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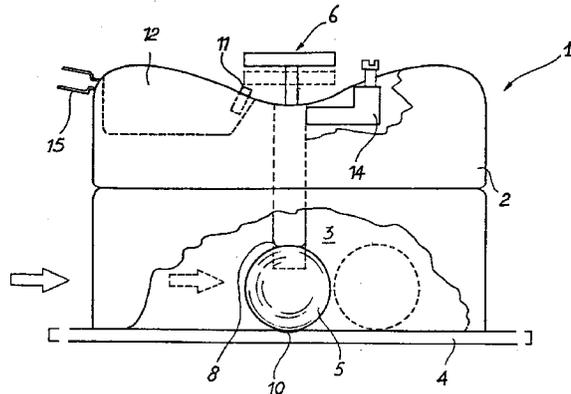
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**Impact sensitive sensor-switch device for the activation of electric or electronic circuits.**

The invention relates to an impact-sensitive sensor-switch device for the activation of electric or electronic circuits, comprising a box structure (2) defining an internal chamber (3) closed by a substantially flat element (4), the element houses a sphere (5) which is free to move inside the said chamber, said box structure has an elastically mobile organ (6) housed internally to it and centrally arranged in the said chamber, perpendicular to the said flat element, and having its lower end (8) internal to the said chamber; the said mobile organ being axially mobile between an upper position and a lower position, having its lower end interfering with said sphere and holding said sphere, and its upper end (7), in the lower position of the said mobile organ, free and interfering with a button (11) of a switch means (12) of an electric or electronic circuit.



**fig.1**

The invention relates to an impact-sensitive sensor-switch for the activation of electric or electronic circuits, in particular for application to vehicles, means or machines in movement.

The prior art embraces signalling devices which transmit distance signals to warn drivers approaching on roads with normal viability, of the existence of danger nearby, for example of dangerous bends, of roadworks, of motorway barriers, which in conditions of bad visibility can prevent the timely reading of normal road signals. Said prior art devices comprise a transmitter, placed in proximity to the place where danger exists and therefore where a signal is desired, and a receiver installed on board the mobile vehicle which receives the signal.

The prior art devices, then, were designed to have the signalling device fixed in a place and the receiving device fixed on board the moving vehicle.

Detailed research has shown that it is opportune that the said device on board the vehicle is also capable of transmitting, when there exist situations of potential danger, to other moving vehicles; or in any case it is advantageous that the said device be capable of sending a message to receivers installed in crucial places, such as roadside service stations or suchlike.

In order to arrive at solutions of this kind, the prior art systems must envisage both a transmission device installed on the vehicle and an activating device, that is a sensor-switch for the transmitting device, in order to permit of automatic and immediate transmission of the signal should the vehicle be involved in an accident. This sensor-switch on the transmitting device must be thus sensitive to impacts which a vehicle might be subjected to in the case of accidents or in any case to impacts or violent movements which exceed a determined limit. For this reason sensor-switch devices exist in the prior art which are sensitive to impacts which occur in a certain given direction. Said sensor-switch devices normally envisage a mobile element positioned in instable conditions along an inclined slide at the opposite end of which a switch means is envisaged.

Said prior art sensor-switch devices have, as already indicated, the substantial limitation of only being sensitive to forces or actions which act in a certain direction prefixed at the moment of installation. To have a situation where the sensor-switch, or any alarm-signalling circuit, could signal at any impact or accident with which the vehicle might meet, it would be necessary to have a plurality of said sensor-switch devices directed in various directions.

Aim of the present invention is thus to eliminate the above-mentioned drawbacks and to realise a sensor-switch device which is sensitive to impacts or violent actions acting in any direction on vehicles, means or machines of any kind, in movement or fixed, which device activates a determined electric or electronic

circuit.

Further aim of the invention is to realise a sensor-switch device as indicated above which has a high degree of reliability and stability with regard to the activation threshold, and which has a structure which permits of rapid and easy resetting.

The invention, as described in the claims which follow, solves the problem by providing a sensor-switch sensitive to impacts for the activation of electric or electronic circuits which, from a general point of view, is characterised by the fact of being constituted by a box structure defining an internal chamber closed by a substantially flat element and housing a sphere, which sphere is free to move inside said chamber, said box structure having and housing in an opposite position to the said flat element a mobile organ, arranged centrally to the chamber and perpendicular to said flat element, having its upper end external to the said box structure and its lower end internal to the said chamber; said mobile organ being axially mobile between an upper position and a lower position, said mobility depending on the action of a return spring; said mobile organ having its lower end, in the upper position of the mobile organ, in a position of interference with regard to the said sphere and blocking its movement, by means of the pressure exerted by the said return spring, in a position in which the said sphere is unstable on a small seating cut centrally into the said flat element, and said mobile organ having its upper end, in the lower position of the said mobile organ, interfering with the button of a switch device of an electric or electronic circuit; said sphere exiting from said seating when released by the pressure exerted by said mobile organ in the presence of a force acting from any direction on the box structure, which force will be superior to the inertia force of the said sphere and superior to the pressure exerted on the said sphere by the mobile organ and determining the displacement of the said mobile organ into the lower position by the action of the said return spring.

Further characteristics and advantages will better emerge from the detailed description which follows, of a preferred but not exclusive embodiment, illustrated here purely in the form of a non-limiting example, in the drawings, in which:

- figure 1 shows a schematic lateral view of the invention, partly cut away;
- figure 2 shows a schematic vertical section, with certain particulars in evidence.

With reference to the drawings, 1 indicates a sensor-switch device which is sensitive to impacts coming from any direction, for the automatic and immediate activation of electric or electronic circuits placed, for example, on moving vehicles or on other mobile or fixed machines or apparatus.

The sensor-switch device 1 comprises a box structure 2, of preferably cylindrical form, which defines an internal chamber 3, also preferably cylin-

drical, closed by a substantially flat element 4. In the said chamber 3, as shown in figure 1 and in figure 2, a sphere 5 is housed, which sphere 5 is free to move internally to the said chamber 3.

The said box structure 2 has housed in an opposite position to the said flat element, a mobile organ 6 which organ 6 has one upper end 7 external to the box structure 2 and one lower end 8 internal to the said chamber 3. The mobile organ 6, as shown in both figure 1 and figure 2, is axially mobile between an upper position and a lower position, depending on the action of a return spring 9, which spring 9 is set at the beginning of the operation.

In figure 1 the mobile organ 6 is shown with a continuous line in its upper position, in which the lower end 8 interferes with the said sphere 5, holding it by force of pressure exerted by the said spring 9 in a position in which the sphere 5 is arranged unstably on a small seating 10 cut centrally in the said flat element 4.

In figure 2 the mobile organ 6 is shown in the lower position, in which its lower end 8 is free, that is not interfering with the said sphere 5, while the upper end 7 interferes with a button 11 of a switch device 12 of an electric or electronic circuit not shown in the figure, but connectable to the said switch device by means of the illustrated contacts 15.

Advantageously, as already mentioned, the sensor-switch device 1 is applied using conventional fixing means, which preferably pass through said flat element 4 in the tracts which project from the box structure 2, to surfaces of any type of means, machine or moving vehicle and said sensor-switch device can activate any type of electric or electronic circuit in the case in which the said mobile organ 6, and in particular its upper end 7, interferes with the button 11.

In the case in which a moving vehicle has an accident, the said sphere 5 exits from its said seating 10, released by the pressure exerted by the said mobile organ 6 in the presence of a force acting from any direction on the said box structure 2, which force is superior to the force of inertia of the said sphere 5 and superior to the pressure exerted on the said sphere 5 by the mobile organ 6. This determines the displacement into the lower position of the said mobile organ 6 which thus interferes with the said button 11, and thus activates the electric or electronic circuit connected to the said switch means 12.

The force of inertia of the sphere 5 and the pressure exerted on it by the mobile organ 6 by action of the return spring 9 constitute the threshold value of the force acting on the box structure 2 to activate the device. The said threshold is pre-determined by the original spring setting value, but advantageously the invention comprises an adjustment device 14 for the spring 9 (figure 1) which permits of different settings for the spring 9 and therefore of different activation

threshold values, in relation to the different applications or arrangements of the device.

Once the device is activated, it can be brought into the primed condition simply by favouring the return of the sphere 5 into its seating 10 and manually bring the mobile organ 6 to interfere with the sphere 5, holding it in its unstable position. Naturally the resetting of the activation conditions of the device is made easier by its being fixedly located with said flat element 4 substantially horizontal.

Advantageously, the flat element 4 has a slightly concave shaping of the internal surface of the chamber 3, which concavity converges towards the said seating 10, in such a way that the sphere 5, in the resetting phase, is more rapidly brought towards the said seating 10.

## Claims

1. An impact-sensitive sensor-switch device for the activation of electric or electronic circuits, comprising a box structure (2) which box structure (2) defines an internal chamber (3) closed by a substantially flat element (4) and housing a sphere (5), which sphere (5) is free to move in the said chamber (3), said box structure (2) having a mobile organ (6) housed in an opposite position to the said flat element (4), which mobile organ (6) is arranged centrally to the said chamber (3) and perpendicular to the said flat element (4); said mobile organ (6) having its upper end (7) external to the box structure (2) and its lower end (8) internal the the said chamber (3); said mobile organ (6) being axially mobile between an upper position and a lower position, depending on the action of a return spring (9); said mobile organ (6) having its lower end (8); when the mobile organ (6) is in its upper position, interfering with the said sphere (5) and holding it still by means of the pressure exerted by the said return spring (9), in a position in which the said sphere (5) is in an unstable position on a small seating (10) cut centrally in the said flat element (4); said mobile organ (6) having its upper end (7), when the mobile organ is in the lower position, interfering with a button (11) of a switch mechanism (12) of an electric or electronic circuit; said sphere (5) exiting from said seating (10) when the pressure exerted by the said mobile organ (6) in the presence of a force acting from any direction on the box structure (2) is superior to the force of inertia of the sphere (5) itself and the pressure exerted on the said sphere (5) by the mobile organ (6); said exiting of the said sphere (5) determining the displacement of the said mobile organ (6) into the lower position by action of the said return spring (9).

2. A sensor-switch device, as in claim 1, comprising an adjustment device (14) for the adjustment of the said return spring (9).
3. A sensor-switch device, as in claim 1, wherein said box structure (2) and said chamber (3) are cylindrical in shape. 5
4. A sensor-switch device, as in claim 1, wherein said flat element (4) has its surface internal to the said chamber (3) slightly concavely shaped and converging towards the said seating (10). 10
5. A sensor-switch device, as in claim 1, wherein said switch means (12) is equipped with contacts (15) external to the said box structure (2) for contacting with an electric or electronic circuit. 15

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EUROPEAN SEARCH REPORT

Application Number

EP 92 83 0057

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	FR-A-1 092 515 (ETABLISSEMENTS DURAND ET PILVEN) * the whole document *	1, 3-5	H01H35/14
Y	---	2	
X	FR-A-2 285 703 (COMPAGNIE FRANÇAISE D'EQUIPEMENT AUTOMOBILE) * the whole document *	1, 3-5	
X	FR-A-748 860 (GALLIMARD) * the whole document *	1, 4, 5	
X	US-A-2 806 916 (GIBBLE) * the whole document *	1, 5	
X	FR-A-790 543 (WILLIAUME) * page 1, line 52 - page 4, line 36; figure 1 *	1	
A	DE-U-7 203 903 (ZWIEBELHOFER) * the whole document *	1, 3	
A	DE-B-1 134 248 (KUSCHEL) * claim 1; figure *	1	
Y	---	2	
A	DE-A-3 128 594 (DANNENBERGER VORRICHTUNGSBAU) * the whole document *	1, 3, 5	
A	DE-U-1 936 591 (MOLL) * the whole document *	1	H01H
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The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 27 APRIL 1992	Examiner NIELSEN K. G.
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