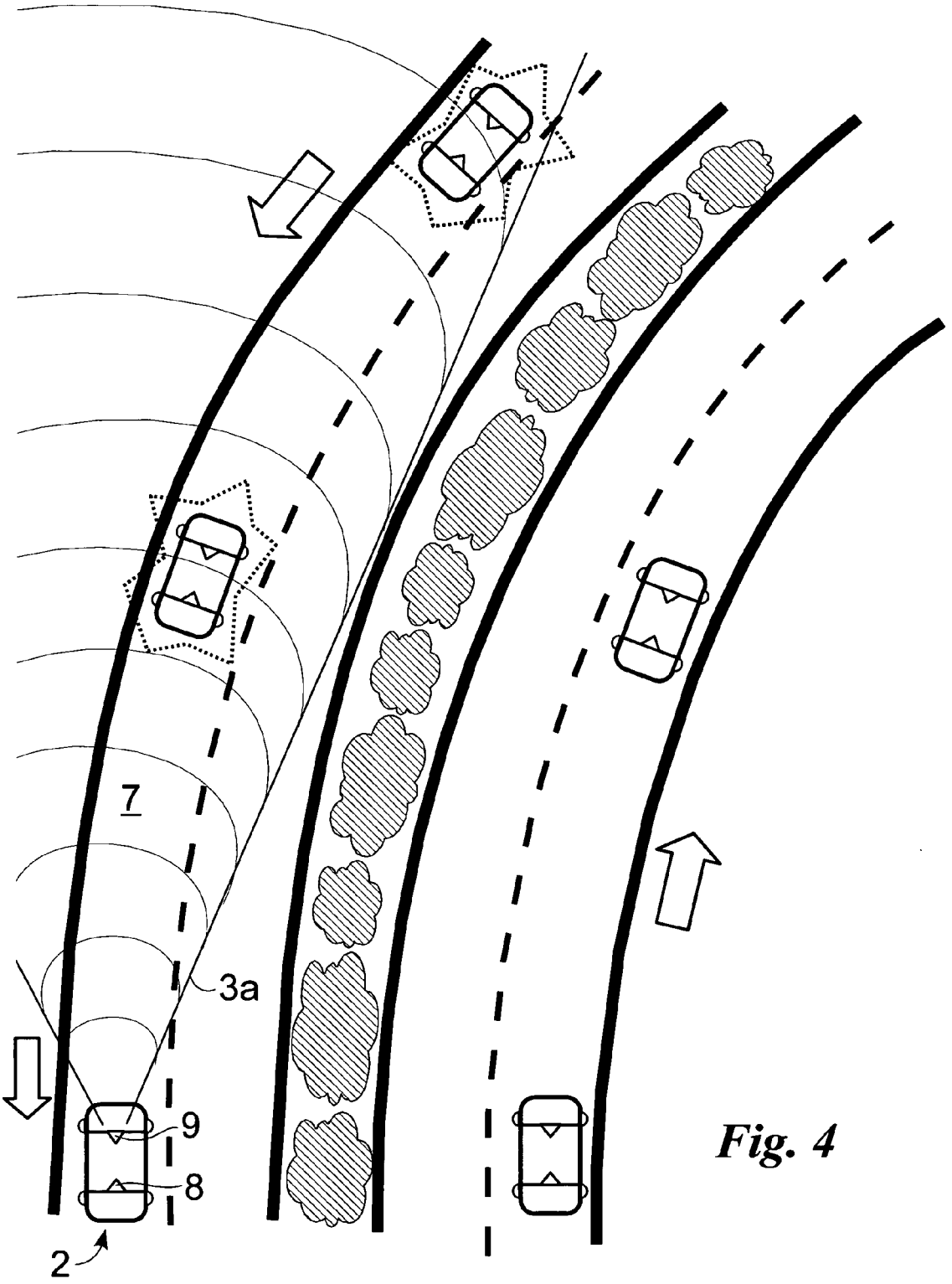

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 00 1776

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2005/137781 A1 (HUDSON THOMAS R JR [US] HUDSON JR THOMAS RANDALL [US]) 23 June 2005 (2005-06-23) * the whole document *	1-12, 25-27	INV. G08G1/16
X	DE 103 51 883 A1 (VALEO SCHALTER & SENSOREN GMBH [DE]) 2 June 2005 (2005-06-02) * figure 2 *	1-12, 25-27	
X	US 7 005 977 B1 (TENGLER STEVE [US] ET AL) 28 February 2006 (2006-02-28) * column 2, line 26 - column 3, line 53; figure 1 *	1-12, 25-27	
A	WO 2005/107181 A (PHILIPS INTELLECTUAL PROPERTY [DE]; KONINKL PHILIPS ELECTRONICS NV [NL) 10 November 2005 (2005-11-10) * figure 5 *	1-12, 25-27	
			TECHNICAL FIELDS SEARCHED (IPC) G08G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 May 2008	Créchet, Patrick

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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29-05-2008

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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