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Protected vehicle or ship

The invention relates to a vehicle equipped with seats and/or equipment for use in regions, in which the detonation by mines or such like is to be feared, wherein walls, floors and ceiling are equipped with means withdrawing energy from the blast wave of a detonation by work of deformation and the floor is only suspended through ropes, rods or chains with separable connections.

In the passenger transportation in regions, where the presence of explosive mines is to be feared, containers protected against blast waves are utilised as armoured vehicles (DE 198 42 629 C1), although these have not proven themselves sufficiently, and that also in that case, when they are formed with wall, floor and ceiling linings, which deform under in the influence of pressure and thus withdraw the largest part of the energy of the blast wave. In a vehicle equipped in this manner it cannot be prevented that such a strong blast wave is produced by a mine that its forces attack at the floor and beneath the seats, and can accelerate the seat with the person sitting thereon such that the person is seriously injured or the equipment situated at the location is destroyed, respectively.

The invention wants to solve this problem. It is intended to provide a vehicle or a ship, respectively, of the type indicated above, wherein the energy of a blast wave created by a detonation cannot reach the floor of a vehicle with the persons and equipment situated thereon.

In general this is achieved according to the invention in that already at the formation of a blast wave created by a detonation, the floor of the vehicle is mechanically released from its suspension and is, in the ideal case, in the state of free fall at the arrival of the blast wave.

By such a suspension it can be achieved that by the break of the separable connection the floor is arranged shockproof during a mine explosion.

The required sensor system serves the purpose to detect an arising shock wave, measure and evaluate it and to ignite explosive or pyrotechnical charges in the area of the separable connections. After destruction of the break-off connections the floor of the vehicle floats freely in the space and cannot be reached by the blast waves of a detonation such that especially a vertical decoupling is achieved. However, the invention can be utilised as effectively in order to separate the floor laterally from the body of the vehicle, when a detonation occurs laterally to the vehicle. The point is in this regard that the lateral attachment of the floor at the vehicle body is broken systematically and that in time before the ingress of the blast wave, and also in this context a connection

with a bolt and an eye is released according to the invention.

Special safety can be achieved in that, when for example in a recreation room formed as a container, which is transported like a usual container, the floor is secured in vertical as well as in horizontal directions with a separable connection according to the invention.

The shearing pins utilised so far in the art, which are intended to break the force flow between parts connected with each other in case of overload, are much too inert with regard to the propagation speed of a blast wave. They would break a connection, after the blast wave has already developed its destructive effect. Thus, it is a special aspect of the present invention to accomplish this break within a shorter period of time, i.e. the explosive charge for the bolt reacts within a period of time below 1 or 2 ms. The blast wave itself reaches the floor only after 4 ms, assuming that the vehicle is located directly above a detonating mine.

In order to ensure that the floor does not fall unboundedly, after the explosive charges have been ignited, either a stop can be provided or the suspension itself is utilised again, but using an oblong eye, in which firstly the retractable bolt (also indicated as pin puller) is situated in operative connection, as well as a second pin is provided arranged at a distance above it, which is loaded, when the bolt has been retracted.

The invention is explained below based on the drawings by way of example.

Fig. 1 shows a break-off connection for a vehicle or ship according to the invention in the normal state.

Fig. 2 shows a corresponding situation shortly before the ignition of the explosive charge of the break-off connection.

Fig. 3 shows a corresponding arrangement, in which the catching pin has come into operation.

Fig. 4 shows a vertical sectional view through a transport container, which has been equipped according to the invention.

In Fig. 1 the reference numbers for the individual parts are inserted, which can also be recognised in the other figures.

These show a separable connection 8 according to the invention.

The floor of a military passenger vehicle or recreation room is attached at 10 by means of bolt connections 7 to a block 4, 5 6, at which a pin 12 and a catching pin 14 are mounted at a different level. The two pins project into an oblong hole or an eye 9 of a fastener 13, which is fixed in

the top area approximately at the ceiling of a vehicle according to the invention.

The pin 12 rests in the lower part of the oblong hole 9 and this is the normal case, i. e. the condition before any detonation.

The pin 12 is provided with an explosive charge 11, which can be ignited through a pressure sensor, not shown.

After the ignition of the explosive charge 11, the connection between the pin 12 and the fastener 13 is broken such that the floor 10 can fall freely. The shock wave passes the way starting from the side wall (post) to the rope suspension only at a time, when the mechanical separation has already occurred.

The movement directed downwardly of the floor is stopped after a few centimetres, because the catching pin 14 now comes into engagement with the lower end of the suspension part 13. The distance between the two pins 12 and 14 can be chosen such that the floor 10 floats freely during the detonation and, after fading away of the blast waves caused by the detonation, a firm connection is established between the floor 10 and the ceiling of the vehicle again.

In fig. 4 a vertical cross-sectional view through a container is shown, which is formed by two side walls 21, a ceiling 23 and a floor 22 (already deformed). In the interior the real floor 10 is located, on which equipment can be put down or persons can stand or sit on chairs. This

floor 10 is mounted through rope suspensions at several points, for example at four points at the ceiling 23 of the container. Ropes 24 and 25 as well as shock absorbers 26 and 27 serve this purpose. The lower end of these suspensions is formed by the separable connections 8, which have already been described in the figures 1 to 3. One of these separable connections 8 is shown only graphically on an altered scale such that the spatial arrangement of such a separable connection can be recognised.

In figure 4, 30 shows graphically a detonation, which has occurred directly below the vehicle and has caused the deformation of the floor 22 of the container. The effects of this detonation 30 cannot reach the floor 10, though, because the mechanical connection has been released before.

In figure 4 a lateral detonation 31 is shown as well and it is obvious to connect the floor 10 of the recreation room with the side walls 21 in corresponding manner through releasable separable connections.

It is substantial for the present invention that sensors can detect a detonation wave already at that time, when the real shock wave has still not become noticeable in the vehicle. Thus it is essential to detect accelerations (such as in the manner of an airbag) or pressure variation speeds and to trigger the ignition signal correspondingly. Such sensors are known. They can be included into an evaluation circuit, which decides within shortest time, which releasable connections are to be separated, in order to reduce dangers for humans and goods to a minimum.

The present invention has been shown in connection with a bolt or pin, which can be moved in its longitudinal direction as a result of an explosive charge, in order to break the connection of forces flowing between the floor and the suspension. It is obvious to utilise any other part instead of the bolt as well, which breaks the connection between floor and suspension in corresponding manner. Also the arrangement of the sensors is not critical. If a sensor is mounted close to a break off-connection, this has the advantage of short "switching paths".

Claims

1. Vehicle equipped with seats and/or equipment for use in regions, in which detonations by mines or such like are to be feared, wherein walls, floor and ceiling are provided with means, which can withdraw energy from the blast wave of a detonation by means of work of deformation, and the floor is suspended only through ropes, rods or chains by means of separable connections, characterised in that at least one pressure sensor and/or acceleration sensor is provided, which reacts to a blast wave, outputs a signal and ignites explosive charges thereby, and that the explosive charges (11) are arranged at the separable connections (8) and break these, before the blast wave of a detonation has reached the floor (10).
2. Vehicle according to claim 1, characterised in that the separable connection is formed as a moveable bolt (12), which is arranged at the floor (10) and projects into an eye (9), which in turn is mounted at the rope (24, 25), at the rod or chain, and that the ignited explosive charge (11) can move the bolt (12) out of the eye (9).