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(54) **VEHICLE COMPRISING COLLISION CONTROL SYSTEM, COLLISION CONTROL SYSTEM AND METHOD**

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Description

TECHNICAL FIELD

[0001] Example embodiments presented herein are directed towards a collision control system for controlling deflection of an instrument cluster in a vehicle during collision. Example embodiments are also directed towards a vehicle comprising such a collision control system as well as corresponding methods for controlling deflection of an instrument cluster in a vehicle during collision.

BACKGROUND ART

[0002] Passenger safety is one of the major concerns with designing a modern vehicle such as e.g. passenger cars. The forces placed on occupants of a vehicle during a collision event may be large enough to lead to serious or fatal injury. Modern vehicles are often equipped with an airbag on the driver's side, which deploys during serious collisions. Most vehicles have this airbag located in a compartment near the centre of the steering wheel.

[0003] In some modern vehicles, the steering column will also move forward in a controlled manner, i.e. displacing the steering wheel in the forward direction of the vehicle during a collision event. This will accomplish, among other things, a reduction of force on the driver, both in cases where the airbag deploys as normal, supplementing the airbag.

[0004] An issue with the displacement of the steering column is that it may impact the instrument cluster during its displacement, the collection of meters and other indicators most often located above the steering column in the dashboard. This may cause reduce the benefit during collision as the instrument cluster may hinder forward movement of the steering column (which may lead to the force reduction on the driver not being sufficiently low). Additionally, the force may damage or shatter the instrument cluster, leading to costly repairs and/or debris from the cluster being scattered inside the vehicle posing additional risk to the occupants.

[0005] US 2009/0085338 A1 discusses a vehicle instrument panel structure ensuring a frontward displacement of the steering column during collision. The instrument panel structure is arranged to detach the instrument cluster when a steering column cover contacts the cluster, and push the meter unit upwardly. This allows the steering mechanism to be displaced towards the front of the vehicle.

[0006] WO 00/17035 A1 discloses a dashboard arrangement with a steering mechanism which is adapted to be displaced towards the dashboard. A section of the dashboard is connected to a pyrotechnic removal member, which is arranged to pull the section away from the steering wheel along guides during collision.

[0007] While the solutions found in the prior art work well in some situations, there is still room in the vehicle field for an improved collision control solution.

SUMMARY OF THE INVENTION

[0008] An object of this disclosure is to provide a collision control system for controlling deflection of an instrument cluster in a vehicle during collision. Another object of this disclosure is to provide a vehicle comprising such a collision control system. A further object of this disclosure is to provide a method for controlling deflection of an instrument cluster in a vehicle during collision.

[0009] An object of the disclosure is achieved by a collision control system according to the claims. In a collision control system for controlling deflection of an instrument cluster in a vehicle during collision, said collision control system comprises a steering assembly including a steering wheel and a steering column, a cross car beam comprising a first sliding surface, and an instrument panel assembly including an instrument cluster and a second sliding surface, which is arranged to abut and slide along said first sliding surface during said collision. During collision, said steering column is configured to move forward in a controlled manner and said steering assembly is arranged to push said instrument cluster, such that said second sliding surface of said instrument panel assembly slides along the first surface for controlled deflection of the instrument cluster.

[0010] An example advantage of the collision control system is that the instrument cluster is deflected in a predictable and safe manner. This allows for the steering assembly, and in particular the steering column, to more reliably and controllably absorb a well-defined and well-distributed amount of force during vehicle collision. This may for example occur during a relatively severe collision or as part of a secondary collision after a first collision in which the airbag has already been deployed.

[0011] The deflection of the instrument cluster is further enabled by using the cross car beam as rigid support for the deflection motion of the instrument cluster. The already existing cross car beam may thus have dual functionality by providing support to the instrument panel and steering assembly, as well as providing support for the deflection motion. Thereby, no additional component is required for providing the necessary deflection support.

[0012] According to some of the example embodiments, the instrument cluster comprises said second sliding surface. In another example embodiment, the instrument panel assembly comprises an instrument panel substrate that comprises the second sliding surface. Thereby, the instrument cluster may slide directly on a surface of the cross car beam, or the instrument cluster may be arranged inside or on the instrument panel substrate which will slide on the surface of the cross car beam.

[0013] According to some of the example embodiments, said first sliding surface of said cross car beam is located on a cross car beam attachment located on said cross car beam. This allows the dimensions of the first sliding surface to be chosen independently of the shape and size of the cross car beam.

[0014] According to some of the example embodiments, the instrument panel assembly comprises an instrument panel substrate that comprises the first sliding surface, and the instrument cluster comprises said second sliding surface. This allows the instrument cluster to slide inside the instrument panel substrate when arranged therein, while the instrument panel substrate is being supported by the cross car beam. Thereby the cross car beam also supports the first sliding surface.

[0015] According to some of the example embodiments, the instrument cluster comprises said second sliding surface. The instrument cluster may thus be configured to directly contact the first sliding surface. The second sliding surface may be located at the rear and/or bottom portion of the instrument cluster. The second sliding surface may be formed integrally with a housing of the instrument cluster or alternatively be located on a separate part that is permanently attached to the instrument cluster, such as specially designed sliding part made of plastic and/or metal material.

[0016] According to some of the example embodiments, the instrument panel assembly comprises an instrument panel substrate, and said instrument panel substrate comprises said second sliding surface. In this arrangement, the instrument cluster during collision consequently pushes the instrument panel substrate, which slides along the first sliding surface. The portion of the instrument panel substrate holding the instrument cluster is in such configuration preferably relatively flexible for allowing sufficient deflection of the instrument cluster without inducing any significant counterforce.

[0017] According to some of the example embodiments, the instrument cluster is arranged partially enclosed by a compartment of the instrument panel assembly, and a part of said compartment is arranged to flex when said instrument cluster is displaced during said collision. This provides additional room for the instrument cluster to be displaced, which may otherwise have been prevented by the interior of the dashboard. The primarily relevant direction of flex is along the direction of the sliding surface, i.e. a direction towards the front and upwards of the vehicle.

[0018] According to some of the example embodiments, an extension direction of the first sliding surface defines an angle relative to a direction of axial extension of the steering column. Said angle is in the range of 10-80° degrees, specifically in the range of 20-60° degrees, and more specifically in the range of 30-55° degrees. This angle, which depends on the dashboard dimensions, is necessary to ensure that the instrument cluster is deflected in a correct direction. If the angle is too high, the forces pressing on the instrument cluster would not move it out of the way, and instead impact it. If the angle is too low, the distance which it would be necessary to push it out of the way is too low.

[0019] According to some of the example embodiments, said steering assembly comprises a steering assembly attachment arranged at said steering column,

wherein said steering assembly attachment comprises a bearing surface, and wherein said steering assembly is arranged to push said instrument cluster by said bearing surface, and where an extension direction of said bearing surface defines an angle relative to a direction of axial extension of the steering column, and wherein said angle is in the range of 10-80° degrees, specifically in the range of 30-75° degrees, and more specifically in the range of 45-70° degrees. This angled surface contributes to improving the ability of the collision control system to push the instrument cluster away from the path of the steering assembly.

[0020] According to some of the example embodiments, at least one of the first and second sliding surfaces is equipped with at least one groove along at least part of the extension of the first or second sliding surface, which at least one groove extends in an intended sliding direction of said second sliding surface along said first sliding surface. This allows the contact surface area to be tuned to achieve the preferred friction between the first and second sliding surfaces. Thus, the friction values may be achieved with many different materials and can be easily integrated with regards to existing components.

[0021] According to some of the example embodiments, the first and second sliding surfaces are configured for deflecting the instrument cluster in a direction towards a point above the cross car beam. Depending on the dimensions of the interior of the dashboard, this allows the instrument cluster to be pushed in a direction without impacting or being hindered by the cross car beam.

[0022] According to some of the example embodiments, the first sliding surface is substantially flat. This provides a linear path of deflection for the instrument cluster.

[0023] According to some of the example embodiments, the collision control system is configured such that the force needed to displace said instrument cluster 50 mm along said first sliding surface is below 500 N, more preferably below 300 N. The force needed to deflect to the instrument cluster is preferable relatively low compared to the forces absorbed by the steering column during the move forward in a controlled manner thereof, for the purpose of not negatively affecting the calculated and controlled forward motion of the steering wheel during a vehicle collision. In principle, the force needed to deflect to the instrument cluster is preferably very low, such as for example, about less than 1/5 of the force required for moving the steering column forward in a controlled manner. This allows deflection and energy absorption to be more or less entirely controlled by the steering column.

[0024] According to some of the example embodiments, at least one of the first or second sliding surfaces comprises two transversally spaced sliding surface parts. These sliding surface parts could be placed e.g. at either side of the steering column, which may e.g. allow for fitting of other components between these sliding surface parts.

[0025] According to some of the example embodiments, the first and second sliding surfaces are arranged to abut during normal operation of the vehicle. This means that the instrument cluster does not first need to be pushed into abutting the first sliding surface at the second sliding surface, but can instead be pushed out of the way of the steering column right away when said steering column is moving forward.

[0026] A further object of the disclosure is achieved by a vehicle according to the claims. An example embodiment of the vehicle comprises a collision control system according to the disclosure.

[0027] A further yet object of the disclosure is achieved by a method according to the claims.

[0028] According to some of the example embodiments of the method for controlling deflection of an instrument cluster in a vehicle during collision, said vehicle comprises a steering assembly including a steering wheel and a steering column, a cross car beam supporting a first sliding surface, and an instrument panel assembly including an instrument cluster and a second sliding surface. The method comprises the steps of, upon said collision: displacing said steering assembly by moving said steering column forward in a controlled manner, and pushing said instrument cluster by said displacing steering assembly, such that said second sliding surface of said instrument panel assembly slides along the first surface for controlled deflection of the instrument cluster.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The foregoing will be apparent from the following more particular description of the example embodiments, as illustrated in the accompanying figures in which like references characters refer to the same parts throughout the different views. The figures are not necessarily to scale, emphasis instead being placed upon illustrating the example embodiments through schematic figures.

- Fig. 1 shows a longitudinally cut schematic view of a collision control system prior to deflection,
- Fig. 2 shows a longitudinally cut schematic view of a collision control system subsequent to deflection,
- Fig. 3 shows a longitudinally cut schematic view of another example embodiment of the collision control system prior to deflection,
- Fig. 4 shows a longitudinally cut schematic view of another example embodiment of the collision control system subsequent to deflection,
- Fig. 5 shows a cut schematic view of the first and second sliding surfaces, and

Fig. 6 shows a perspective view of the collision control system prior to deflection.

DETAILED DESCRIPTION

[0030] Figures 1 and 2 show longitudinally cut schematic views of an example embodiment of a collision control system 40. The collision control system 40 is installed in the dashboard area 45 of a vehicle. The collision control system comprises a steering assembly 10, a cross car beam 20 and an instrument panel assembly 35.

[0031] Figure 1 shows a schematic view of the collision control 40 before a collision type event has occurred.

[0032] The cross car beam 20 is fixed to a vehicle frame or chassis 50 and is a beam-like structure extending from one transverse side of the vehicle to the other. Many interior components of the vehicle are subsequently attached to the cross car beam 20. A cross car beam attachment 21 is attached to the cross car beam 20. The cross car beam attachment 21 can be part of a general cross car beam attachment, or a separate attachment specifically for the purpose of assembling the collision control system 40. The cross car beam attachment 21 may serve to provide support to the steering column 11, and/or providing support to the instrument panel assembly 35.

[0033] The steering assembly 10 comprises a steering column 11, a steering wheel 12, a steering column component unit 13 and a steering column cover 14. In the example embodiment shown in the figures, the steering column cover 14 partly covers the steering column 11 and steering column component unit 13. This serves to separate mechanical elements and electronics from the passenger compartment reducing risk of accidental damage to either. The steering column 11 extends through an opening in the steering column cover 14 and is attached to the steering wheel 12 at the other end of this opening. The steering assembly 10 also comprises a steering column boot 16, which is a flexible detail arranged to enclose the more flexible parts of the gap between the steering column cover 14 and the instrument cluster 30.

[0034] The steering column component unit 13 comprises electronics and mechanics for operating stalks and switches thereon and on the steering wheel for input by the driver to e.g. turn signals, windshield wipers and so on. The steering column component unit 13 also includes the horn coil and optionally knee absorption elements for reducing the impact on a driver's knees during collision.

[0035] On the steering assembly 10, a bearing surface 15 is formed as part of the steering column cover 14 and/or steering column component unit 13. The bearing surface 15 defines an angle α_2 relative to the steering column 11. This angle α_2 is approximately 60° degrees in the example embodiment shown in figs. 1 and 2. The specific angle α_2 may depend on the dimensions of the surrounding structural elements. The angle α_2 should preferably be between 10-80° degrees, specifically in the

range of 30-75° degrees, and more specifically in the range of 45-70° degrees.

[0036] Additionally, the steering column component unit 13 is provided with a similar angled surface arranged on the interior of the bearing surface 15 which among other things allows the steering column component unit 13 to be housed interiorly of the angled bearing surface 15.

[0037] While not shown in the figures, the cross car beam attachment 21 also functions to fix the steering column 11 to the body of the vehicle via the cross car beam 20, thereby providing dual functionality of the cross car beam attachment 21. In particular, the steering column 11 may be clamped to the cross car beam 20 or cross car beam attachment 21 by means of threaded members or by means of welding.

[0038] In the example embodiment of fig. 1 the cross car beam 20 comprises the first sliding surface 22, and more specifically, the cross car beam 20 comprises a cross car beam attachment 21, which is provided with and comprises the first sliding surface 22. By forming the first sliding surface directly on the cross car beam 20 or cross car beam attachment 21, such that the first sliding surface is integrally formed with the cross car beam 20 or cross car beam attachment 21, no additional component is required for providing the desired guidance ramp enabling controlled deflection of the instrument cluster 30. This solution thus simplifies assembly and reduces cost. Moreover, a high strength support structure underlying the first sliding surface 22 is also provided, thereby reducing the risk for collapse of the first sliding surface 22 during a crash event.

[0039] The first sliding surface 22 is substantially flat. Thereby mounting and correct positioning of the member carrying the second sliding surface 32 is simplified and cost-efficient. The first sliding surface faces in a direction upwardly and towards a rear of the vehicle for enabling the desired deflection of the instrument cluster 30.

[0040] The first sliding surface 22 extends towards a point above the cross car beam 20, such as to ensure that any object sliding along the first sliding surface does not collide with the cross car beam 20. This means that a plane defined by the first sliding surface 22 does not intersect with the cross car beam 20.

[0041] The first sliding surface defines an angle α_1 relative to the steering column 11. This angle α_1 is approximately 50° degrees in fig. 1 and 2. The specific angle α_1 may depend on the dimensions of the surrounding structural elements. The angle α_1 should preferably be between 10-80° degrees, specifically in the range of 20-60° degrees, and more specifically in the range of 30-55° degrees.

[0042] The cross car beam attachment 21 forms a ramp having a ramp surface with respect to the longitudinal direction of the steering column 11, wherein the first sliding surface 22 is provided on the ramp surface.

[0043] The instrument panel assembly 35 comprises an instrument cluster 30, an instrument panel substrate

36 and a second sliding surface 32, which second sliding surface 32 is arranged to abut and slide along the first sliding surface 22. The instrument cluster 30 is arranged above the steering assembly 10, inside the dashboard region 45. The instrument cluster 30 comprises electronics and meters for informing the driver of the vehicle regarding the status of the vehicle, such as e.g. the speedometer, fuel gauge, and status information display.

[0044] In the example embodiments shown in figs. 1 and 2, the second sliding surface 32 is arranged on an outside part of the instrument cluster. In these example embodiments, the instrument cluster 30 has an instrument cluster portion 31, which instrument cluster portion 31 comprises the second sliding surface 32. The instrument cluster portion 31 can be an integral part of the instrument cluster 30 or formed as a separate unit and assembled to the instrument cluster 30.

[0045] In figure 1, the instrument cluster 30 is arranged such that the second sliding surface 32 is abutting the first sliding surface 22 on the cross car beam attachment 21. However, it is also possible that the instrument cluster 30 is arranged at a short distance from the cross car beam attachment, and will abut only upon collision of the vehicle.

[0046] Upon the vehicle colliding with another object, the steering column 11 will move forward in a controlled manner, which will drive the components of the steering assembly 10 in an axial direction of the steering column 11 towards a point below the cross car beam. The forward motion of the steering column 11 is the result of a controlled axial collapse of the steering column 11 upon engagement a compressive force. For example, the force may be about 2500 N, however this value may vary depending on many factors such as the steering column design.

[0047] As the steering column 11 moves forward in a controlled manner, the bearing surface 15 will start to press on the instrument cluster 30. Thereby, the instrument cluster 30 will be pressed in such a manner that it slides along the first sliding surface 22 by means of the second sliding surface 32. As the instrument cluster 30 is pressed sufficiently along the first sliding surface 22, the instrument cluster 30 will also have been sufficiently distanced from the steering column assembly 10, by travelling along the bearing surface 15, in the radial direction of the steering column that the instrument cluster 30 will have cleared the steering assembly 10.

[0048] The disclosure is not limited to a direct contact between the bearing surface 15 of the steering assembly 10 and the instrument cluster 30, but any part of the steering assembly 10 may be arranged to press any part of the instrument panel assembly 35 such that the instrument cluster 30 will be slidably displaced from a normal position to a deflected position, depending on the design of the instrument panel assembly 35 and steering assembly 10.

[0049] Shown in figure 2 is the structural relationship of the components of the collision control system 40 after

the steering column 11 has moved forward in a controlled manner. The instrument cluster 30 has been slid along the first sliding surface 22 as a result of being pressed by the bearing surface 15. The instrument cluster 30 has thus cleared the steering assembly 10 and is now essentially located above the steering assembly 10 in the radial direction of the steering column 11.

[0050] The instrument cluster is 30 arranged partially enclosed by a compartment of the instrument panel assembly 35. Part of the compartment of the instrument panel assembly 35 in which the instrument cluster 30 is arranged, such as a wall or roof thereof, is arranged to flex and/or hinge to accommodate the displacement of the instrument cluster 30. The instrument cluster 30 may push on said part of said compartment, or the instrument cluster 30 may be in rigid communication with the instrument panel assembly 35, which will thus push said part of said compartment to accommodate the displacement of the instrument cluster 30.

[0051] In the example embodiment shown in figs. 1 and 2, the compartment is formed as part of the instrument panel substrate 36, which will thus hinge/and or flex upon the instrument cluster 30 being displaced.

[0052] Figures 3 and 4 show another example embodiment of the collision control system 40.

[0053] In the example embodiment shown in figs. 3 and 4, the second sliding surface 32 is arranged on another part of the instrument panel assembly 35, in this case the instrument panel substrate 36. The instrument cluster 30 is embedded in or arranged on the instrument panel substrate 36. The instrument cluster 30 and instrument panel substrate 36 are arranged such that when the instrument cluster 30 is pushed, pushing movement will cause at least part of the instrument panel substrate 36 slide along the first sliding surface 22 by means of the second sliding surface 32. Thereby, both at least part of the instrument panel substrate 36 and the instrument cluster 30 will slide along the first sliding surface 22 by means of the second sliding surface 32.

[0054] In figure 3, the instrument cluster 30 is arranged such that the second sliding surface 32 is abutting the first sliding surface 22 on the cross car beam attachment 21. However, it is also possible that the instrument panel substrate 36 is arranged at a short distance from the cross car beam attachment 21, and will abut only upon collision of the vehicle.

[0055] In figure 4, the structural relationship of the example embodiment in figure 3 after the steering column 11 has moved forward in a controlled manner is shown. The instrument panel substrate 36 has been slid along the first sliding surface 22 as a result of the instrument cluster 30 being pressed by the bearing surface 15. The instrument cluster 30 has thus cleared the steering assembly 10 and is now essentially located above the steering assembly 10 in the radial direction of the steering column 11.

[0056] In the example embodiment shown in fig. 4, the tip of the dashboard 45 and instrument panel substrate

36 are flexed and/or hinged away from the steering assembly 10 by the action of the instrument cluster 30 being displaced.

[0057] According to yet another example embodiment (not shown in the figures) the cross car beam 20 supports the instrument panel substrate 36, which comprises the first sliding surface 22. Thereby, the cross car beam 20 supports the first sliding surface 22. The instrument panel substrate 36 may for example be fastened to the cross car beam 20 or cross car beam attachment 21. In this case, the instrument cluster 30 comprises the second sliding surface 32, and the instrument cluster 30 moves along the first sliding surface 22 of the instrument panel substrate 36 when pressed by the bearing surface 15.

[0058] Figure 5 shows a lateral cut view of the first and second sliding surfaces 22, 32. Shown in fig. 5, the cross car beam attachment 21 comprises an upper and a lower part, where the first sliding surface 22 is located on the top side of the upper part. The instrument cluster 30 is provided with grooves 33 which extend along the sliding direction of the instrument cluster 30. The grooves 33 reduce the surface area contact between the first and second sliding surfaces 22, 32 which reduces friction during the sliding movement upon collision. The desired friction may differ between vehicle designs, and the size of the grooves and/or proportion thereof to the abutting parts of the second sliding surface 32 may be adjusted to achieve a suitable friction, by which the force required to displace the instrument cluster may be adjusted.

[0059] The desired in friction is achieved by longitudinal grooves 33 in the example embodiment shown in figure 5, but additional and/or alternative manners in which this can be achieved may be incorporated in the collision control system 40. The desired friction can for example also, or alternatively, come from the materials used for forming the first and second sliding surfaces 22, 32. Other structural designs of the sliding surfaces 22, 32 may be also be used.

[0060] A perspective view of an example embodiment of the collision control system 40 is schematically illustrated in fig. 6. The cross car beam 20 is fastened to the frame 50 of the vehicle at both transverse sides of the frame 50. The cross car beam 20 comprises a cross car beam attachment 21. A steering column 11 is disclosed permanently fastened to the cross car beam 20 via the cross car beam attachment 21. A steering wheel 12 and steering column component unit 13 are schematically illustrated in front of the instrument cluster 30 that is located in the normal position.

[0061] The cross car beam attachment 21 according to the disclosed example embodiment comprises two transversally offset cross car beam attachment members. Both cross car beam attachment members have similar geometry and size and each member comprises a first sliding surface 22. Many alternative designs of the cross car beam 20 and/or cross car beam attachment 21 are however possible and the illustrated design of the two cross car beam attachment members is merely one

example out of many, which may be selected according to the specific circumstances. For example, there may be only a single member having a single first sliding surface 22, or the two members are interconnected by a plate that forms a single first sliding surface 22.

[0062] The present invention may be embodied in other specific forms without departing from its essential characteristics. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning of the claims are to be included within their scope.

[0063] Reference signs mentioned in the claims should not be seen as limiting the extent of the matter protected by the claims, and their sole function is to make claims easier to understand.

[0064] The order of embodiments has no particular meaning and has nothing to do with the importance of the embodiments.

REFERENCE LIST

[0065]

- 10 Steering assembly
- 11 Steering column
- 12 Steering wheel
- 13 Steering column component unit
- 14 Steering column cover
- 15 Bearing surface
- 16 Steering column boot
- 20 Cross car beam
- 21 Cross car beam attachment
- 22 First sliding surface
- 30 Instrument cluster
- 31 Instrument cluster portion
- 32 Second sliding surface
- 33 Groove
- 35 Instrument panel assembly
- 36 Instrument panel substrate
- 40 Collision control system
- 45 Dashboard
- 50 Vehicle frame
- α_1 First sliding surface angle
- α_2 Bearing surface angle

Claims

1. Collision control system (40) for controlling deflection of an instrument cluster (30) in a vehicle during collision, wherein said collision control system (40) comprises:
 - a steering assembly (10) including a steering wheel (12) and a steering column (11);
 - a cross car beam (20), **characterized in that** said cross car beam (20) comprises a first sliding surface (22); and

an instrument panel assembly (35) including an instrument cluster (30) and a second sliding surface (32), which is arranged to abut and slide along said first sliding surface (22) during said collision,

wherein during collision said steering column (11) is configured to move forward in a controlled manner and said steering assembly (10) is arranged to push said instrument cluster (30), such that said second sliding surface (32) of said instrument panel assembly (35) slides along the first sliding surface (22) for controlled deflection of the instrument cluster (30).

2. Collision control system (40) according to claim 1, wherein said instrument cluster (30) comprises said second sliding surface (32) or wherein said instrument panel assembly (35) comprises an instrument panel substrate (36) that comprises said second sliding surface (32).
3. Collision control system (40) according to claim 2, wherein said first sliding surface (22) of said cross car beam (20) is located on a cross car beam attachment (21) located on said cross car beam (20).
4. Collision control system (40) according to claim 1, wherein said instrument panel assembly (35) comprises an instrument panel substrate (36) that comprises said first sliding surface (22), and wherein said instrument cluster (30) comprises said second sliding surface (32).
5. Collision control system (40) according to any of the preceding claims, wherein said instrument cluster (30) is arranged partially enclosed by a compartment of the instrument panel assembly (35), and wherein at least a part of said compartment is arranged to flex when said instrument cluster (30) is displaced during said collision.
6. Collision control system (40) according to any of the preceding claims, wherein an extension direction of said first sliding surface (22) defines an angle (α_1) relative to a direction of axial extension of the steering column (11), and wherein said angle (α_1) is in the range of 10-80° degrees, specifically in the range of 20-60° degrees, and more specifically in the range of 30-55° degrees.
7. Collision control system (40) according to any of the preceding claims, wherein said steering assembly (10) comprises a steering assembly attachment (14) arranged at said steering column (11), wherein said steering assembly attachment (14) comprises a bearing surface (15), wherein said steering assembly (10) is arranged to push said instrument cluster (30) by said bearing surface (15) during said collision.

sion, wherein an extension direction of said bearing surface (15) defines an angle relative to a direction of axial extension of the steering column (11), and wherein said angle is in the range of 10-80° degrees, specifically in the range of 30-75° degrees, and more specifically in the range of 45-70° degrees.

8. Collision control system (40) according to any of the preceding claims, wherein at least one of the first and second sliding surfaces (22, 32) is equipped with at least one groove (33) along at least part of the extension of the first or second sliding surface (22, 32), which at least one groove (33) extends in an intended sliding direction of said second sliding surface (32) along said first sliding surface (22).

9. Collision control system (40) according to any of the preceding claims, wherein the first and second sliding surfaces (22, 32) are configured for deflecting the instrument cluster (30) in a direction towards a point above the cross car beam (20).

10. Collision control system (40) according to any of the preceding claims, wherein the first sliding surface (22) is substantially flat.

11. Collision control system (40) according to any of the preceding claims, wherein the collision control system (40) is configured such that the force needed to displace said instrument cluster (30) 50 mm along said first sliding surface (22) is below 500 N, more preferably below 300 N.

12. Collision control system (40) according to any of the preceding claims, wherein the first and second sliding surfaces (22, 32) are arranged to abut during normal operation of the vehicle.

13. Collision control system (40) according to any of the preceding claims, wherein the cross car beam (20) has a beam-like structure that is arranged to extend from one transverse side of the vehicle to the other, and wherein the cross car beam (20) is arranged to be fixed to a vehicle frame (50).

14. Collision control system (40) according to any of the preceding claims, wherein the steering column (11) is fastened and supported by the cross car beam (20) or a cross car beam attachment (21).

15. Vehicle comprising a collision control system (40) according to any of the preceding claims.

16. Method for controlling deflection of an instrument cluster (30) in a vehicle during collision, said vehicle comprising:

a steering assembly (10) including a steering

wheel (12) and a steering column (11);
a cross car beam (20) comprising a first sliding surface (22); and
an instrument panel assembly (35) including an instrument cluster (30) and a second sliding surface (32),
wherein the method comprises, upon said collision:

displacing said steering assembly (10) by moving said steering column (11) forward in a controlled manner; and
pushing said instrument cluster (30) by said displacing steering assembly (10), such that said second sliding surface (32) of said instrument panel assembly (35) slides along the first surface (22) for controlled deflection of the instrument cluster (30).

Patentansprüche

1. Kollisionssteuerungssystem (40) zum Steuern einer Auslenkung eines Kombi-Instruments (30) in einem Fahrzeug während einer Kollision, wobei das Kollisionssteuerungssystem (40) umfasst:

eine Lenkeinrichtung (10) umfassend ein Lenkrad (12) und eine Lenksäule (11);
einen Cross Car Beam (20), **dadurch gekennzeichnet, dass** der Cross Car Beam (20) eine erste Gleitfläche (22) umfasst; und
eine Armaturenbretteinrichtung (35) umfassend ein Kombi-Instrument (30) und eine zweite Gleitfläche (32), die dazu ausgebildet ist, während der Kollision an der ersten Gleitfläche (22) in Anlage zu kommen und entlang dieser zu gleiten,
wobei während der Kollision die Lenksäule (11) dazu ausgelegt ist, sich in einer gesteuerten Weise vorwärts zu bewegen, und die Lenkeinrichtung (10) dazu ausgebildet ist, das Kombi-Instrument (30) derart zu schieben, dass die zweite Gleitfläche (32) der Armaturenbretteinrichtung (35) entlang der ersten Gleitfläche (22) gleitet, um das Kombi-Instrument (30) gesteuert auszulenken.

2. Kollisionssteuerungssystem (40) nach Anspruch 1, wobei das Kombi-Instrument (30) die zweite Gleitfläche (32) umfasst, oder wobei die Armaturenbretteinrichtung (35) ein Armaturenbrettsubstrat (36) umfasst, das die zweite Gleitfläche (32) umfasst.

3. Kollisionssteuerungssystem (40) nach Anspruch 2, wobei die erste Gleitfläche (22) des Cross Car Beams (20) an einer Cross Car Beam-Befestigung (21) angeordnet ist, die an dem Cross Car Beam-Befes-

tigung (20) angeordnet ist.

4. Kollisionssteuerungssystem (40) nach Anspruch 1, wobei die Armaturenbretteinrichtung (35) ein Armaturenbrettsubstrat (36) umfasst, das die erste Gleitfläche (22) umfasst, und wobei das Kombi-Instrument (30) die zweite Gleitfläche (32) umfasst. 5
5. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei das Kombi-Instrument (30) von einem Innenraum der Armaturenbretteinrichtung (35) teilweise umschlossen angeordnet ist, und wobei mindestens ein Teil des Innenraums bei einer Versetzung des Kombi-Instruments (30) während einer Kollision zum Biegen ausgebildet ist. 10
6. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei eine Erstreckungsrichtung der ersten Gleitfläche (22) einen Winkel (α_1) relativ zu einer axialen Erstreckungsrichtung der Lenksäule (11) definiert, und wobei der Winkel (α_1) im Bereich von 10-80° Grad, spezifisch im Bereich von 20-60° Grad, und spezifischer im Bereich von 30-55° Grad, liegt. 20
7. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei die Lenkeinrichtung (10) eine Lenkeinrichtungsbefestigung (14) umfasst, die an der Lenksäule (11) angeordnet ist, wobei die Lenkeinrichtungsbefestigung (14) eine Lagerfläche (15) umfasst, wobei die Lenkeinrichtung (10) dazu ausgebildet ist, während der Kollision das Kombi-Instrument (30) durch die Lagerfläche (15) zu schieben, wobei eine Erstreckungsrichtung der Lagerfläche (15) einen Winkel relativ zu einer axialen Erstreckungsrichtung der Lenksäule (11) definiert, und wobei der Winkel im Bereich von 10-80° Grad, spezifisch im Bereich von 30-75° Grad, und spezifischer im Bereich von 45-70° Grad, liegt. 25
8. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei mindestens eine der ersten und zweiten Gleitfläche (22, 32) mit zumindest einer Nut (33) entlang zumindest eines Teils der Erstreckung der ersten oder zweiten Gleitfläche (22, 32) ausgestattet ist, wobei sich die mindestens eine Nut (33) in einer vorgesehenen Gleitrichtung der zweiten Gleitfläche (32) entlang der ersten Gleitfläche (22) erstreckt. 30
9. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei die erste und zweite Gleitfläche (22, 32) ausgelegt ist, um das Kombi-Instrument (30) in eine Richtung gegen einen Punkt oberhalb des Cross Car Beams (20) auszulenken. 35
10. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei die erste Gleitfläche 40

(22) im Wesentlichen flach ist.

11. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei das Kollisionssteuerungssystem (40) derart ausgelegt ist, dass die für das Versetzen des Kombi-Instruments (30) um 50 mm entlang der ersten Gleitfläche (22) erforderliche Kraft unter 500 N, eher bevorzugt unter 300 N, beträgt. 5
12. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei die erste und die zweite Gleitfläche (22, 32) dazu ausgebildet sind, während eines Normalbetriebs des Fahrzeugs in Anlage zu kommen. 10
13. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei der Cross Car Beam (20) eine balkenartige Struktur aufweist, die dazu ausgebildet ist, sich von einer queren Seite des Fahrzeugs zur anderen zu erstrecken, und wobei der Cross Car Beam (20) zum Fixieren an einem Fahrzeugrahmen (50) ausgebildet ist. 15
14. Kollisionssteuerungssystem (40) nach einem der vorgehenden Ansprüche, wobei die Lenksäule (11) durch den Cross Car Beam (20) oder eine Cross Car Beam-Befestigung (21) befestigt und unterstützt ist. 20
15. Fahrzeug, das ein Kollisionssteuerungssystem (40) nach einem der vorhergehenden Ansprüche umfasst. 25
16. Verfahren zum Steuern einer Auslenkung eines Kombi-Instruments (30) in einem Fahrzeug während einer Kollision, wobei das Fahrzeug umfasst: 30
 - eine Lenkeinrichtung (10) umfassend ein Lenkrad (12) und eine Lenksäule (11);
 - ein Cross Car Beam (20) umfassend eine erste Gleitfläche (22); und
 - eine Armaturenbretteinrichtung (35), die ein Kombi-Instrument (30) und eine zweite Gleitfläche (32) umfasst,
 wobei das Verfahren, nach der Kollision, umfasst: 35

Versetzen der Lenkeinrichtung (10) durch ein gesteuertes Bewegen nach vorne der Lenksäule (11); und
Schieben des Kombi-Instruments (30) durch das Versetzen der Lenkeinrichtung (10) derart, dass die zweite Gleitfläche (32) der Armaturenbretteinrichtung (35) entlang der ersten Gleitfläche (22) gleitet, um das Kombi-Instrument (30) gesteuert auszulenken. 40

Revendications

1. Système de commande de collision (40) pour commander la déviation d'un groupe d'instruments (30) dans un véhicule lors d'une collision, dans lequel ledit système de commande de collision (40) comprend:
 - un ensemble de direction (10) comprenant un volant de direction (12) et une colonne de direction (11);
 - une poutre de voiture croisée (20), **caractérisé en ce que** ladite poutre de voiture croisée (20) comprend une première surface de glissement (22); et
 - un ensemble de tableau de bord (35) comprenant un groupe d'instruments (30) et une deuxième surface de glissement (32) qui est agencée pour venir en butée sur et coulisser le long de ladite première surface de glissement (22) pendant ladite collision,
 - dans lequel, lors de la collision, ladite colonne de direction (11) est configurée pour aller de l'avant de manière contrôlée et ledit ensemble de direction (10) est agencé pour pousser ledit groupe d'instruments (30), si bien que ladite deuxième surface de glissement (32) dudit ensemble de tableau de bord (35) glisse le long de la première surface de glissement (22) pour la déviation contrôlée du groupe d'instruments (30).
2. Système de commande de collision (40) selon la revendication 1, dans lequel ledit groupe d'instruments (30) comprend ladite deuxième surface de glissement (32), ou dans lequel ledit ensemble de panneau de bord (35) comprend un substrat de panneau de bord (36) qui comprend ladite deuxième surface de glissement (32).
3. Système de commande de collision (40) selon la revendication 2, dans lequel ladite première surface de glissement (22) de ladite poutre de voiture croisée (20) est située sur une fixation de poutre de voiture croisée (21) située sur ladite poutre de voiture croisée (20).
4. Système de commande de collision (40) selon la revendication 1, dans lequel ledit ensemble de panneau de bord (35) comprend un substrat de panneau de bord (36) qui comprend ladite première surface de glissement (22), et dans lequel ledit groupe d'instruments (30) comprend ladite deuxième surface de glissement (32).
5. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel ledit groupe d'instruments (30) est disposé partiellement enfermé par un compartiment de l'ensemble de tableau de bord (35), et dans lequel au moins une partie dudit compartiment est agencée pour fléchir lorsque ledit groupe d'instruments (30) est déplacé pendant ladite collision.
6. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel une direction d'extension de ladite première surface de glissement (22) définit un angle (α_1) par rapport à une direction d'extension axiale de la colonne de direction (11), et dans lequel ladite l'angle (α_1) se situe dans la plage de 10 à 80° degrés, spécifiquement dans la plage de 20 à 60° degrés, et plus spécifiquement dans la plage de 30 à 55° degrés.
7. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel ledit ensemble de direction (10) comprend une fixation d'ensemble de direction (14) disposée sur ladite colonne de direction (11), dans lequel ladite fixation d'ensemble de direction (14) comprend une surface d'appui (15), dans lequel ledit ensemble de direction (10) est agencé pour pousser ledit groupe d'instruments (30) par ladite surface d'appui (15) pendant ladite collision, dans lequel une direction d'extension de ladite surface d'appui (15) définit un angle par rapport à une direction d'extension axiale de la colonne de direction (11), et dans lequel ledit angle est dans la plage de 10 à 80° degrés, spécifiquement dans la plage de 30 à 75° degrés, et plus spécifiquement dans la plage de 45 à 70° degrés.
8. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel au moins l'une des première et deuxième surfaces de glissement (22, 32) est équipée d'au moins une rainure (33) le long d'au moins une partie de l'extension de la première ou deuxième surface de glissement (22, 32), ladite au moins une rainure (33) s'étendant dans une direction de glissement prévue de ladite deuxième surface de glissement (32) le long de ladite première surface de glissement (22).
9. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel les première et deuxième surfaces de glissement (22, 32) sont configurées pour dévier le groupe d'instruments (30) dans une direction vers un point situé au-dessus de la poutre de voiture croisée (20).
10. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel la première surface de glissement (22) est essentiellement plate.
11. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans

lequel le système de commande de collision (40) est configuré si bien que la force nécessaire pour déplacer ledit groupe d'instruments (30) à 50 mm le long de ladite première surface de glissement (22) est inférieure à 500 N, plus préférentiellement inférieur à 300 N. 5

12. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel les première et deuxième surfaces de glissement (22, 32) sont agencées pour venir en butée pendant le fonctionnement normal du véhicule. 10

13. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel la poutre de voiture croisée (20) présente une structure en forme de poutre qui est agencée pour s'étendre d'un côté transversal du véhicule à l'autre, et dans lequel la poutre de voiture croisée (20) est agencée pour être fixée à un châssis de véhicule (50). 15 20

14. Système de commande de collision (40) selon l'une quelconque des revendications précédentes, dans lequel la colonne de direction (11) est fixée et supportée par la poutre de voiture croisée (20) ou par une fixation de poutre de voiture croisée (21). 25

15. Véhicule comprenant un système de commande de collision (40) selon l'une quelconque des revendications précédentes. 30

16. Procédé pour commander la déviation d'un groupe d'instruments (30) dans un véhicule pendant une collision, ledit véhicule comprenant: 35

un ensemble de direction (10) comprenant un volant de direction (12) et une colonne de direction (11);
une poutre de voiture croisée (20) comprenant une première surface de glissement (22); et
un ensemble de tableau de bord (35) comprenant un groupe d'instruments (30) et une deuxième surface de glissement (32),
dans lequel le procédé comprend, après ladite collision: 40 45

le déplacement dudit ensemble de direction (10) en déplaçant ladite colonne de direction (11) vers l'avant d'une manière contrôlée; et
la poussée dudit groupe d'instruments (30) par ledit ensemble de direction (10), si bien que ladite deuxième surface de glissement (32) dudit ensemble de tableau de bord (35) glisse le long de la première surface de glissement (22) pour la déviation contrôlée du groupe d'instruments (30). 50 55

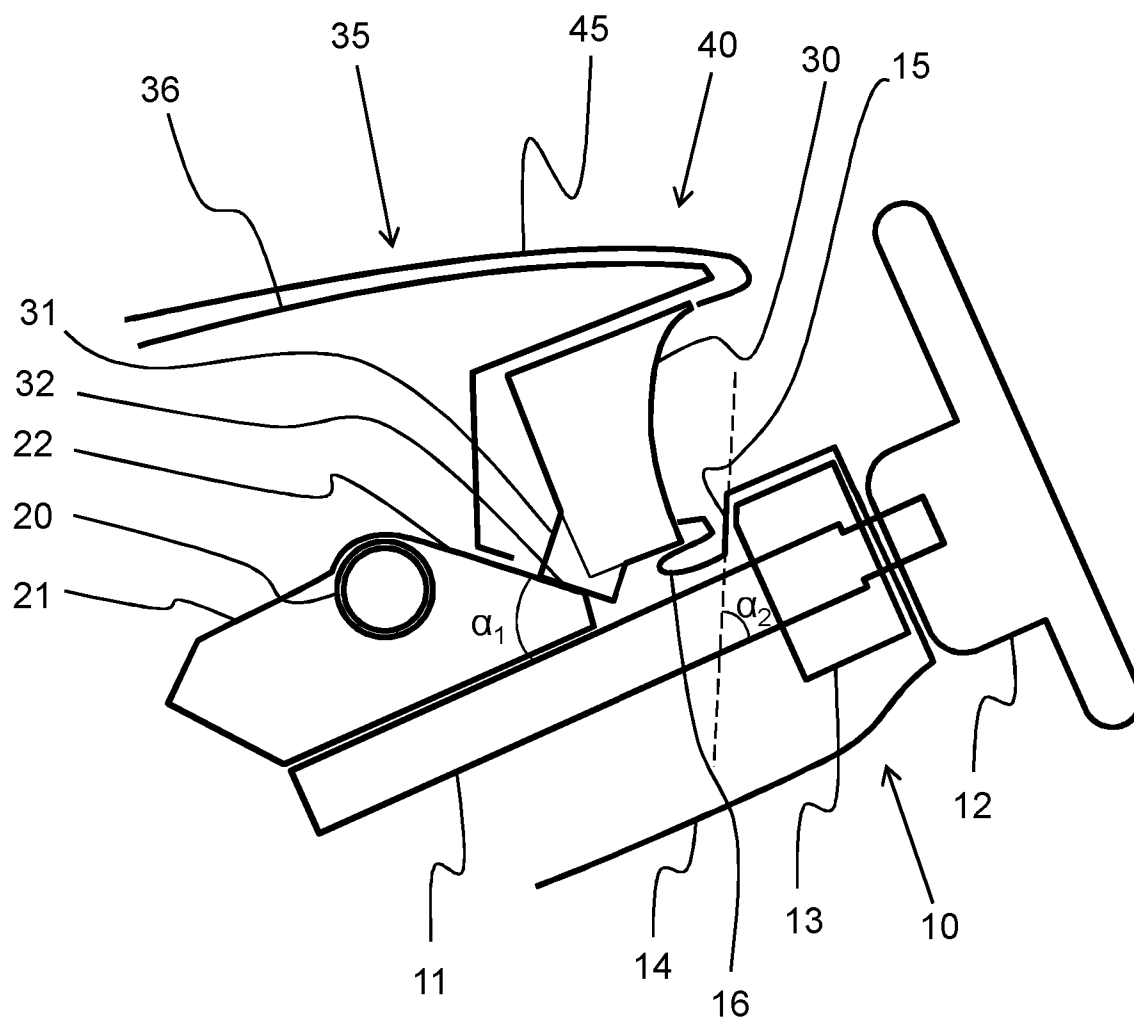


FIG.1

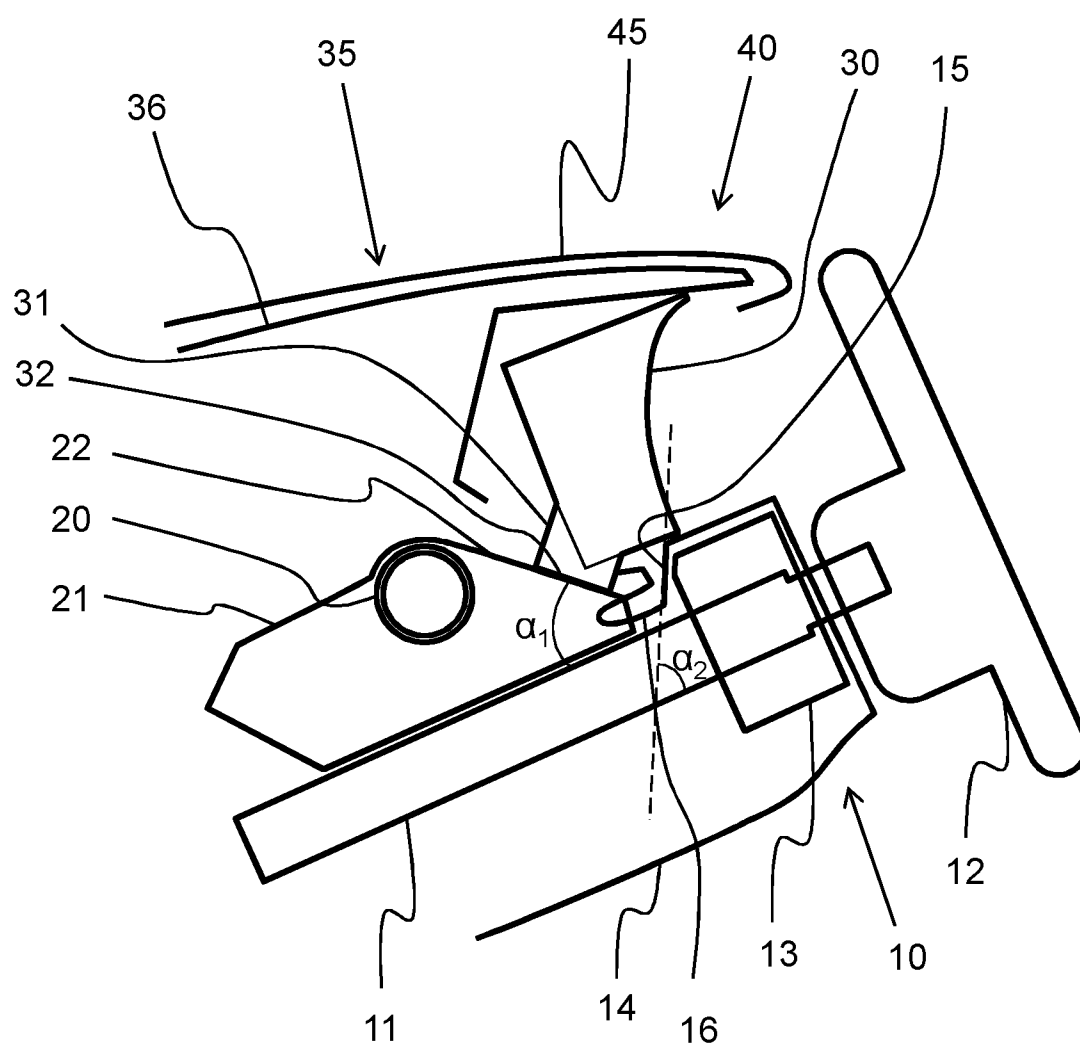


FIG.2

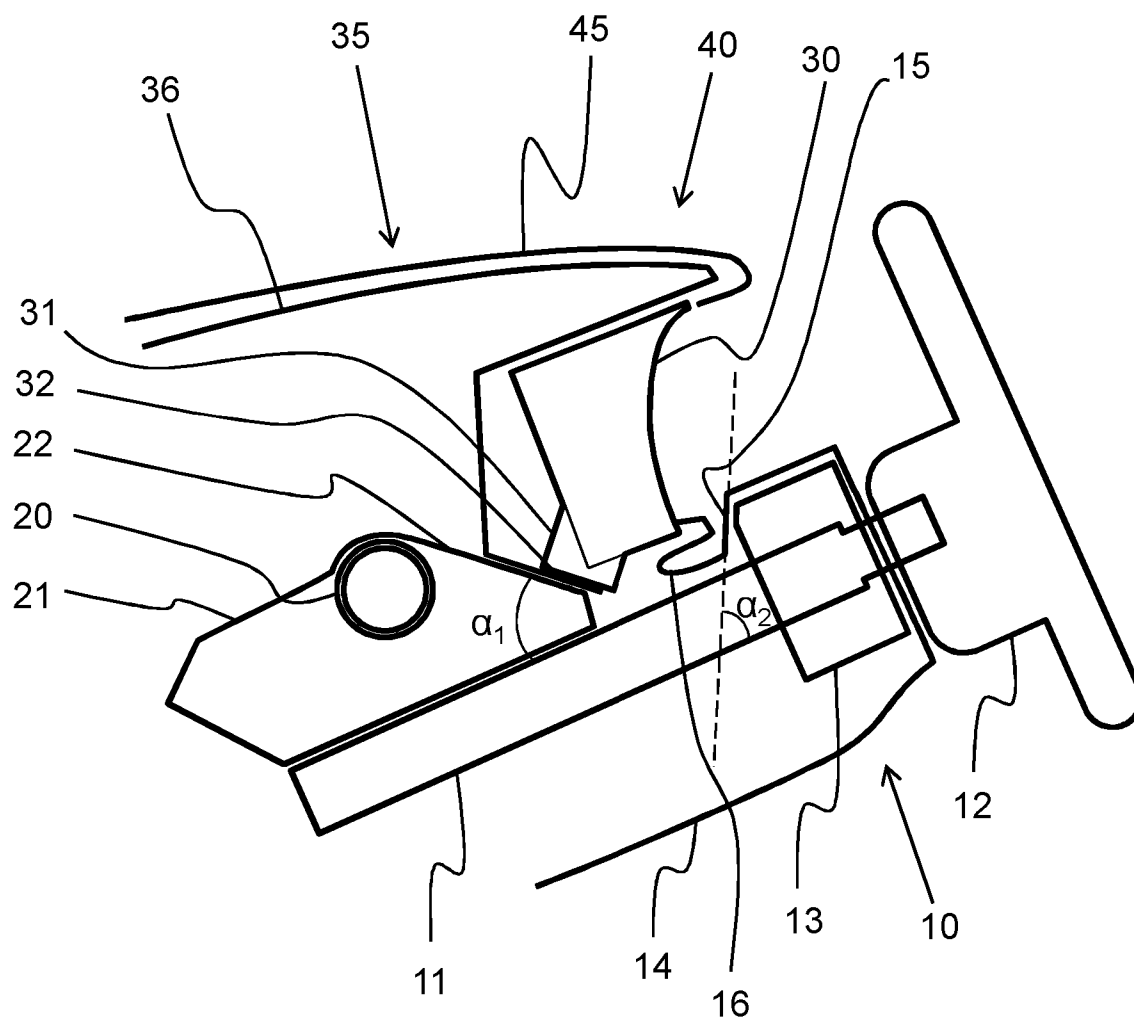


FIG.3

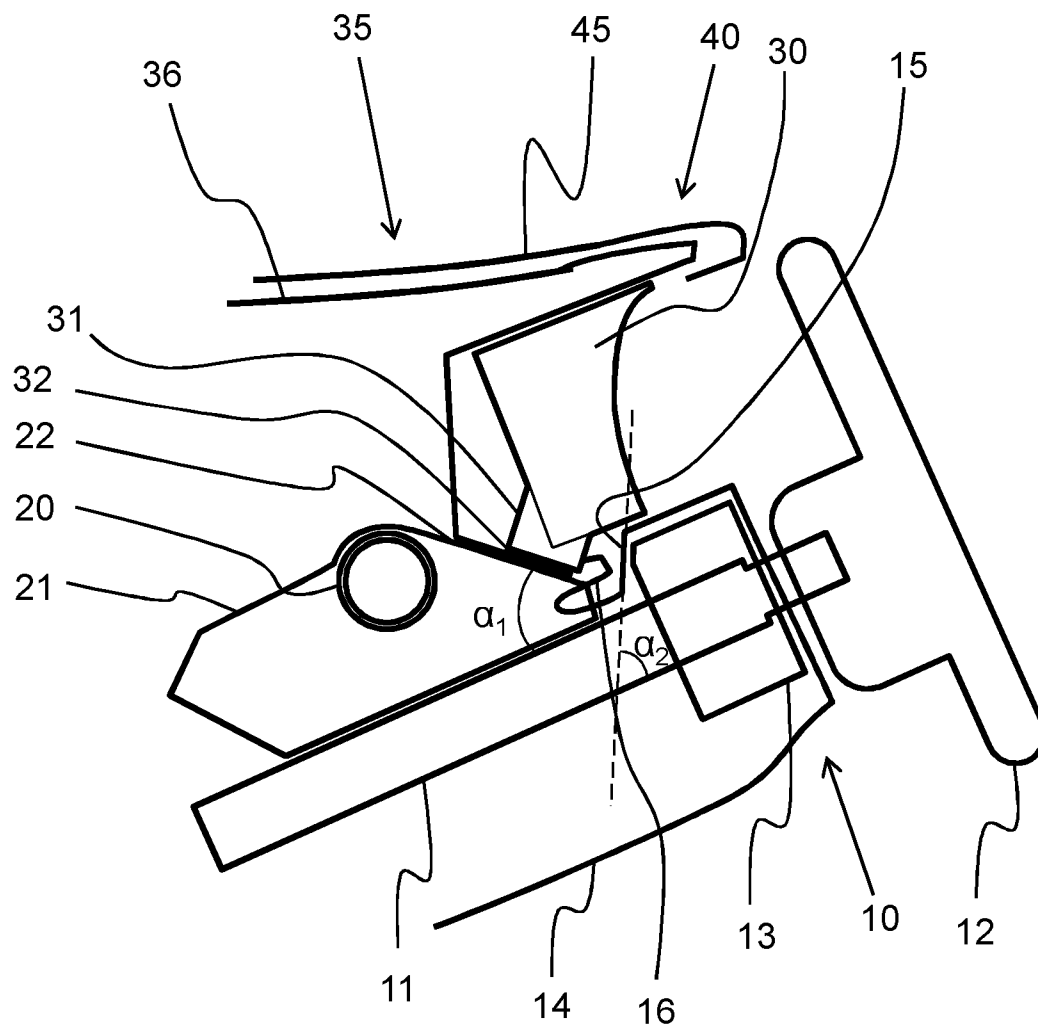


FIG.4

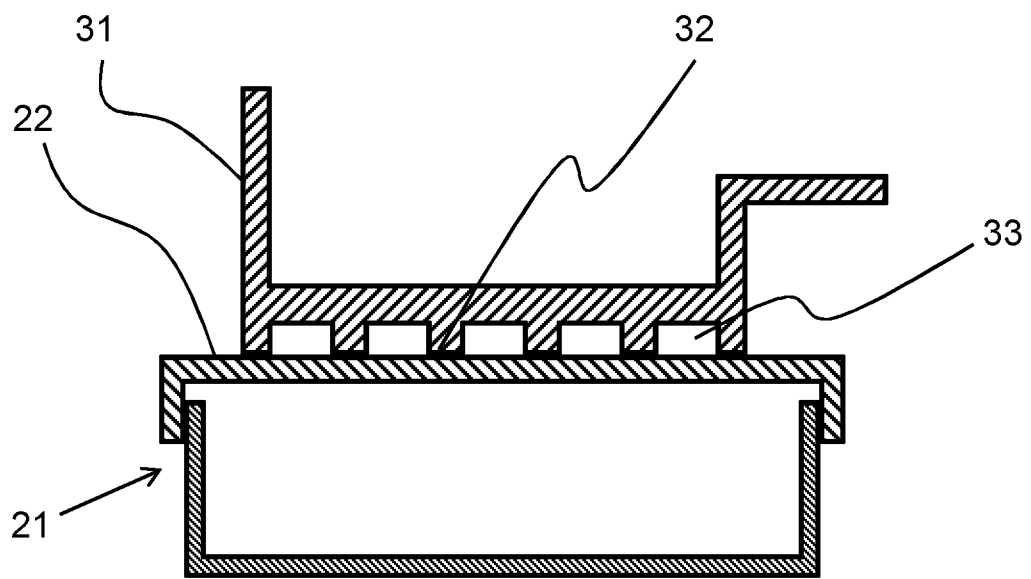


FIG.5

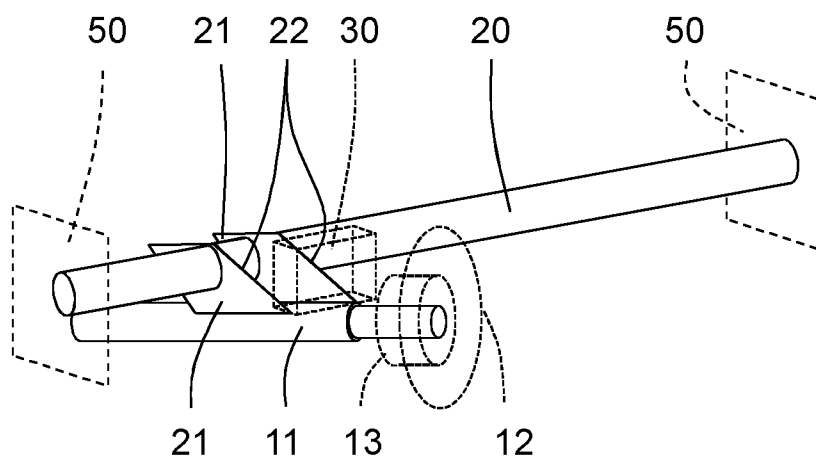


FIG.6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20090085338 A1 [0005]
- WO 0017035 A1 [0006]

Ütközéscsökkentő rendszerrel ellátott jármű,
ütközéscsökkentő rendszer és eljárás



SZABADALMI IGÉNYPONTOK

1. Ütközéscsökkentő rendszer (40) járművön elrendezett eszközcsoport (30) deformálódásának szabályozására ütközés során, ahol az említett ütközésszabályozó rendszer (40) tartalmaz:
kormányelrendezést (10), amelyben kormánykerék (12) és kormányoszlop (11) van;
kereszttartót (20), *azzal jellemezve*, hogy a kereszttartó (20) első csúszófelületet (22) tartalmaz, és egy eszközpanel elrendezést (35) tartalmaz, amelyben eszközcsoport (30), valamint második csúszófelület (32) van elrendezve, amely úgy van kialakítva, hogy az első csúszófelület (22) mentén és ahhoz ütközve működjön az ütközés során,
és ahol a kormányoszlop (11) úgy van kialakítva, hogy az ütközés során szabályozott módon előre mozdul és a kormányelrendezés (10) úgy van kialakítva, hogy az eszközcsoportot (30) nyomja úgy, hogy az eszközpanel elrendezés (35) második csúszófelülete (32) elcsússzon az első csúszófelület (22) mentén annak érdekében, hogy az eszközcsoport (30) szabályozott alakváltozásai eredményezze.
2. Az 1. igénypont szerinti ütközésszabályozó rendszer (40), ahol az eszközcsoport (30) tartalmazza a második csúszófelületet (32), vagy ahol az említett eszközpanel elrendezés (35) eszközpanel alapot (36) tartalmaz, amelyben a második csúszófelület (32) van elrendezve.
3. A 2. igénypont szerinti ütközésszabályozó rendszer (40), ahol a kereszttartó (20) említett első csúszófelülete (22) olyan kereszttartó csatlakozó elemen (21) van elrendezve, amely a kereszttartóra (20) van felszerelve.
4. Az 1. igénypont szerinti ütközésszabályozó rendszer, ahol az említett eszközpanel elrendezés (35) eszközpanel alapja (36) tartalmazza az első csúszófelületet (22), és ahol az eszközcsoport (30) tartalmazza a második csúszófelületet (32).
5. Az előző igénypontok bármelyike szerinti ütközésszabályozó rendszer (40), ahol az említett eszközcsoport (30) részben az eszközpanel elrendezés (35) kamrájába zárva van elrendezve, és ahol legalább a kamra egy része úgy van elrendezve, hogy elhajoljon, amikor az említett eszközcsoport (30) az ütközés során elmozdul.
6. Az előző igénypontok bármelyike szerinti ütközésszabályozó rendszer (40), ahol az említett első csúszófelület (22) nyúlánya szögét (α_1) zár be a kormányoszlop (11) tengelyirányával, és ahol az említett szög (α_1) $10^\circ - 80^\circ$ közötti, előnyösen $20^\circ - 60^\circ$ közötti, és még célszerűbben $30^\circ - 55^\circ$ közötti van.

7. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40), ahol az említett kormányelrendezés (10) kormányelrendezés rögzítő elemmel (14) van ellátva, amely a kormányoszlopnál (11) van elrendezve, ahol a kormányzó elrendezés rögzítő eleme tartalmaz (11) egy hordfelületet (15), ahol a kormányelrendezés (10) úgy van elrendezve, hogy az említett eszközcsoportot (30) a hordfelülethez (15) nyomja az ütközés során, ahol a hordfelület (15) meghosszabbítása a kormányoszlop (11) tengelyével szöveget zár be, és ahol az említett szög 10° - 80° között, előnyösen 30° - 75° között, még előnyösebben 45° - 70° között van.
8. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40), ahol az első és második csúszófelületek (22, 32) legalább egyike legalább egy horonnyal (33) van ellátva, amely az első vagy második csúszófelület (22, 32) meghosszabbításának legalább egy része mentén húzódik, és amely legalább egy horony (33) a második csúszófelület (32) szerinti csúszásirányában húzódik az említett első csúszófelület (22) mentén.
9. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40), ahol az első és a második csúszófelületek (22, 32) úgy vannak kialakítva, hogy az eszközcsoportot (30) a keresztartó (20) fölötti pont irányában deformálják.
10. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40), ahol az első csúszófelület (22) lényegében sík.
11. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40), ahol az ütközésszabályzó rendszer úgy van kialakítva, hogy az eszközcsoport (30) elmozdításához szükséges erő, amely azt 50 mm-re mozditja el az említett első csúszófelület mentén (22), 500 N alatt, célszerűen 300 N alatt van.
12. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40), ahol az első és második csúszófelületek (22, 122) úgy vannak elrendezve, hogy a jármű normál működése során felütközzenek.
13. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40), ahol a jármű keresztartója (20) gerendaszerkezet, amely úgy van elrendezve, hogy a jármű egyik oldalától keresztben a másikig húzódik, és ahol a keresztartó (20) úgy van elrendezve, hogy a jármű vázához (50) rögzíthető.
14. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40), ahol a kormányoszlop (11) a keresztartóval (20) vagy keresztartó toldalékkal (21) van rögzítve és alátámasztva.
15. Az előző igénypontok bármelyike szerinti ütközésszabályzó rendszer (40) tartalmazó jármű.
16. Eljárás eszközcsoport (30) szabályozott deformációjára jármű ütközése során, ahol a jármű tartalmaz: kormányelrendezést (10), amelyben kormánykerék (12) és kormányoszlop van elrendezve, keresztartót (20), amelyben első csúszófelület (22) van,

eszközpanel elrendezést (35), amely eszközcsoportot (30), valamint egy második csúszófelületet (32) tartalmaz,

és ahol az eljárás során ütközés esetén:

elmozdítjuk az említett kormányelrendezést (10) a kormányoszlop (11) szabályozott módon történő mozgatásával;

az eszközcsoportot (30) a kormányelrendezés (10) elmozdításával nyomjuk úgy, hogy az eszközpanel elrendezés (35) második csúszófelülete (32) elcsúszik az első felület (22) mentén annak érdekében, hogy az eszközcsoport (30) szabályozott deformációját okozza.