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(54) **Alarm system.**

(57) An alarm system comprises a plurality of alarm units (11), each of which includes means for transmitting an alarm signal containing data indicative of the orientation of the alarm unit ; a plurality of roadside receiving units, each of which includes means (10) for receiving alarm signals transmitted from an alarm unit within a certain range, and means (16) for retransmitting a signal to a control centre (6), which includes means from receiving signals transmitted from the receiving units ; and means (3, 5) connecting the receiving units to the control centre.

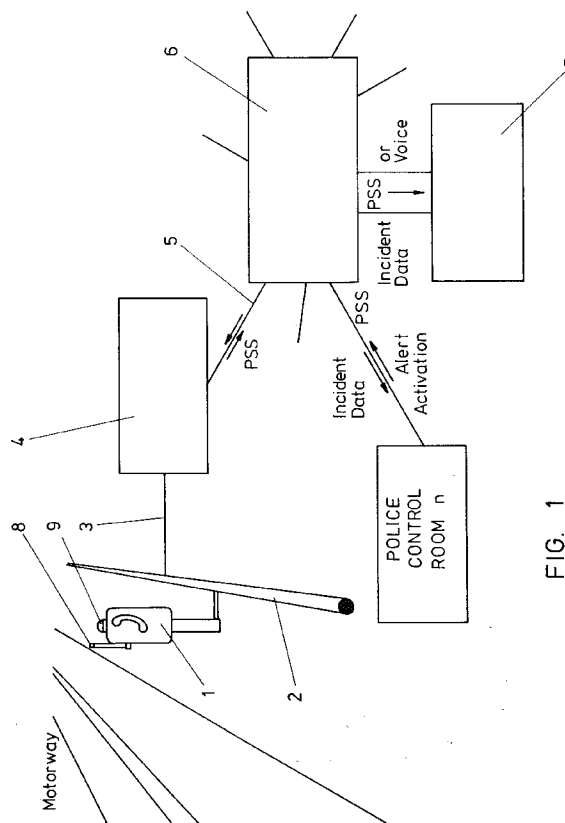


FIG. 1

This invention relates to an alarm system, and particularly to an alarm system for use in vehicles and on highways.

The problems associated with vehicle breakdown are well known. A choice must generally be made between staying in the vehicle and hoping that a police vehicle will stop and give assistance, and leaving the vehicle to find a roadside emergency or other telephone in order that assistance can be summoned. The potential dangers of the latter course, particularly for lady drivers, are well known.

The present invention provides an alarm system which includes a plurality of alarm units and a plurality of receiving units, which receive signals from the units and transmit signals in response to the alarm signals to a control centre.

Accordingly, in one aspect, the invention provides an alarm system which comprises:

- (a) a plurality of alarm units, each of which includes means for transmitting an alarm signal containing data indicative of the orientation of the alarm unit;
- (b) a plurality of roadside receiving units, each of which includes means for receiving alarm signals transmitted from an alarm unit within a certain range, and means for retransmitting a signal;
- (c) a control centre which includes means from receiving signals transmitted from the receiving units; and
- (d) means connecting the receiving units to the control centre.

In such a system, roadside receiving units will be installed at appropriate intervals along a highway, and a driver using the system will have his own alarm unit. If the vehicle breaks down and assistance is required, the alarm unit will be directed generally forwardly of the vehicle and will be operated to generate and transmit the alarm signal. The signal will be received by all receiving units that are within range. That unit will be effective to retransmit the received signal or signal derived therefrom to a control centre. Staff at the control centre can then summon emergency assistance, and can direct that assistance to the appropriate location. The emergency assistance has thus been summoned without the driver leaving the vehicle.

The orientation data contained in each alarm signal is preferably analysed at the control centre, to assist in determining the location of the vehicle. As an alternative, it would be possible for each receiving unit to analyse the orientation data comprised within the signal. A receiving unit would then only respond if the orientation data lay within a set of parameters that were predetermined for that receiving unit, those parameters being such that a response will only be generated at receiving units that are on the same highway as the vehicle and for dual carriageways, on the same carriageway. Only on a proper response by a receiving unit would that unit retransmit to the control centre.

Preferably the orientation is the bearing of the alarm unit, and the orientation data is derived from a flux gate transducer incorporated in the alarm unit.

The alarm signal is preferably a radio signal, and each alarm unit may incorporate a non-directional aerial for transmitting the alarm signal, each receiving unit incorporating an omnidirectional aerial for receiving alarm signals. Radio is the preferred medium, although other carrier media could be used.

The omni-directional aerial may be provided in any suitable manner. If the alarm unit is intended to be carried normally on the driver's person then the aerial may conveniently be incorporated in a keyring that forms part of the alarm unit. The alarm unit may then be kept with the car keys and if emergency assistance is required the keys will be removed from the ignition, the alarm unit will be pointed in a direction that is generally in the direction of travel of the vehicle so that the correct orientation data is transmitted. Alternatively, the alarm unit may be designed to be mounted on a vehicle for operation from within the vehicle, and the non-directional aerial will be located at an appropriate part of the vehicle. The orientation of the alarm unit will then correspond to the orientation of the vehicle.

Preferably each alarm unit is precoded with identity data that is unique to that alarm unit, and the identity data forms part of the alarm signal. Thus, the individual person or vehicle from whom the alarm signal is sent may be identified at the control centre, which may hold any required amount of data. Basic data will usually be the name and address of the holder of the unit or the owner of the vehicle, but it will be understood that information relating to medical requirements, disability or other information germane to an emergency response to that person may also be held.

In an emergency situation it is always reassuring to have some confidence that proper operation of the alarm system has occurred. Accordingly, the alarm unit may desirably include display means for displaying confirmation that an alarm signal has been properly transmitted. Additionally, the receiving units may each include visual indication means that are activated on receipt of an alarm signal. Thus, if the receiving unit is in line of sight then this will give additional reassurance.

Many highways, and particularly motorways, are already equipped with roadside emergency telephones, and it is envisaged that it will be particularly appropriate for the receiving units to be incorporated into the housings of these emergency telephones. Such telephones are usually linked to police control rooms and those linkages may be used to carry alarm signals from the system. The linkages may be provided by hard lines, for example by telecommunication lines, carrying signals which may be electrical or optical in nature. Linkages in other forms may be used such as, for example, using radio equipment,

and repeater apparatus such as that disclosed in EP-A-401974, can be particularly useful.

The control room will have means of identifying a signal raised on the system from a normal emergency telephone call and may be equipped with means for automatically routing the alarm signals to a control centre for dealing specifically with them.

The invention will be better understood from the following description of the specific embodiment thereof given in conjunction with the accompanying drawings in which:-

Figure 1 is a layout drawing of an alarm system; and

Figure 2 is a schematic diagram indicating signal transmission.

Figure 1 shows part of a motorway with a conventional emergency telephone 1 located at the roadside. Such telephones are, in the United Kingdom, generally located at one mile intervals. The emergency telephones are linked by a roadside cable 2 and by a communications cable 3 to a police control room 4 which services a group of such telephones. The police control room 4 is linked via the public telephone system or by a dedicated transmission system 5 to a control centre 6 housing a number of operating staff. It will be understood that a single control centre may service any required number of police control rooms. The control centre is in turn linked by way of the public telephone network or by dedicated lines to breakdown services 7. Again, as many breakdown services as necessary may be accessed from a single central station.

The standard emergency telephone is modified by the inclusion of an omni-directional aerial 8 for receiving radio signals and a xenon beacon 9 capable of being illuminated to give a visual signal. Within the housing of the emergency telephone is a receiving unit 10. Each user of the system is provided with an alarm unit which may be mounted in a vehicle or may be portable and carried by the user. Referring to Figure 2 an alarm unit is indicated at 11 and is provided with a keyring 12 which incorporates a non-directional radio aerial. The alarm unit may be simply carried on the same ring as the user's car keys and will incorporate a push button 13 by which transmission of an emergency signal may be generated. The alarm unit additionally includes a flux gate transducer providing an output that is related to the bearing of the alarm unit, and means for incorporating orientation data related to that output to a signal that is transmitted by the unit. The unit is also precoded with identity data unique to that unit, and again that data is transmitted as part of an alarm signal.

Each receiving unit 10 includes a circuit 14 for receiving alarm signals, a memory 15 storing a unique identity code for that receiving unit, and a transmitter 16 in the receiver 10 for transmitting data onwardly from the receiver to the police control room 4, having

added to the data the code unique to that particular receiver. The transmitter may be a radio transmitter. A signal from the transmitter can be transmitted to the control room via repeaters, for example of the type disclosed in EP-A-401974.

The system operates as follows. On operation of the alarm unit 11 this transmits a non-directional signal which has three signal components, a system code SC, orientation data OD and an identity code ID for the particular alarm unit. That signal is received by all receivers that are within range of the alarm unit and, for example, is received at receivers R1 and R2 in Figure 2. It is not received at receiver R3, which is out of range. When emergency telephones spaced one mile apart are used to house the receiver, then each alarm unit will need to have a range of half a mile.

Each receiver receiving the signal will add its own identity code and will transmit to the police control room a signal comprising a system code SC, orientation data OD, receiver identifying code RC and the identity code ID transmitted by the alarm unit. Equipment at the police control room recognises the system code as meaning that the received signal is destined for the control centre, and the signal is retransmitted onto that control centre. The system code element is no longer necessary and each signal reaching the control centre consists simply of the receiver code, orientation data and the identity code. On receipt at the control centre the signal passes to a microprocessor which reads these codes.

In the particular case illustrated two receivers transmit a single alarm signal, recognisable by a common identity code ID. The orientation data in these codes is processed and that data will define the heading of the vehicle and thus the carriageway on which the vehicle is located. Details of the active receivers, together with details of the individual driver or vehicle from whom the alarm has been transmitted, can then be retrieved from memory and displayed on a VDU, together with the vehicle heading. The VDU may also retrieve from memory details of the nearest appropriate breakdown service, and an operator at the control centre will make contact with that service and request them to proceed along the road on which the breakdown occurred to locate the stranded vehicle in the vicinity of receiver R1.

It will be appreciated that details of the system may be changed from those illustrated, and that the system may be administered in any way thought to be appropriate. A subscription system whereby users pay an annual subscription for use of the alarm units is perhaps an appropriate arrangement.

Claims

1. An alarm system which comprises:

- (a) a plurality of alarm units, each of which includes means for transmitting an alarm signal containing data indicative of the orientation of the alarm unit;
- (b) a plurality of roadside receiving units, each of which includes means for receiving alarm signals transmitted from an alarm unit within a certain range, and means for retransmitting a signal;
- (c) a control centre which includes means for receiving signals transmitted from the receiving units; and
- (d) means connecting the receiving units to the control centre.
2. An alarm system as claimed in claim 1 in which the signal transmitted by the receiver is the received alarm signal.
3. An alarm system as claimed in claim 1 in which the signal transmitted by the receiver is a further signal derived from the received alarm signal.
4. An alarm system as claimed in any one of claims 1 to 3 which includes means for analysing the orientation data of the alarm signal or signal derived from the received alarm signal.
5. An alarm system as claimed in claim 4 in which the means for analysing the orientation data is provided in the receiving unit.
6. An alarm system as claimed in claim 4 in which the means for analysing the orientation data is provided in the control centre.
7. An alarm system as claimed in any one of claims 1 to 6 in which the orientation data is derived from a flux gate transducer incorporated in the alarm unit.
8. An alarm system as claimed in any one of claims 1 to 7 in which the alarm signal is a radio signal.
9. An alarm system as claimed in any one of claims 1 to 8 in which each alarm unit incorporates a non-directional aerial.
10. An alarm system as claimed in any one of claims 1 to 9 in which each receiving unit incorporates an omni-directional aerial.
11. An alarm system as claimed in claim 9 in which the non-directional aerial is incorporated in a keyring that forms part of the alarm unit.
12. An alarm system as claimed in any one of claims 1 to 10 in which the alarm unit is mounted on a vehicle for operation from within the vehicle.
13. An alarm system as claimed in any one of claims 1 to 12 in which each alarm unit is precoded with identity data that is unique to that alarm unit.
14. An alarm system as claimed in any one of claims 1 to 13 which includes display means for displaying confirmation that an alarm signal has been properly transmitted.
15. An alarm system as claimed in claim 14 in which the display means is provided on each receiving unit.
16. An alarm system as claimed in any one of claims 1 to 15 in which the receiving units are incorporated into or adjacent to the housings of roadside emergency telephones.

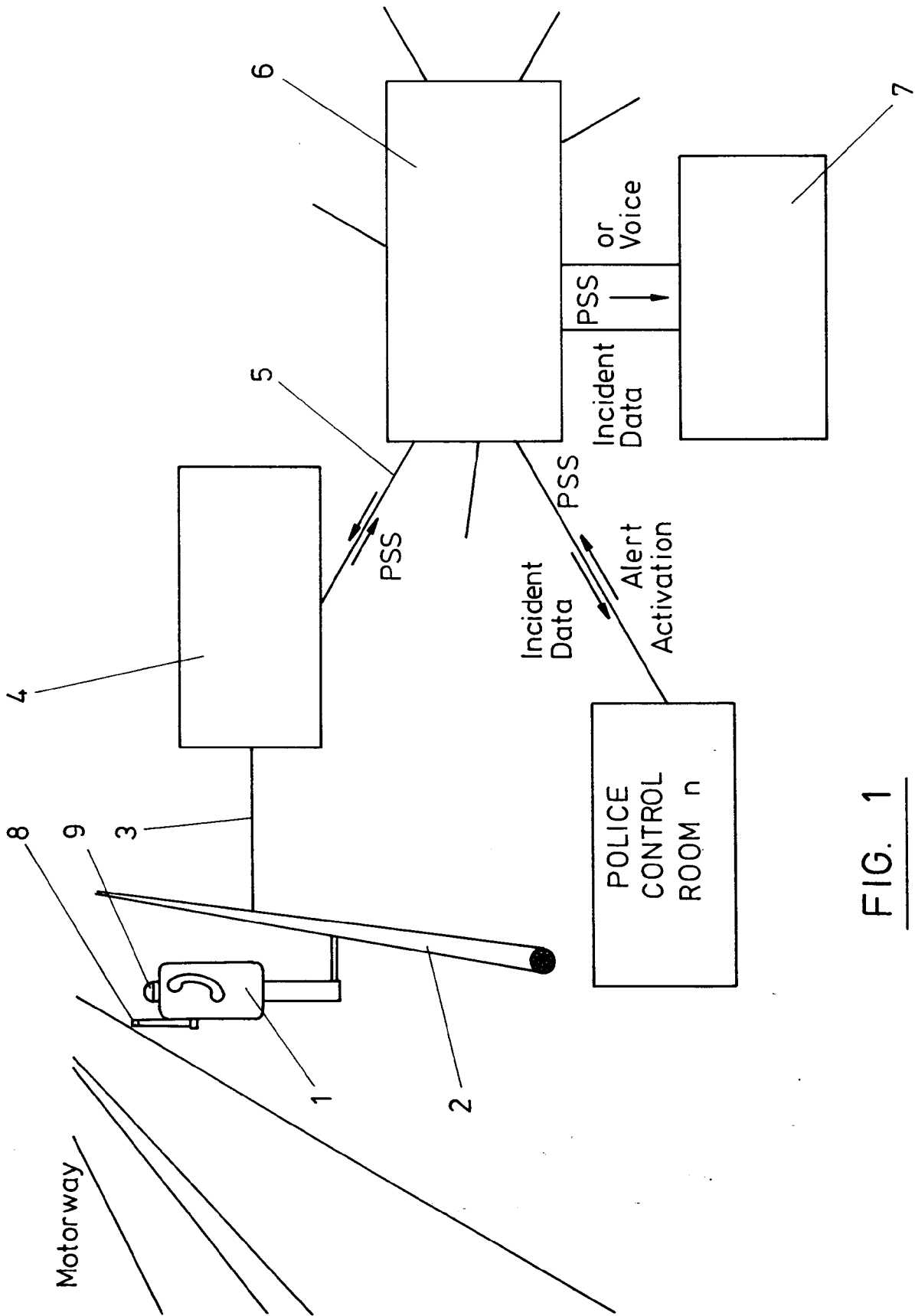


FIG. 1

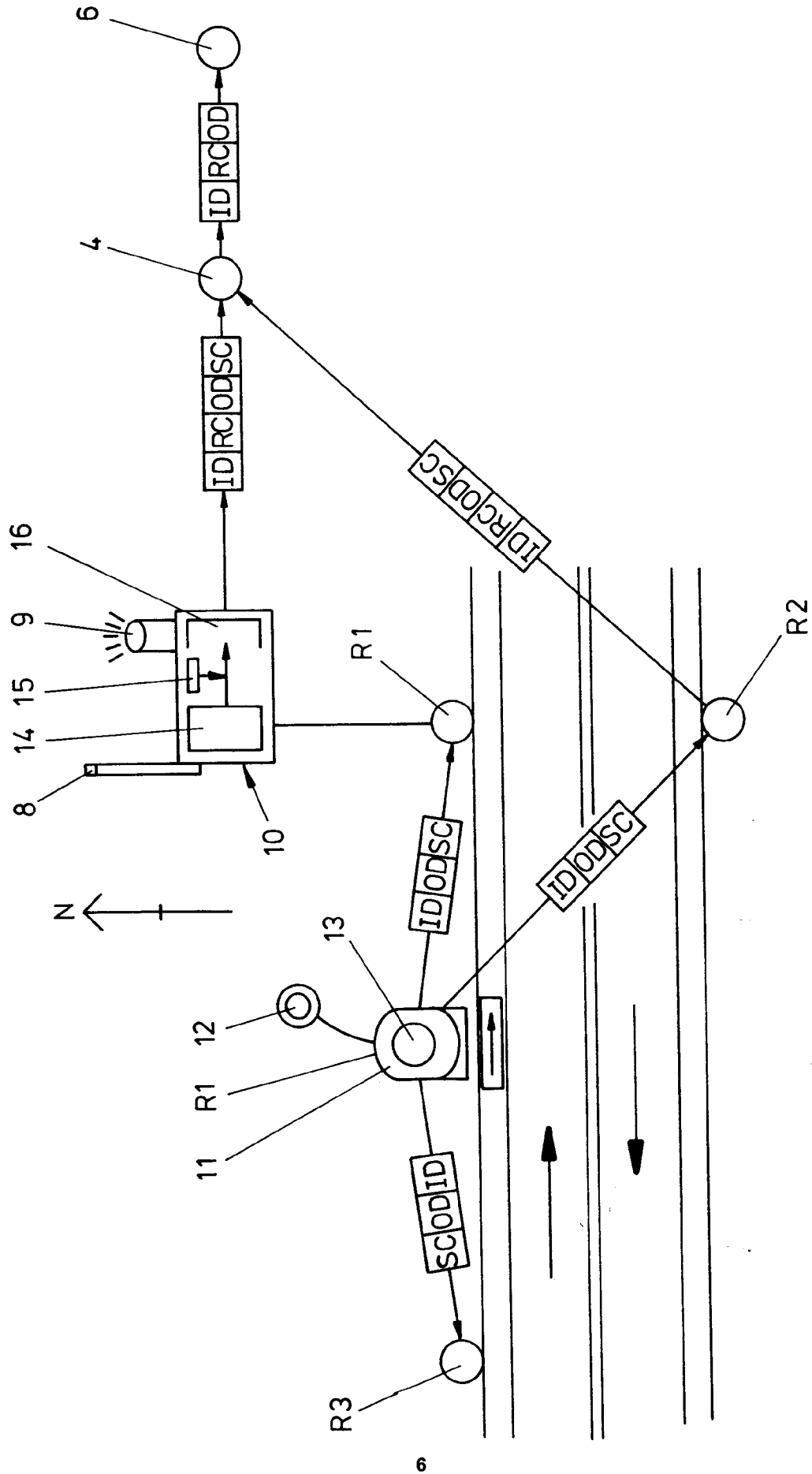


FIG. 2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 2551

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X Y	US-A-3 986 119 (HEMMER JR ET AL.) * the whole document * ---	1-6, 8-16 7	G08G1/127 G08B25/01
X	DE-A-3 830 301 (LICENTIA PATENT-VERWALTUNGS-GMBH) * the whole document * ---	1-6, 8-10, 12-16	
P, Y	DE-A-4 004 816 (GRUNDIG E. M. V. ELEKTRO-MECHANISCHE VERSUCHANSTALT MAX GRUNDIG HOLLAND.) * claims * ---	7	
A	FR-A-2 348 536 (COMPAGNIE DE SIGNAUX ET D'ENTREPRISES ELECTRIQUES) * the whole document * ---	1-6, 8-13	
A	FR-A-2 262 836 (DULOQUIN) * claims * ---	1-6, 8-13, 16	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-4 002 983 (KAVALIR ET AL.) * abstract; claims * -----	1-6, 8-13	G08G G08B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 JULY 1992	Examiner REEKMANS M. V.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			

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