

UTILITY VEHICLE

The present invention relates to a utility vehicle, in particular to a military utility vehicle.

5

Off-road utility vehicles for the military area usually comprise a protected driver's cab. In order to protect the occupants of the driver's cab against gunfire, booby traps, improvised explosive devices (IEDs), mines, or similar threats, the driver's cab comprises an appropriately armored driver's cab floor. The applicant
10 is aware of the internal state of the art, in which additional material in the form of thickened sections, such as several plates welded together, ribs, and/or stiffening elements, is provided on the driver's cab floor. This makes it possible to manufacture a driver's cab floor that is as rigid as possible, which can withstand the blast generated when the driver's cab is blown up and does not deform into the
15 driver's cab.

Furthermore, in such utility vehicles, it is usually possible to tilt the entire driver's cab forward from a closed state to an open state, for example, to carry out maintenance work on the utility vehicle's motor. A hydraulic tilt cylinder can be
20 used for this purpose. This tilt cylinder is coupled to the driver's cab floor. If the utility vehicle is blown up, the driver's cab can move from the closed state to the open state, accelerating rapidly. The rapid acceleration can cause injuries to the vehicle occupants. This needs to be improved.

25 Against this background, one task of the present invention is to provide an improved utility vehicle.

Accordingly, a utility vehicle, in particular a military utility vehicle, is proposed. The utility vehicle comprises a chassis, a driver's cab connected to the chassis in
30 a tiltable manner, and a tilt and catch device, wherein the tilt and catch device

comprises a tilt cylinder, with the aid of which the tilt and catch device is configured to tilt the driver's cab relative to the chassis from a closed state into an open state and vice versa, and wherein the tilt and catch device is configured to decelerate a tilt movement of the driver's cab from the closed state towards the open state with the aid of the tilt cylinder in the event of the utility vehicle being blown up.

The fact that the tilt cylinder can be used both to move the driver's cab from the closed state to the open state and vice versa and to decelerate the tilt movement of the driver's cab means that it advantageously has a dual function. Additional devices for decelerating or braking the tilt movement of the driver's cab are not required. This saves space and weight in the design of the utility vehicle. Furthermore, the tilt cylinder is used in particular to dissipate or convert energy and to reduce the energy acting on the driver's cab floor, in particular on attachment areas where the tilt and catch device can be connected to the driver's cab floor. This reliably prevents unwanted deformation of the driver's cab floor, in particular at the attachment areas.

The utility vehicle is preferably a land vehicle, in particular a truck. The utility vehicle is in particular a military utility vehicle. The utility vehicle can therefore also be referred to as a military utility vehicle. Therefore, in the present case, the terms "utility vehicle" and "military utility vehicle" can be used interchangeably. In particular, the utility vehicle is an off-road truck. The utility vehicle can be an armored vehicle and can therefore also be referred to as such.

25

The utility vehicle preferably comprises a chassis frame, which is part of the chassis, with a plurality of axles. This means that the utility vehicle can be a multi-axle vehicle, in particular a three-axle vehicle. The utility vehicle preferably comprises four-wheel drive. The utility vehicle can therefore also be referred

to as an all-wheel drive utility vehicle. The utility vehicle can be a wheeled vehicle. Alternatively, the utility vehicle can also be a tracked vehicle.

The driver's cab may also be referred to as a driver's compartment or driver's cabin. The driver's cab is suitable for accommodating several vehicle occupants, for example a driver and a passenger. The driver's cab is in particular a protected driver's cab or can be referred to as such. This means that the driver's cab is protected against gunfire, booby traps, improvised explosive devices, mines, or the like. For this purpose, the driver's cab can, for example, be constructed from armored steel plates or feature armored steel plates. However, aluminum alloys and/or fiber composite materials can also be used.

The cab preferably comprises a front wall, a rear wall opposite the front wall, two opposite side walls, and the aforementioned driver's cab floor. A roof is located opposite the driver's cab floor. A windshield may be attached to the front wall. The windshield may be divided. Doors may be provided on the side walls. The front wall, the rear wall, the side walls, the roof, and the driver's cab floor enclose an interior space of the driver's cab and thus separate the interior space from a surroundings of the cab. The interior space may be accessible from the surroundings via doors and/or hatches. The driver's cab floor is preferably curved in multiple places. In particular, the driver's cab floor may comprise an egg-shaped or ovoid geometry, at least in sections.

Preferably, a coordinate system with an x-direction or longitudinal direction, a y-direction or transverse direction, and a z-direction or height direction is assigned to the utility vehicle. The directions are oriented perpendicular to each other. The height direction can be oriented parallel to the direction of gravity. In particular, the driver's cab can be tilted or moved from the closed state to the open state and vice versa about an axis of rotation. This axis of rotation corresponds to the transverse direction or is arranged parallel to it.

The chassis preferably comprises the chassis frame extending in the longitudinal direction. The chassis frame is preferably rigid and torsion-soft and extends from the driver's cab to the rear of the vehicle. "Torsion-soft" means in particular that the chassis frame can twist about the longitudinal direction. In contrast to the chassis or the chassis frame, the driver's cab comprises a high degree of rigidity. In this context, "rigidity" refers in particular to the resistance of a body to elastic deformation caused by external stress and conveys the relationship between the stress on the body and its deformation. The rigidity is determined by the material of the body and its geometry.

Since the driver's cab has greater rigidity than the chassis or chassis frame, it is not possible for the cab to twist or warp during operation of the utility vehicle. The driver's cab must therefore be mounted on the chassis in such a way that the chassis can twist or warp without the deformation of the chassis being impeded by the cab. The tilt and catch device connects the tilt cylinder to the cab or the driver's cab floor in such a way that the cab can move relative to the chassis without the cab restricting the deformability of the chassis.

The tilt and catch device can also be referred to as a driver's cab tilt and catch device. Furthermore, the tilt and catch device can also be referred to as a tilt and mine catch device. The terms "tilt and catch device," "driver's cab tilt and catch device," and "tilt and mine catch device" can therefore be used interchangeably in this context.

With the aid of the tilt and catch device, the driver's cab can be moved from the closed state to the open state and vice versa. Furthermore, the tilt and catch device can be used to brake, dampen, or decelerate the tilt movement of the driver's cab in the event of the utility vehicle being blown up, so that injuries to vehicle

occupants in the driver's cab due to excessive acceleration of the driver's cab are avoided. The tilt and catch device thus has a dual function.

Preferably, two such tilt and catch devices are provided. The two tilt and catch devices are preferably coupled to the aforementioned attachment areas of the driver's cab floor, whereby two attachment areas may be provided which are spaced apart from each other when viewed in the transverse direction. One tilt and catch device is assigned to each attachment area. However, only one tilt and catch device will be discussed below.

In this case, the fact that the driver's cab is connected to the chassis in a "tiltable" manner means in particular that the driver's cab can be moved, rotated, swiveled, pivoted, tilted, or tipped relative to the chassis about the aforementioned axis of rotation. For this purpose, the driver's cab or the driver's cab floor can be connected to the chassis or the chassis frame by means of hinges.

The tilt cylinder is preferably a hydraulic cylinder. In particular, two such tilt cylinders are provided, with each of the two aforementioned tilt and catch devices being assigned exactly one tilt cylinder. In particular, the tilt cylinder is a double-acting cylinder. This means, in particular, that the tilt cylinder can be moved from a retracted state to an extended state by applying a hydraulic fluid, such as hydraulic oil. To move the tilt cylinder from the retracted state to the extended state, a piston of the tilt cylinder is moved out of a housing of the tilt cylinder. For this purpose, the housing can be pressurized with the hydraulic fluid. To move the tilt cylinder from the extended state back to the retracted state, the tilt cylinder is again pressurized with hydraulic fluid. The piston then moves back into the housing.

The piston of the tilt cylinder can be passively pulled out of the housing against a retaining force of, for example, approximately 40 kN. To do this, a tensile force is

applied to the piston. The tensile force is applied to the piston, for example, by the tilt and catch device braking or slowing down the tilt movement of the driver's cab from the closed state towards the open state with the aid of the tilt cylinder. When the tilt movement or the cab is slowed down, the piston is thus pulled
5 out of the housing against the retaining force.

The fact that the tilt and catch device is configured to tilt the driver's cab relative to the chassis from the closed state to the open state and vice versa means in this case that the tilt and catch device uses the tilt cylinder to move the driver's cab
10 from the closed state to the open state and vice versa. The fact that the tilt and catch device is "configured" to decelerate the tilt movement of the driver's cab from the closed state towards the open state in the event of the utility vehicle being blown up is to be understood in the present case in particular as meaning that the tilt and catch device uses the tilt cylinder to brake or decelerate the tilt
15 movement. In particular, the driver's cab is braked or slowed down.

In particular, when the utility vehicle is blown up, the tilt movement of the driver's cab from the closed state towards the open state can be slowed down or braked with the aid of the tilt cylinder in such a way that the tilt cylinder preferably
20 dissipates or converts energy, thereby reducing the energy acting on the driver's cab floor, in particular on the attachment areas where the tilt and catch device can be connected to the driver's cab floor. This reliably prevents deformation of the driver's cab floor, in particular at the attachment areas.

25 In this context, "blowing up" the utility vehicle refers in particular to the utility vehicle being blown up or detonated with the aid of an explosive charge, for example in the form of a mine or an improvised explosive device. The explosive charge may be located under or next to the utility vehicle, for example. The explosive charge may also be buried, at least in sections, in a subsoil on which the utility
30 vehicle is traveling in an operational area or mission area. The explosive

charge can then be detonated, for example, when the vehicle drives over the explosive charge and/or passes it. The explosive charge generates a blast or pressure wave that acts on the driver's cab and, in particular, on the driver's cab floor. The utility vehicle is blown up in particular when the utility vehicle is in use in the aforementioned operational area or mission area. The term "explosion" can also be used instead of the term "blowing up".

A utility vehicle, in particular a military utility vehicle, with a chassis, a driver's cab connected to the chassis in a tiltable manner, and a tilt and catch device is particularly preferred. The tilt and catch device may comprise a tilt and catch console connected to the driver's cab, a swingarm rotatably mounted on the tilt and catch console, a catch bolt, and a tilt cylinder on which the swingarm is rotatably mounted by means of the catch bolt. Preferably, the tilt and catch device is configured to decelerate a tilt movement of the driver's cab from a closed state of the driver's cab towards an open state of the driver's cab with the aid of the tilt cylinder when the utility vehicle is blown up. In particular, the tilt and catch console and the catch bolt engage with each other in a form-fitting manner by means of a rotation of the swingarm relative to the tilt and catch console in order to apply a tensile force to the tilt cylinder.

In particular, the tensile force acts against the aforementioned retaining force of the tilt cylinder. The retaining force brakes or decelerates the tilt movement or the driver's cab. Preferably, the tilt and catch device is configured to tilt, rotate, swivel, transfer, or move the cab relative to the chassis from the closed state to the open state and vice versa. In particular, the tilt and catch console and the catch bolt engage in a form-fitting manner in that the catch bolt strikes or comes into contact with the tilt and catch console, in particular with a flap section of the tilt and catch console.

According to one embodiment, the tilt and catch device comprises a swingarm rotatably coupled to the driver's cab, with the aid of which the tilt cylinder is coupled to the driver's cab.

- 5 The tilt and catch device preferably comprises a tilt and catch console as mentioned above. The tilt and catch console comprises, in particular, a clearance within which the swingarm is preferably assembled. In particular, the tilt and catch console can comprise two flap sections, with the clearance within which the swingarm is assembled preferably being provided between the two flap sections.
- 10 The clearance is provided between the two flap sections, in which the swingarm and, in particular, a connection point of the tilt cylinder with the catch bolt are preferably arranged. The swingarm is mounted on the cab or on the cab floor so that it can rotate around a first axis of rotation of the swingarm. The tilt cylinder is also connected to the swingarm. The tilt cylinder is thus indirectly connected to
- 15 the cab or the driver's cab floor via the swingarm. The swingarm is connected to the tilt cylinder, in particular to the connection point of the tilt cylinder, so that it can rotate about a second axis of rotation.

According to another embodiment, the tilt and catch device comprises a tilt and
20 catch console connected to the driver's cab, wherein the swingarm is rotatably coupled to the tilt and catch console.

In particular, the tilt and catch console is firmly connected to the driver's cab floor. For example, the tilt and catch console can be screwed, riveted, and/or
25 welded to the driver's cab floor. The tilt and catch console preferably comprises a plate-shaped basic section with which the tilt and catch console rests on the driver's cab floor. The basic section is firmly connected to the driver's cab floor. The swingarm is rotatably coupled to the tilt and catch console by means of the aforementioned first axis of rotation. For this purpose, a bolt may be provided around
30 which the swingarm can rotate relative to the tilt and catch console. The tilt

cylinder is thus indirectly connected to the cab and/or the driver's cab floor via the swingarm and the tilt and catch console. The tilt and catch console can be, for example, a cast component or a welded component.

5 According to another embodiment, the swingarm comprises a first axis of rotation about which the swingarm is rotatably coupled to the tilt and catch console, and a second axis of rotation about which the swingarm is rotatably coupled to the tilt cylinder.

10 A catch bolt may be provided on the second axis of rotation, with the aid of which the tilt cylinder is rotatably coupled to the swingarm. In particular, the tilt cylinder may be coupled to the swingarm with its aforementioned connection point in the form of a ball head. In this case, the catch bolt is passed through the connection point in the form of the ball head.

15

According to another embodiment, the first axis of rotation and the second axis of rotation are spaced apart from each other and arranged parallel to each other.

For example, the first axis of rotation and the second axis of rotation may be

20 spaced apart by up to 1,000 mm.

According to another embodiment, the tilt cylinder is coupled to the swingarm by means of a catch bolt.

25 In particular, the catch bolt is passed through the swingarm. The catch bolt protrudes laterally beyond the swingarm. Bearing elements, for example in the form of bearing bushes, may be provided on the swingarm, in which the catch bolt can be rotatably mounted.

According to another embodiment, the tilt and catch console is configured to catch the catch bolt during the tilt movement of the driver's cab, so that a tensile force can be applied to the tilt cylinder in order to decelerate the tilt movement with the aid of the tilt cylinder.

5

In this context, the fact that the tilt and catch console "catches" the catch bolt means in particular that the catch bolt strikes the tilt and catch console and/or is positively engaged or gripped by it, so that the aforementioned tensile force can be applied to the tilt cylinder via the tilt and catch console and the catch bolt. A

10 "positive connection" is understood to mean the interlocking or intermeshing of two connecting partners, in this case the tilt and catch console and the catch bolt. When the tensile force is applied to the tilt cylinder, it is stretched against the aforementioned retaining force, whereby the piston is pulled out of the housing of the tilt cylinder. As mentioned above, the retaining force can be 40 kN, for exam-
15 ple. This slows down or decelerates the tilt movement of the cab with the aid of the tilt cylinder. To catch the catch bolt, the tilt and catch device is moved from an untriggered or unactivated state to a triggered state. In the untriggered state, the catch bolt does not contact the tilt and catch console. In the triggered state, the catch bolt rests against or contacts the tilt and catch console.

20

According to another embodiment, the tilt and catch console comprises at least one flap section for catching the catch bolt.

The flap section can also be referred to as a mine tab. Accordingly, the terms

25 "flap section" and "mine tab" can be used interchangeably in the present context.

The flap section is preferably U-shaped and surrounds a breakthrough. The catch bolt protrudes laterally from the breakthrough and thus also protrudes laterally beyond the flap section. The flap section "catches" the catch bolt by the catch bolt resting against or striking the flap section. To this end, the tilt and catch device
30 is moved from the untriggered state, in which the catch bolt does not touch the

flap section, to the triggered state, in which the catch bolt touches the flap section.

According to another embodiment, the tilt and catch console comprises exactly
5 two flap sections, wherein a clearance is provided between the two flap sections, within which a connection point for the tilt cylinder is arranged for connecting the latter to the catch bolt.

In particular, the flap sections are arranged at a distance from each other when
10 viewed along the transverse direction. The clearance is arranged or provided between the two flap sections. As mentioned above, the connection point of the tilt cylinder is particularly preferably a ball head. The ball head is arranged in the clearance. The terms "connection point" and "ball head" can therefore be inter-
changed at will in the present case.

15

According to another embodiment, the catch bolt protrudes laterally on both sides beyond the two flap sections.

In particular, viewed along the transverse direction, the catch bolt protrudes lat-
20 erally on both sides beyond the flap sections. In particular, a first flap section and a second flap section are provided.

According to another embodiment, the at least one flap section runs at least in
25 sections around a breakthrough, wherein the catch bolt passes through the breakthrough.

In particular, the flap section extends out of the plate-shaped basic section of the tilt and catch console and extends away from the driver's cab floor. As mentioned above, preferably exactly two flap sections are provided, with each flap section
30 comprising such a breakthrough assigned to it.

According to another embodiment, a cross-sectional area of the breakthrough is multiple times larger than a cross-sectional area of the catch bolt.

- 5 For example, the cross-sectional area of the breakthrough is 10 to 20 times larger than the cross-sectional area of the catch bolt. This allows the catch bolt to move freely in the breakthrough when the utility vehicle is in motion without coming into contact with the basic section or the flap section or sections. This allows the chassis to twist freely relative to the driver's cab.

10

According to another embodiment, the swingarm comprises a first swingarm element and a second swingarm element, wherein the first swingarm element and the second swingarm element are connected to each other by means of a tubular connection element.

15

The first swingarm element, the second swingarm element, and the connection element may be welded together. In particular, the aforementioned first axis of rotation is associated with the connection element.

- 20 According to another embodiment, the swingarm is rotatably coupled to the tilt and catch console by means of a bolt passing through the connection element.

For example, the bolt is fixed to the tilt and catch console so that the connection element together with the swingarm can rotate around the bolt. The bolt can be
25 secured by means of a nut.

According to another embodiment, the first swingarm element and the second swingarm element are arranged parallel to each other and spaced apart from each other.

30

The first swingarm element and the second swingarm element can, for example, be plate-shaped. The connection point of the tilt cylinder, in particular in the form of a ball head, is arranged between the first swingarm element and the second swingarm element. Alternatively, the first swingarm element and the second swingarm element can also be placed at an angle to each other. The swingarm elements are kept spaced apart from each other and connected to each other by means of the connection element.

"One" should not necessarily be understood as limiting the number of elements to exactly one; rather, several elements, such as two, three, or more, may also be provided. Likewise, any other counting word used here should not be understood as limiting the number of elements to exactly the number specified. Rather, deviations in number up or down are possible, unless otherwise specified.

Further possible implementations of the utility vehicle also include combinations of features or embodiments described previously or below in relation to the embodiments that are not explicitly mentioned. In this regard, the skilled person will also add individual aspects as improvements or additions to the respective basic form of the utility vehicle.

Further advantageous designs and aspects of the utility vehicle are the subject of the subclaims, and the embodiments of the utility vehicle described below. The utility vehicle will be explained in more detail below with reference to preferred embodiments and the accompanying figures.

Fig. 1 shows a schematic side view of one embodiment of a utility vehicle;

Fig. 2 shows a further schematic side view of the utility vehicle according to Fig. 1;

Fig. 3 shows a schematic view of one embodiment of a tilt cylinder for the utility vehicle according to Fig. 1;

Fig. shows another schematic view of the tilt cylinder according to Fig. 3;

5

Fig. 5 shows a schematic front view of one embodiment of a driver's cab for the utility vehicle according to Fig. 1;

Fig. 6 shows a schematic sectional view of the driver's cab according to sectional line VI-VI of Fig. 5;

10

Fig. 7 shows a schematic perspective view of one embodiment of a driver's cab floor for the driver's cab according to Fig. 5;

Fig. 8 shows a schematic side view of a tilt and catch device for the driver's cab according to Fig. 5;

15

Fig. 9 shows a further schematic side view of the tilt and catch device according to Fig. 8;

20

Fig. 10 shows a schematic perspective view of the tilt and catch device according to Fig. 8; and

Fig. 11 shows a schematic perspective view of one embodiment of a swingarm for the tilt and catch device according to Fig. 8.

25

In the figures, identical or functionally identical elements have been assigned the same reference numerals, unless otherwise specified. Concealed components are shown in the figures with dashed lines.

30

Figs. 1 and 2 each show a schematic side view of one embodiment of a utility vehicle 1.

The utility vehicle 1 is a land vehicle. The utility vehicle 1 is, in particular, a military utility vehicle. The utility vehicle 1 can therefore also be referred to as a military utility vehicle. The utility vehicle 1 can be a truck, as shown in Figs. 1 and 2. In particular, the utility vehicle 1 is an off-road truck. The utility vehicle 1 can be an armored vehicle.

A coordinate system with an x-direction or longitudinal direction L, a y-direction or transverse direction Q, and a z-direction or height direction H is assigned to the utility vehicle 1. The directions H, L, and Q are oriented perpendicular to each other. The height direction H is oriented parallel to a direction of gravity g. The direction of gravity g is oriented from top to bottom in the orientation of Figs. 1 and 2.

The utility vehicle 1 comprises a chassis 2 comprising a chassis frame 3 extending in the longitudinal direction L. The chassis frame 3 is preferably rigid and torsion-resistant and extends from a driver's cab 4 to the rear of the vehicle. "Torsionally flexible" means in particular that the chassis frame 3 can twist about the longitudinal direction L.

A plurality of axes 5 to 7 are provided on the chassis frame 3. The axes 5 to 7 carry wheels 8 to 10. For example, three axes 5 to 7 may be provided. This means that the utility vehicle 1 is a three-axle vehicle in this case. However, the number of axes 5 to 7 is arbitrary. The utility vehicle 1 preferably comprises all-wheel drive. This means that all axes 5 to 7 are driven. The utility vehicle 1 can therefore also be referred to as an all-wheel drive utility vehicle. The utility vehicle 1 can be a wheeled vehicle, as shown in Fig. 1. Alternatively, the utility vehicle 1

can also be a tracked vehicle. The height direction H is oriented from axes 5 to 7 in the direction of the chassis frame 3.

The chassis 2 is suitable for carrying a replaceable and torsion-resistant super-
 5 structure 11 of the utility vehicle 1 in addition to the driver's cab 4. The super-
 structure 11 can be, for example, a flatbed, a container, a box, a tank, or the like.
 Figs. 1 and 2 show a superstructure 11 in the form of a flatbed.

The driver's cab 4 is preferably protected against gunfire, booby traps, impro-
 10 vised explosive devices (IEDs), mines, or the like. The driver's cab 4 encloses an
 interior 12 in which passengers, for example, a driver and a co-driver, can be ac-
 commodated. The driver's cab 4 encloses the interior space 12, thereby separating
 it from the surroundings 13 of the driver's cab 4.

15 The driver's cab 4 can be moved from a folded or closed state Z1 shown in Fig. 1
 to an unfolded or open state Z2 shown in Fig. 2 and vice versa. The closed state
 Z1 can also be referred to as the folded state, and the open state Z2 can also be
 referred to as the unfolded state. In the open state Z2, the driver's cab 4 is folded
 forward or tilted about an axis of rotation 14 in the orientation of Fig. 2 compared
 20 to the closed state Z1. In this way, for example, an engine of the utility vehicle 1
 is accessible in the open state Z2. The driver's cab 4 can be pivoted, swiveled,
 tilted, or tipped about the axis of rotation 14. The aforementioned terms can
 therefore be used interchangeably in the present context.

25 Fig. 3 shows a schematic view of one embodiment of a tilt cylinder 15 for the util-
 ity vehicle 1. Fig. 4 shows a further schematic view of the tilt cylinder 15. Refer-
 ence is made to Figs. 3 and 4 simultaneously below.

With the aid of the tilt cylinder 15, the driver's cab 4 can be moved from the
 30 closed state Z1 shown in Fig. 1 to the open state Z2 shown in Fig. 2 and vice

versa. For this purpose, two tilt cylinders 15 are provided in particular, which are arranged at a distance from each other in the transverse direction Q. The tilt cylinders 15 are connected both to the chassis 2, in particular to the chassis frame 3, and to the driver's cab 4. Only one tilt cylinder 15 will be discussed below.

5

The tilt cylinder 15 comprises a housing 16 with a first connection point 17, by means of which the housing 16 is connected to the chassis 2, in particular to the chassis frame 3. The first connection point 17 can be, for example, a ball joint.

The tilt cylinder 15 also comprises a piston 18 with a second connection point 19,
10 which is connected to the driver's cab 4, in particular to a floor of the driver's cab 4. The second connection point 19 can also be a ball joint.

The piston 18 can be moved into and out of the housing 16. In particular, the tilt cylinder 15 can be moved from a retracted state Z10 shown in Fig. 3 to an ex-
15 tended state Z20 shown in Fig. 4 and vice versa. To move the tilt cylinder 15 from the retracted state Z10 to the extended state Z20, the piston 18 is moved out of the housing 16. For this purpose, hydraulic fluid can be applied to the housing 16. The piston 18 can be passively pulled out of the housing 16 against a retaining force R, which can be approximately 40 kN, for example.

20

To move the driver's cab 4 from the closed state Z1 to the open state Z2, the tilt cylinder 15 is moved from the retracted state Z10 to the extended state Z20. To move the driver's cab 4 back from the open state Z2 to the closed state Z1, the tilt cylinder 15 is moved back from the extended state Z20 to the retracted state Z10.

25 The tilt cylinder 15 is thus telescopic.

Fig. 5 shows a schematic front view of one embodiment of a driver's cab 4 for the utility vehicle 1 as mentioned above. Fig. 6 shows a schematic sectional view of the driver's cab 4 along the sectional line VI-VI of Fig. 5. Fig. 7 shows a schematic

perspective view of one embodiment of a driver's cab floor 20 for the driver's cab 4. Reference will now be made simultaneously to Figs. 5 to 7.

The aforementioned coordinate system with the directions H, L, Q can also be assigned to the driver's cab 4. The driver's cab 4 comprises a mine-protected, in particular mine-protection-optimized, driver's cab floor 20, a roof 21 arranged opposite the driver's cab floor 20, two side walls 22 arranged opposite each other, 23, which may be provided with doors, a front wall 24, and a rear wall 25 arranged opposite the front wall 24. The front wall 24 may comprise a windshield.

The driver's cab floor 20, the roof 21, the side walls 22, 23, the front wall 24, and the rear wall 25 enclose the interior space 12. The interior space 12 can be accessed from the surroundings 13 by means of doors and/or hatches. The driver's cab 4, i.e. the interior 12, accommodates a driver's seat or first seat 26 and a passenger seat or second seat 27. Viewed in the transverse direction Q, the seats 26, 27 are positioned next to each other and spaced apart from each other.

The driver's cab floor 20 is not plane, but comprises a three-dimensionally shaped geometry, in particular in the form of a free-form surface. In this context, a "free-form surface" is understood to mean any arbitrarily three-dimensionally shaped surface. A free-form surface can be described in particular with the aid of piecewise polynomial functions. In particular, free-form surfaces in the present case are three-dimensional, usually double-curved surfaces.

The driver's cab floor 20 comprises a first protrusion 28 molded onto it, which is curved away from the interior 12. This means that the first protrusion 28 curves into the surroundings 13 of the driver's cab 4. Preferably, a first protrusion 28, which is assigned to the first seat 26, and a second protrusion 29, which is assigned to the second seat 27, are provided. Viewed along the height direction H, the first seat 26 is arranged above the first protrusion 28. Accordingly, the second

seat 27 is arranged above the second protrusion 29 when viewed along the height direction H. The protrusions 28, 29 are preferably identical in shape. The protrusions 28, 29 can also be referred to as bulges or bucklings.

5 The protrusions 28, 29 comprise a three-dimensional and bulge-optimized geometry, so that the protrusions 28, 29 comprise a high degree of rigidity or structural strength. In this context, "rigidity" refers in particular to the resistance of a body to elastic deformation caused by external stress and conveys the relationship between the stress on the body and its deformation. The rigidity is determined by
10 the material of the body and its geometry.

The protrusions 28, 29 are at least partially egg-shaped or ovoid. The terms "egg-shaped" or "ovoid" refer in this case to a three-dimensional rounded shape that resembles the profile of a bird's egg in the broadest sense. In particular, the egg-
15 shaped geometry can be created by rotating an oval around an axis of symmetry. However, unlike an ellipse, the oval comprises only one axis of symmetry, to which the oval is mirror-symmetrical. The geometry of the protrusions 28, 29 can also be referred to as ovoid geometry or ovoid.

20 A dome section 30 is molded onto the driver's cab floor 20 between the first protrusion 28 and the second protrusion 29. The dome section 30 protrudes inward into the interior 12 of the driver's cab 4. For example, the dome section 30 can accommodate a transmission tunnel. Furthermore, a third protrusion 31 is provided centrally between the protrusions 28, 29. The third protrusion 31 protrudes
25 less far from the interior 12 than the protrusions 28, 29. The protrusions 28, 29, 31 are not visible in Fig. 7.

As Fig. 7 shows, the aforementioned axis of rotation 14 is provided at or in the area of a leading edge 32 of the driver's cab floor 20. Hinges can be attached to
30 the leading edge 32 or in the area of the leading edge 32 for this purpose. With

the aid of the hinges, the driver's cab floor 20 can be pivotably connected to the chassis 2, in particular to the chassis frame 3, in order to tilt or move the driver's cab 4 between the states Z1 and Z2. Furthermore, attachment areas 33, 34 are provided on the driver's cab floor 20, at which the second connection points 19 of the tilt cylinders 15 are connected to the driver's cab floor 20. The attachment areas 33, 34 may be provided in the area of the dome section 30 and/or the protrusions 28, 29.

Fig. 8 shows a schematic side view of one embodiment of a tilt and catch device 35 for the driver's cab 4. Fig. 9 shows another schematic side view of the tilt and catch device 35. Fig. 10 shows a schematic perspective view of the tilt and catch device 35. Reference is made to Figs. 8 to 10 simultaneously in the following.

The tilt and catch device 35 can also be referred to as a driver's cab tilt and catch device. Furthermore, the tilt and catch device 35 can also be referred to as a tilt and mine catch device. The terms "tilt and catch device," "driver's cab tilt and catch device," and "tilt and mine catch device" can therefore be used interchangeably in this context.

With the aid of the tilt and catch device 35, the driver's cab 4 can be moved from the closed state Z1 to the open state Z2 and vice versa. Furthermore, with the aid of the tilt and catch device 35, a tilt movement B (Fig. 2) of the driver's cab 4 can be dampened or decelerated when the utility vehicle 1 is blown up, so that injuries to vehicle occupants in the driver's cab 4 due to excessive acceleration of the driver's cab 4 can be avoided. The tilt and catch device 35 thus comprises a dual function, as will be explained below.

Preferably, two such tilt and catch devices 35 are provided. The two tilt and catch devices 35 are coupled to the attachment areas 33, 34 of the driver's cab floor 20,

with one tilt and catch device 35 assigned to each attachment area 33, 34. However, only one tilt and catch device 35 will be discussed below.

The tilt and catch device 35 comprises a tilt cylinder 15 as mentioned above. At the end of the piston 18 of the tilt cylinder 15, a connection point 19 in the form of a ball head as mentioned above is provided. The connection point 19 is movably connected to a swingarm 37 shown in Fig. 11 by means of a catch bolt 36 passing through the connection point 19.

As shown in Fig. 11, the swingarm 37 comprises two plate-shaped swingarm elements 38, 39, which are connected to each other by means of a tubular connection element 40. For example, the swingarm elements 38, 39 and the connection element 40 are welded together. The swingarm elements 38, 39 run parallel to each other and are kept spaced apart from each other by means of the connection element 40. A first axis of rotation 41 is assigned to the connection element 40, to which the connection element 40 can be constructed in a rotationally symmetrical manner.

Furthermore, a bearing element 42, 43, for example in the form of a plain bearing, is attached to each swingarm element 38, 39. The bearing elements 42, 43 can be bearing bushes or designated as such. The catch bolt 36 is rotatably mounted in the bearing elements 42, 43. A second axis of rotation 44 is assigned to the bearing elements 42, 43, to which the bearing elements 42, 43 can be constructed in a rotationally symmetrical manner. The axes of rotation 41, 44 can, for example, be arranged at a distance of up to 1,000 mm from each other. The axes of rotation 41, 44 run parallel to each other.

Returning now to Figs. 8 to 10, the tilt and catch device 35 also comprises a tilt and catch console 45, which is firmly connected to the driver's cab floor 20 at one of the attachment areas 33, 34. For example, the tilt and catch console 45 can be

screwed, riveted, and/or welded to the respective attachment area 33, 34. The tilt and catch console 45 can be, for example, a cast component or a welded component.

5 The tilt and catch console 45 comprises a basic section 46 which rests on the driver's cab floor 20 and can be firmly connected to one of the attachment areas 33, 34. The basic section 46 is plate shaped. The basic section 46 may be three-dimensionally curved. In particular, the basic section 46 is adapted to the geometry of the respective attachment area 33, 34 so that it can lie flat against the respective
10 tive attachment area 33, 34.

Two rear contact surfaces 47, 48 are provided on the basic section 46. Furthermore, the basic section 46 comprises two front contact surfaces 49, 50, against which the swingarm 37 can bear with its swingarm elements 38, 39. Between the
15 two front contact surfaces 49, 50, there is a deepening 51, which can partially accommodate the connection point 19 in the form of the ball head.

The swingarm 37 is connected to the tilt and catch console 45 in a rotatable manner by means of a bolt 52 passed through the connection element 40. The bolt 52
20 can be secured by means of a nut 53. The swingarm 37 can thus pivot about the bolt 52 relative to the tilt and catch console 45.

Two arcuate flap sections 54, 55 extend from the basic section 46. The flap sections 54, 55 can also be referred to as mine lugs. Accordingly, the terms "flap section" and "mine lug" can be used interchangeably in the present context. The flap
25 sections 54, 55 are U-shaped and each surround one breakthrough 56, 57. The catch bolt 36 protrudes laterally through the breakthroughs 56, 57 and thus laterally over the flap sections 54, 55. An intermediate clearance 58 is provided between the two flap sections 54, 55, in which the swingarm 37 and the connection
30 point 19 with the catch bolt 36 are assembled.

Fig. 8 shows the tilt and catch device 35 in an untriggered or unactivated state Z100. Fig. 9 shows the tilt and catch device 35 in a triggered state Z200. By blowing up the utility vehicle 1 with an explosive charge 59 (Figs. 5 and 6), for example in the form of a mine or an improvised explosive device, the tilt and catch device 35 can be moved from the non-triggered state Z100 to the triggered state Z200. The explosive charge 59 can be located, for example, under one of the wheels 8 or centrally under the driver's cab 4.

The functionality of the tilt and catch device 35 is explained below. Initially, the utility vehicle 1 is in driving mode. For this purpose, the driver's cab 4 is moved to the closed state Z1, with the tilt cylinder 15 in the retracted state Z10. The driver's cab 4 is significantly stiffer than the chassis 2. This means that the chassis 2 can twist, for example when driving off-road, but the driver's cab 4 does not deform.

Because the tilt cylinder 15 is not directly coupled to the driver's cab floor 20, but is connected to the driver's cab floor 20 by means of the swingarm 37 and the tilt and catch console 45, the swingarm 37 can move, whereby the catch bolt 36 can move in the breakthroughs 56, 57 without contacting the flap sections 54, 55. The catch bolt 36 can therefore move or swing freely during driving.

If the driver's cab 4 is to be moved from the closed state Z1 to the open state Z2, for example to carry out maintenance work, the tilt cylinder 15 is moved from the retracted state Z10 to the extended state Z20. The swingarm elements 38, 39 rest against the front contact surfaces 49, 50 of the tilt and catch console 45, causing the tilt cylinder 15 to tilt the driver's cab 4 from the closed state Z1 to the open state Z2. In the open state Z2, the weight force of the driver's cab 4 rests on the tilt cylinder 15. In the open state Z2, however, the weight force of the driver's cab 4 can also rest on a retaining bar or support bar (not shown). The driver's cab 4

can be locked in both the closed state Z1 and the open state Z2. A locking device (not shown) can be provided for this purpose.

If the driver's cab 4 is now blown up with the explosive charge 59, the driver's cab 4 is initially in the closed state Z1. The explosive charge 59 generates a pressure wave or blast 60 that acts on the driver's cab floor 20. This causes the driver's cab 4 to perform the aforementioned tilt movement B from the closed state Z1 towards the open state Z2.

During this aforementioned tilt movement B of the driver's cab 4, the swingarm 37 rotates around the bolt 52. The swingarm 37 is lifted off the front contact surfaces 49, 50. The driver's cab 4 tilts forward around the axis of rotation 14 toward the open state Z2, whereby the swingarm 37 is again pivoted around the bolt 52 relative to the tilt and catch console 45.

Since the catch bolt 36 protrudes laterally beyond the flap sections 54, 55 when viewed along the transverse direction Q, the flap sections 54, 55 catch the catch bolt 36 during the tilt movement B, thereby preventing the swingarm 37 from coming into contact with the rear contact surfaces 47, 48. With the aid of the catch bolt 36 and the flap sections 54, 55, a tensile force F (Fig. 9) is applied to the tilt cylinder 15, which acts in opposition to the retaining force R. The piston 18 is moved out of the housing 16 by the tensile force F. This slows down or decelerates the tilt movement B.

Excessive acceleration of the driver's cab 4 due to the impact, which could supply injuries to the vehicle occupants, is prevented. With the aid of the tilt cylinder 15, energy is dissipated or converted and a reduction in the energy acting on the driver's cab floor 20 in the attachment areas 33, 34 is achieved. This prevents unwanted deformation of the driver's cab floor 20. The attachment areas 33, 34, to each of which a tilt and catch console 45 is fastened, exhibit the highest

deformation in the event of an explosion. However, the tilt and catch device 35 can reliably prevent or at least reduce deformation of these attachment areas 33, 34.

5 The tilt and catch device 35 also prevents the driver's cab 4 from tipping over beyond the open state Z2 in the event of an explosion. Advantageously, the tilt and catch device 35 can be easily integrated into a utility vehicle (not shown) without such a tilt and catch device 35. The tilt and catch device 35 can therefore be retrofitted. Higher mine threats can thus be addressed retrospectively. The tilt and
10 catch device 35 requires only a small installation space. This can result in weight savings, for example.

Although the present invention has been described with reference to embodiments, it is modifiable in many ways.

LIST OF REFERENCE NUMBERS

	1	utility vehicle
	2	chassis
5	3	chassis frame
	4	driver's cab
	5	axis
	6	axis
	7	axis
10	8	wheel
	9	wheel
	10	wheel
	11	superstructure
	12	interior
15	13	surroundings
	14	axis of rotation
	15	tilt cylinder
	16	housing
	17	connection point
20	18	piston
	19	connection point
	20	driver's cab floor
	21	roof
	22	side wall
25	23	side wall
	24	front wall
	25	rear wall
	26	seat
	27	seat
30	28	protrusion

	29	protrusion
	30	dome section
	31	protrusion
	32	leading edge
5	33	attachment area
	34	attachment area
	35	tilt and catch device
	36	catch bolt
	37	swingarm
10	38	swingarm element
	39	swingarm element
	40	connection element
	41	axis of rotation
	42	bearing element
15	43	bearing element
	44	axis of rotation
	45	tilt and catch console
	46	basic section
	47	contact surface
20	48	contact surface
	49	contact surface
	50	contact surface
	51	deepening
	52	bolt
25	53	nut
	54	flap section
	55	flap section
	56	breakthrough
	57	breakthrough
30	58	clearance

	59	explosive charge
	60	blast
	B	tilt movement
5	F	tensile force
	g	direction of gravity
	H	height direction
	L	longitudinal direction
	Q	transverse direction
10	R	retaining force
	Z1	state
	Z2	state
	Z10	state
	Z20	state
15	Z100	state
	Z200	state

CLAIMS

1. Utility vehicle (1), in particular military utility vehicle, comprising
a chassis (2),

5 a cab (4) connected to the chassis (2) in a tiltable manner, and
a tilt and catch device (35),

wherein the tilt and catch device (35) comprises a tilt cylinder (15), with the
aid of which the tilt and catch device (35) is configured to tilt the driver's cab (4)
relative to the chassis (2) from a closed state (Z1) into an open state (Z2) and vice
10 versa, and

wherein the tilt and catch device (35) is configured to decelerate a tilt move-
ment (B) of the driver's cab (4) from the closed state (Z1) towards the open state
(Z2) with the aid of the tilt cylinder (15) in the event of the utility vehicle (1) be-
ing blown up.

15

2. Utility vehicle according to claim 1,
characterized in that

the tilt and catch device (35) comprises a swingarm (37) rotatably coupled to the
driver's cab (4), with the aid of which the tilt cylinder (15) is coupled to the driv-
er's cab (4).

20

3. Utility vehicle according to claim 2,
characterized in that

the tilt and catch device (35) comprises a tilt and catch console (45) connected to
25 the driver's cab (4), wherein the swingarm (37) is rotatably coupled to the tilt and
catch console (45).

4. Utility vehicle according to claim 3,
characterized in that

the swingarm (37) comprises a first axis of rotation (41) about which the swingarm (37) is rotatably coupled to the tilt and catch console (45), and a second axis of rotation (44) about which the swingarm (37) is rotatably coupled to the tilt cylinder (15).

5

5. Utility vehicle according to claim 4, characterized in that the first axis of rotation (41) and the second axis of rotation (44) are spaced apart from each other and arranged parallel to each other.

10

6. Utility vehicle according to one of claims 3 to 5, characterized in that the tilt cylinder (15) is coupled to the swingarm (37) by means of a catch bolt (36).

15

7. Utility vehicle according to claim 6, characterized in that the tilt and catch console (45) is configured to catch the catch bolt (36) during the tilt movement (B) of the driver's cab (4), so that a tensile force (F) can be applied to the tilt cylinder (15) in order to decelerate the tilt movement (B) with the aid of the tilt cylinder (15).

20

8. Utility vehicle according to claim 7, characterized in that the tilt and catch console (45) comprises at least one flap section (54, 55) for catching the catch bolt (36).

25

9. Utility vehicle according to claim 8, characterized in that the tilt and catch console (45) comprises exactly two flap sections (54, 55), wherein a clearance (58) is provided between the two flap sections (54, 55),

30

within which a connection point (19) of the tilt cylinder (15) is arranged for connecting the latter to the catch bolt (36).

10. Utility vehicle according to claim 9,

5 characterized in that

the catch bolt (36) protrudes laterally on both sides beyond the two flap sections (54, 55).

11. Utility vehicle according to one of claims 8 to 10,

10 characterized in that

the at least one flap section (54, 55) runs at least in sections around a breakthrough (56, 57), wherein the catch bolt (36) passes through the breakthrough (56, 57).

15 12. Utility vehicle according to claim 11,

characterized in that

a cross-sectional area of the breakthrough (56, 57) is multiple times larger than a cross-sectional area of the catch bolt (36).

20 13. Utility vehicle according to any one of claims 3 to 12,

characterized in that

the swingarm (37) comprises a first swingarm element (38) and a second swingarm element (39), wherein the first swingarm element (38) and the second swingarm element (39) are connected to each other by means of a tubular connection element (40).

25

14. Utility vehicle according to claim 13,

characterized in that

the swingarm (37) is rotatably coupled to the tilt and catch console (45) by means of a bolt (52) passing through the connection element (40).

30

15. Utility vehicle according to claim 13 or 14,
characterized in that
the first swingarm element (38) and the second swingarm element (39) are ar-
5 ranged parallel to each other and spaced apart from each other.