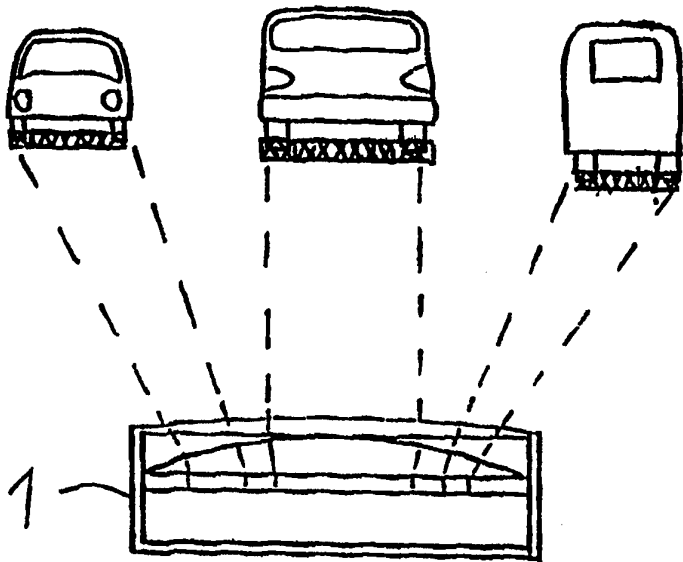




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/NO95/00062 (22) International Filing Date: 10 April 1995 (10.04.95) (30) Priority Data: 941385 15 April 1994 (15.04.94) NO (71)(72) Applicant and Inventor: YSTAD, Arvid [NO/NO]; Guvernørens vei 6A, N-0284 Oslo (NO).</p>	<p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Norwegian).</i></p>	
<p>(54) Title: ALARM DEVICE</p>		
<p>(57) Abstract</p> <p>Method of warning an automobile driver in case of danger of a collision with the vehicle driving in front when the distance to the vehicle in front decreases quicker than a preset limit, by optically sensing, registering and monitoring a characteristic part image of a vehicle driving in front, such as the shade of the vehicle on the street body, a characteristic picture of the rear part of a vehicle, a horizontal line along the vehicle underside, or such; transmitting the optically registered data to data in a microprocessor, monitoring the movements of the part image up, down, to both sides and diminishing and increasing the size of same; and by transmitting a signal to an alarm device if the part image picture becomes larger than a certain minimum size and at a preset speed. A device for warning an automobile driver comprising a microprocessor being adapted to receive signals from an optical registration unit directed towards the traffic situation in front, the microprocessor being adapted to recognize a characteristic image of a vehicle driving in front, the microprocessor being adapted to transmit a signal to an alarm device if the size of the picture increases from a preset minimum size at a preset minimum speed and the alarm device thereby transmitting a signal to the driver of the vehicle.</p>		

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Alarm device

The present invention is related to a device adapted to alert automobile drivers when a potential danger exists for collision with the vehicle in front.

As a large number of automobile accidents are caused by collisions into the rear part of the car driving in front there has been presented a number of different alarm devices for monitoring the distance to the automobile in front or in general to objects which appear in the driving direction of a vehicle.

Such known systems are designed based on different types of transmitters and receivers, especially constructed according to the radar principle, by transmitting beams of any kind and measuring and interpreting the time elapsed to the receipt of the reflection of the same beams. Electromagnetic beams of different types like radar, lasers, as well as ultrasounds, can be used.

A large number of the prevailing solutions are, however, based on constant monitoring. Display screens for such monitoring may be mounted on or near the windshield of the vehicle. Even if such display devices of this kind are easily readable, they demand a constant or at least periodically attention of the driver. Should there be any way by which the drivers attention could be maintained, it should rather be directed directly to the traffic situation.

Known alarm devices often based on the radar principle often are heavy and expensive. Furthermore they consume rather much electric current and often give false signals caused by reflections from passing vehicles or objects adjacent the road.

It is however substantial to underline that the drivers attention must be directed to the traffic situation in front of the vehicle as well as backwards and transversally to the vehicle.

The drivers attention must be concentrated on the driving action and on the traffic situation in such a way that a possible additional monitoring of the distance to the automobile in front will rather distress the driver than increase his attention.

The background for the present invention is the number

of accidents occurring caused by inattention by the drivers. Approximately one out of five accidents are caused by collisions from behind.

From prior art the following publications are referred
5 to WO 89 /11139, EP 0 498 416, US 4 779 095, US 5 023 712 og
US 5 195 144.

The present invention is however related to an alarm
device for automobile drivers, to raise his attention when
dangerous situations occur in relation to a vehicle driving in
10 front.

When the device is installed in an automobile, it
thereby is ensured that the drivers attention is the traffic
situation. An alarm transmitting sound signals calls on the
drivers attention in dangerous situations. Even in situations
15 where the driver is attentive to the traffic situation, it
nevertheless is suitable that an alarm device giving alert in
dangerous situations, as this will enhance the drivers attention.
Above all, it is important to ensure that the drivers attention
is alerted in situations where he is inattentive or when a
20 possible dangerous situation seems to develop.

This is obtained by the method and the device according
to the present invention as defined by the features of the
claims.

The drawing discloses in figure 1 scematically a
25 traffic situation and how this is registred by an optical
monitoring device, figure 2 shows how the microprocessor
theoretically evaluates the traffic situation represented by the
shade from the vehicle in front in a coordination system and
figure 3 shows a simplified block diagram of the device according
30 to the invention.

An optical registration device 1, is mounted in a
convenient place at the front of a vehicle, for example at the
interior of the windshield, on the front wing or in connection
with the vehicle front lights, for monitoring the traffic
35 situation in front of the vehicle. An imaginary picture with a
coordination system 4 is created in connection with a
microprosessor. The coordination system 4 is devided into areas
defined as more or less dangerous, respectively that situations
occurring in these areas are defined as more or less dangerous.

Accordingly the microprocessor 2 shall not give any warning signal to the alarm device 3 that a signal shall be given to the driver if an automobile comprising an alarm device is overhauling another automobile, nor shall automobiles coming in the other
5 direction cause signals from the alarm device 3.

A characteristic registration object can for instance be chosen the shade from a vehicle on the ground, the shade of the lower part of a vehicle, a characteristic image of a car from behind, for example the horizontal lower surface of a vehicle
10 having vertical limitations defined by the wheels, or a horizontal contrast area which is typical for an automobile as seen from behind.

When the optical registration device 1 has registered such a characteristic image, the picture is monitored by the
15 microprocessor 2, even when the picture in the imaginary coordination system 4 is moving to the right or left in curves or the picture is moving up or down by driving across bumps or dips and even so when the size of the characteristic picture increases or decreases.

20 Only when the image becomes larger and exceeds a preset dimension in the area for dangerous situations, alarm will be activated so that the driver will be alerted in the situation. The speed of the own vehicle is also decisive for when alarm shall be given.

25 Alarm is given by sound, preferably however by sound in combination with light. The alarm device 3 is connected to the microprocessor and secured in a convenient place in the vehicle.

The traffic situation is registered periodically and with a high frequency, for instance up to 60 times per second and
30 with continuous evaluation in the microprocessor 2 of the last registered traffic picture compared previous pictures.

The device according to the present invention may be constructed in different versions. For example can the simplest version be equipped with a battery or it can be connected to the
35 vehicles power supply. The device furthermore can be connected to the automobile in such a way that the speed is registered thereby to be utilised for evaluation in the microprocessor 2. A switch or the like possibly can be installed so that the driver can choose the evaluation in the microprocessor according to the

situation when driving on a motorway, country road or in city traffic.

Suitably the alarm device also may be equipped with a switch or a sensor ensuring that the device will not continue to give alarm based on situations which by the driver is not considered to be dangerous or such situations already observed by the driver. Such signals can be restrained completely or the device can be reset so that the alarm in such situations is activated at a later stage, and if desired even at an earlier stage, for possible future situations.

The microprocessor 2 is such programmed that an imaginary picture of the traffic situation in front is created in the coordination system 4. The programming of the microprocessor 2 ensures that the alarm is not activated from shades on the road, passing vehicles, windshield wipers (if the registration device 1 is mounted inside the windshield), etc. When a characteristic pattern of a vehicle driving in front is observed and registered, the microprocessor "locks" to this picture and monitors this picture until it disappears. Alarm is given only if and when the characteristic features obtain a during a preset periode of time assume a preset minimum size.

In a further developed embodiment a connection between the alarm device and the rear breaking lights of the vehicle may be established, in such a way that the lights are activated simultaneously with the alarm thereby also to give an early warning to drivers of following vehicles.

P a t e n t C l a i m s

5 1. Method of warning an automobile driver in case of
danger of a collision with the vehicle driving in front when the
distance to the vehicle in front decreases quicker than a preset
limit, CHARACTERIZED IN optically to sense, registrate and
monitor a characteristic part image of a vehicle driving in
10 front, such as the shade of the vehicle on the street body, a
characteristic picture of the rear part of a vehicle, a
horisontal line along the vehicle underside or such, to transmit
the optically registered data to data in a microprocessor, to
monitor the movements of the part image up, down, to both sides
15 and diminishing and increasing the size of same, and to transmit
a signal to an alarm device if the part image picture becomes
larger from a certain minimum size and at a preset speed.

 2. A device for warning an automobile driver in case of
danger of collision with a vehicle driving in front occurs, the
20 vehicle driving in front thereby being monitored optically,
CHARACTERIZED IN a microprocessor being adapted to receive
signals from an optical registration unit directed towards the
traffic situation in front, the microprocessor being adapted to
recognize a characteristic image of a vehicle driving in front,
25 the microprocessor being adapted to transmit a signal to an alarm
device if the size of the picture increases from a preset minimum
size at a preset minimum speed and the alarm device thereby
transmitting a signal to the driver of the vehicle.

 3. A device according to claim 2, CHARACTERIZED IN the
30 signal being a sound signal and/or a light signal.

 4. A device according to claims 2-3, CHARACTERIZED IN
the alarm device activating the rear break lights of the vehicle
when alarm is given.

 5. A device according to claims 2-4, CHARACTERIZED IN
35 the characteristical image being the shade on the ground of the
vehicle driving in front.

 6. A device according to claims 2-4, CHARACTERIZED IN
the characteristical image being the contour of the vehicle
driving in front.

7. A device according to claims 5-6, CHARACTERIZED IN the characteristic picture also including reflexes from the vehicle driving in front.

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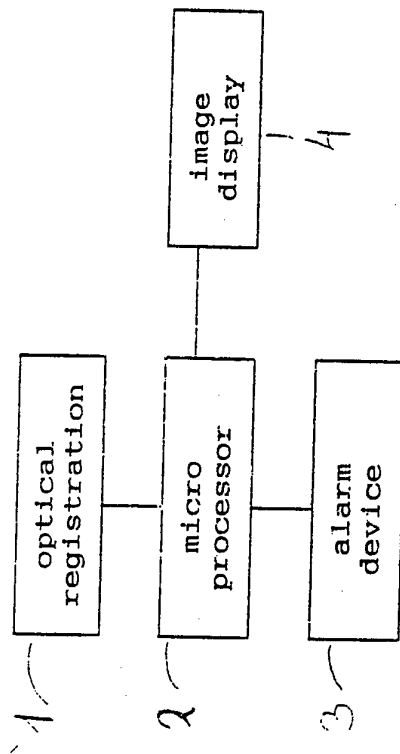
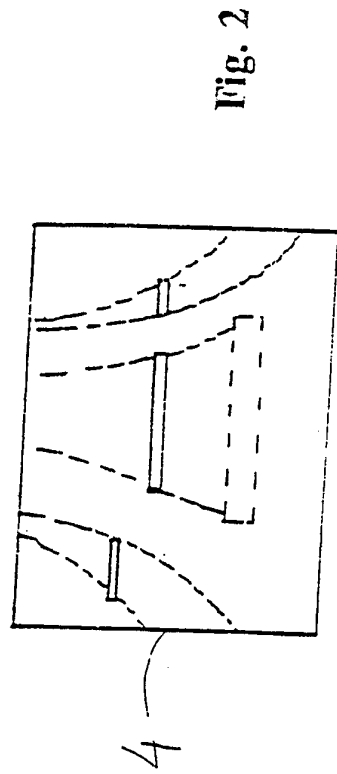
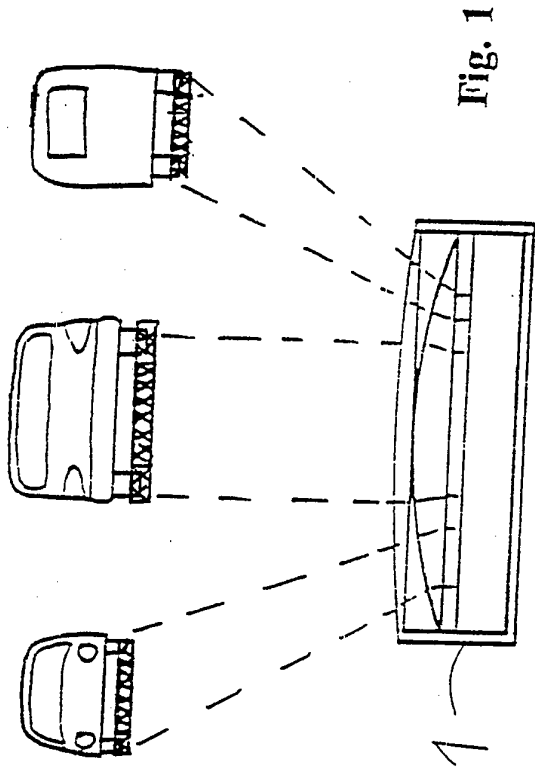


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 95/00062

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: G08G 1/16 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: G08G		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
DIALOG: WPI, CLAIMS		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4257703 A (GEORGE W. GOODRICH), 24 March 1981 (24.03.81), see whole document --	1-7
A	US 4872051 A (ROBERT H. DYE), 3 October 1989 (03.10.89), column 3, line 32 - column 4, line 43, figures 1,2 --	1-3,6
A	EP 0501345 A2 (MITSUBISHI DENKI KABUSHIKI KAISHA), 2 Sept 1992 (02.09.92), column 3, line 15 - column 4, line 48 --	1-4,6
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5195144 A (GUY LE PARQUIER ET AL), 16 March 1993 (16.03.93), abstract, cited in the application ----- --	1-2

INTERNATIONAL SEARCH REPORT
Information on patent family members

28/08/95

International application No.
PCT/NO 95/00062

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4257703	24/03/81	NONE	
US-A- 4872051	03/10/89	NONE	
EP-A2- 0501345	02/09/92	DE-D- 69202274 JP-A- 4269617 US-A- 5309137 JP-A- 4313200	00/00/00 25/09/92 03/05/94 05/11/92
US-A- 5195144	16/03/93	DE-U- 6890625 EP-A,B- 0373979 FR-A,B- 2639108	03/06/93 20/06/90 18/05/90