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(54) **ACTIVATION SYSTEM FOR WEARABLE AIRBAG**

AKTIVIERUNGSSYSTEM FÜR EINEN AM KÖRPER TRAGBAREN AIRBAG

SYSTÈME D'ACTIVATION POUR COUSSIN GONFLABLE DE SÉCURITÉ POUVANT ÊTRE PORTÉ

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Description

Technical Field

[0001] The present disclosure relates to a system for protecting a user's head in case of an abnormal movement, such as a fall or a collision. More specifically, the present invention relates to a wearable airbag for protecting the head of a bicyclist in case of an accident when biking.

Background

[0002] Airbags for the protection of a person's head are known in the art, for example through WO2012044245. As opposed to vehicular airbags the airbag of WO2012044245 is designed to inflate into a complex head protecting shape. The airbag described in the prior art reference is designed as a double-bag construction, of which the inflated helmet-shape of the inner plastic bag is formed by the finger like construction of the outer bag.

[0003] The airbag mentioned in WO2012044245 is designed to detect if the user is exposed to an abnormal movement, such as a fall or a collision, for a specific activity, for example riding a bicycle. For the airbag to protect the user during an accident, the user has to correctly wear the airbag when doing the specific activity. During the activity the wearable airbag is activated, constantly monitoring the movements of the user. As inflation is controlled by comparing the current movement with reference movements of the particular type of activity, it is important to turn off the wearable airbag once the type of activity is changed, e.g. from cycling to walking or running. WO 2019/004918 discloses a similar airbag collar system wherein an idle state and an active are turned on and off by interlocking means comprising a pair of mutually cooperating fastening bodies mounted on the collar.

[0004] Compared to traditional helmets the wearable airbag is so gently arranged around the neck that a user may not want to remove the airbag when doing an activity other than the intended. There is thus a need for an airbag that eliminates or at least mitigates problems arising from this situation.

Summary

[0005] According to a first aspect of the invention, the above and other objects of the invention are achieved, in full or in part, by an airbag system for protecting a body part of a user in case of an accident, comprising an airbag arranged as a collar. The collar comprises a first fastening body and a second fastening body. The first fastening body comprises at least one magnet arranged near at least one sensor, and the second fastening body comprises a shield operable to magnetically shield the at least one sensor from the at least one magnet.

[0006] The fastening bodies are easier to use and less

prone to magnetic disturbances compared to prior art systems.

[0007] In one embodiment, the system further comprises a control unit configured to: arrange the airbag system in an idle state when said at least one sensor detects a magnetic field of said at least one magnet; and arrange the airbag system in an active state when said at least one sensor does not detect said magnetic field.

[0008] The control unit is advantageous in that it allows a user of the system to set the state of the system as needed. The definitions of the states are advantageous in that they are less susceptible to external magnetic fields.

[0009] When the system is in the idle state, the control unit may be configured to prevent the airbag from being inflated.

[0010] The idle state is advantageous in that it prevents accidental inflation of the airbag when it is not needed.

[0011] In a second embodiment, the system further comprises interlocking means arranged to connect the ends of the collar, wherein said interlocking means comprise at least one of said fastening bodies.

[0012] The interlocking means are advantageous in that they have a dual functionality of allowing the collar to be comfortably arranged around the neck of a user and acts as a carrier for the fastening body. This has further benefits in that it is easier for a user to remember to activate the system when putting on the collar and deactivating the system when removing the collar.

[0013] In another embodiment, the second fastening body is operable to engage with said first fastening body.

[0014] The engagement is advantageous in that it allows the fastening bodies to cooperate with each other in an intended manner. It has further benefits in that it makes a clear distinction between an engaged and a disengaged state, which may correspond with the active and idle states of the system.

[0015] When said fastening bodies are engaged, said shield may be arranged to magnetically shield said at least one sensor.

[0016] This arrangement is advantageous in that shield will correctly shield the sensor(s) for the entire duration of the engagement.

[0017] Said first fastening body may further comprise locking means to keep said second fastening body engaged.

[0018] The locking means are advantageous in that it ensures that the fastening bodies are arranged in cooperation with each other in a correct manner and do not accidentally disengage.

[0019] Said locking means may be configured to engage with said shield.

[0020] This is advantageous in that the shield is usually the part of the second fastening body that needs to be fixed in place. The shield is further usually solid and therefore suitable to interact with said locking means.

[0021] Said locking means may comprise at least one spring-loaded protrusion arranged to engage with at least

one receiving hole on said second fastening body.

[0022] The spring-loaded protrusion is advantageous in that it allows the locking means to engage and disengage easily, but not accidentally disengage. The spring-loaded protrusion also has a clearly distinguished engaged state compared to the disengaged state. The spring-loaded nature has further benefits in that it usually creates auditory feedback.

[0023] In yet another embodiment, the system comprises at least two magnets arranged on different sides of the sensor.

[0024] The at least two magnets are advantageous in that they allow for smaller, less powerful magnets compared to having fewer magnets while still maintaining a clear signal. The arrangement is advantageous in that it reduces the impact of magnetic interference.

[0025] In another embodiment, said shield is shaped as a cup or cylinder.

[0026] The shape of the shield allows for a good shielding from all relevant directions and is easy to understand and position correctly as a user. These shapes are further rotationally symmetric, which are especially easy to position.

[0027] In yet another embodiment, said shield comprises metal.

[0028] Metal is advantageous in that it is easy to shape and is magnetically shielding as a Faraday-cage.

[0029] In another embodiment, said at least one sensor is a Hall sensor.

[0030] The Hall sensor is advantageous in that it is a simple and efficient way to detect magnetic radiation.

[0031] In yet another embodiment, said first fastening body is a female connector and said second fastening body is a male connector.

[0032] The female/male connection is advantageous in that it is easy to align and use.

[0033] In another embodiment, said first fastening body further comprises an LED indicator.

[0034] The LED indicator is advantageous in that it may display a bright and energy efficient light.

[0035] Said LED indicator may display a first color of light when the airbag system is in an active state and a second color of light to indicate an error.

[0036] The different colors are a simple user interface that is intuitive for a user to understand.

[0037] Said second fastening body may be operable to engage with said first fastening body; wherein said shield further comprises a transparent portion; and wherein when said fastening bodies are engaged, said transparent portion is arranged to cover said LED indicator.

[0038] The transparent portion is advantageous in that it allows for the LED indicator to be protected and aligned with the rest of the components of the fastening bodies.

[0039] Other objectives, features and advantages of the present invention will appear from the following detailed disclosure, from the attached claims, as well as from the drawings. It is noted that the invention relates

to all possible combinations of features.

[0040] It should be emphasized that the term "comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps, or components, but does not preclude the presence or addition of one or more other features, integers, steps, components, or groups thereof. All terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc.]" are to be interpreted openly as referring to at least one instance of the element, device, component, means, step, etc., unless explicitly stated otherwise.

Brief Description of the Drawings

[0041] By way of example, embodiments of the present invention will now be described with reference to the accompanying drawings, in which:

Fig. 1a is a side view of a user wearing an inflatable helmet, including an airbag system according to some embodiments;

Fig. 1b is a side view of a user wearing an inflated helmet, including an airbag system according to some embodiments;

Fig. 2 is a schematic view of an airbag system according to an embodiment;

Fig. 3 shows an example of the prior art;

Figs. 4a-c show front views of an airbag system according to different embodiments;

Figs. 5a-b show schematic illustrations of a first and second fastening body according to an embodiment; and

Figs. 6a-b show schematic illustrations of locking means according to different embodiments.

Detailed Description

[0042] Embodiments of the invention will now be described with reference to the accompanying drawings. The invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. The terminology used in the detailed description of the particular embodiments illustrated in the accompanying drawings is not intended to be limiting of the invention. In the drawings, like numbers refer to like elements.

[0043] The airbag system described herein is configured to be used to detect an accident, such as a fall or collision, for example for when a user is riding a bicycle. The airbag system is thus configured for the specific use of riding a bicycle, i.e. cycling is the intended activity of the airbag system. For the airbag system to protect the

user during an accident, the user has correctly to wear the airbag system and have it turned on in an active state. It would thus be preferred to provide a system that has an improved locking device to ensure a correct fit of the airbag to the user and a clear indicator if the system is in an active state.

[0044] Furthermore, having the airbag system set in an activate ON-state when the user is not doing the intended activity, e.g. not cycling, results in an undesirable energy loss since the airbag system is in an active state using battery power to power a sensor(s) and to process the movement data gathered therefrom, although there is no risk for a fall or collision. It may also result in a false reading of an abnormal movement, such as a fall or a collision, which triggers the airbag while the user is e.g. walking.

[0045] It would thus be beneficial if the computational demanding determination, if a user is about to fall or collide when doing the intended activity, e.g., riding a bicycle, is deactivated when it's not needed so as to reduce the overall energy consumption of the system. The system may determine if the airbag system is needed, in particular if a user is actually performing the intended activity or not. This information may for example be used to change the mode of the airbag system 100.

[0046] Additionally, or alternatively, to have a system that determines if the airbag system is to be in an active ON-state or an idle OFF-state it is beneficial if no external forces may interfere with the state of the system, as this may cause an unnecessary trigger of the airbag or worse, not trigger the airbag when needed.

[0047] Fig. 1a shows an airbag system 100 according to an embodiment in its non-inflated state. The airbag system 100 forms an apparel having the shape of a collar 10, which is worn around the neck 2 of a user 3. Upon inflation, the apparel transforms into an inflated helmet.

[0048] The collar 10 is placed around the neck 2 of the user 3 and has for that purpose a sealable opening, normally at the front of the collar 10. Alternatively, the opening may be arranged at the back of the collar 10 or at the shoulder portion of the collar 10. Furthermore, the opening may be totally or partly dividable. The opening is sealed using interlocking means 30 to connect the ends of the collar 10 e.g. adjacently the throat or neck region of the user 3. The interlocking means 30 facilitates easy dressing and undressing of the collar 10 on the user 3. Furthermore, the position of the different parts of the interlocking means 30 determines if the airbag system 100 is turned on (i.e. having power) or turned off.

[0049] The interlocking means 30 and the active state will be described more in detail with reference to Figs. 4-6.

[0050] The collar 10 may be made of any kind of flexible material, such as any suitable fabric.

[0051] The collar 10 comprises a folded airbag 15 which is inflated to form a helmet for protecting the head of the user 3 in case of an abnormal movement, e.g. during a cycling accident.

[0052] An inflated helmet is schematically shown in

Fig. 1b. Here, the collar 10 is opened to release the airbag 15 previously enclosed therein. The airbag 15 surrounds the neck 2 and the head 4 of the user 3 and provides an efficient protection for the user 3.

[0053] The airbag 15 is formed by a flexible material in order to be folded and stored within the collar 10 prior to inflation. The airbag 15 may e.g. comprise an inflatable inner bag surrounded by an outer bag. Inflation of the inner bag leads to expansion of the outer bag and the structure of the outer bag defines the shape of the airbag when the inner bag is inflated. Although not shown in Fig. 1a and b, the airbag system may also be a single-bag construction.

[0054] The inner bag may be made of a fluid impermeable material, such as thermoplastic polyurethane film. Since fluid cannot easily leave a fluid impermeable bag, a person wearing an airbag 15 according to the invention will be protected by said airbag 15 for some time after expansion of the airbag 15, effectively protecting the head of the user for the entire time of the accident. The inner bag may be flexible and expandable such that it may expand the outer bag upon inflation to a high pressure. Hence, the inner bag may be inflated resulting in a relatively high internal pressure which preferably is maintained for a required time.

[0055] An example of how the inner and outer bag may be configured is described in WO2012044245 by the same applicant.

[0056] As shown in Fig. 2, the airbag system 100 further comprises at least one sensor 80 for detecting movement of the collar 10, i.e. movement of the user 3 during use, and a control unit 50 configured to, in response to the information gained by the sensor 80, determine if the movement corresponds to an accident situation. If an accident situation is determined, the control unit 50 will trigger inflation of the airbag 15 by means of an inflation device 60. The airbag system 100 further comprises a power source 70, for example a rechargeable battery or a disposable battery, in order to provide electricity to the parts of the system 100. The different parts will now be described more in detail.

[0057] The inflation device 60 may be any suitable type of airbag inflation device, such as a hybrid generator using a combination of compressed gas and solid fuel, a pyrotechnic airbag inflator which uses hot gases formed by powder, a heated gas inflator, or an inflation device using solid fuel. In an embodiment, the inflation device 60 is a cold gas inflator.

[0058] The inflation device 60 may further be provided with a gas guide 65, for directing the gas into the airbag. The inflation device 60 is clamped, screwed, glued, sewed or the like onto the textile bag and the gas guide 65 is positioned inside the textile bag for directing the gas into the bag for inflating the airbag in a proper manner. The gas guide 65 may be T-shaped for being able to lead the gas into the airbag in a suitable stable way. Alternatively the gas guide 65 may be Y-shaped, I-shaped, arrow-shaped, multiple-part shaped cylindrical

shaped or the like.

[0059] The inflation of the airbag 15 is controlled by the control unit 50. The control unit 50 controls the inflation of the airbag in case of an abnormal movement and prevents the airbag system from inflation at an undesired occasion. The control unit 50 may be implemented using instructions that enable hardware functionality, for example, by using executable computer program instructions in a general-purpose or special-purpose processor that may be stored on a computer readable storage medium (disk, memory etc.) 52 to be executed by such a processor. The control unit 50 may be configured to read instructions from the memory 52 and execute these instructions to control the operation of the airbag system 100. The control unit 50 may be implemented using any suitable, publically available processor or Programmable Logic Circuit (PLC). The memory 52 may be implemented using any commonly known technology for computer-readable memories such as ROM, RAM, SRAM, DRAM, FLASH, DDR, SDRAM or some other memory technology.

[0060] The control unit 50 may be a dedicated control unit or the control unit 50 may also be configured to control other functions.

[0061] The at least one sensor 80 collects data relating to the movement of the collar 10. The sensor 80 may e.g. be an accelerometer, a gyro, an air ultrasonic transducer, radar and/or a laser. In one embodiment at least one sensor 80 is an accelerometer measuring acceleration in three dimensions and/or the sensor 80 is a gyro detecting angular speed in three dimensions. Additionally, or alternatively, the at least one sensor 80 may be an air ultrasonic transducer, or any device using electromagnetic waves, that measures the distance from the ground to the collar.

[0062] EP2313814, filed by the same applicant, discloses a method for detecting a bicycle accident without falsely classifying any data samples from normal cycling activities as accident. The system classifies the detected movement into either a "normal class" relating to movement patterns representing riding a bicycle or doing related activities or into an "action class" relating to movement patterns representing a bicycle accident.

[0063] The movement data gathered from the at least one sensor 80 is transmitted to the control unit 50. The control unit 50 processes the data and analyses it in order to evaluate if the processed data corresponds to an accident situation. If the data corresponds to pre-stored data indicating an accident situation, the control unit 50 transmits a triggering signal to the inflation device 60 to trigger the inflation of the airbag 15. The airbag 15 will consequently be inflated when the inflation device 60 receives the triggering signal.

[0064] The controller is coupled to the memory 52 which saves the measured and processed data. The saved data can be used to review and analyse the activity history of the airbag system. This is particularly useful if the airbag system has been deflated and technicians

want to verify that the airbag system was working properly.

[0065] If the user 3 wears the airbag system 100 when performing an activity for which the airbag system 100 was not intended, such as climbing or riding an elevator, there is a slight risk that the control unit 50 incorrectly detects the movement as an accident and triggers the inflation.

[0066] In some embodiments, the system 100 may be configured to directly determine between when a user 3 is doing the intended activity, e.g. riding a bicycle, and when the user is doing an un-intended activity, such as climbing or running, and to subsequently alarm the user 3 if he/she is doing an un-intended activity with the airbag system 100 and that the airbag system 100 should be turned off.

[0067] In the following, the first activity state of the user 3 is the user 3 doing an unintended activity. If the intended activity for the airbag system is riding a bicycle, the first activity state is the user 3 doing an activity other than riding a bicycle. The determination could either be done by determining if the user is doing the intended activity (e.g. bicycling), determining if the user is doing an unintended activity (e.g. activity other than bicycling) and/or determining both if the user is doing the intended activity or an unintended activity.

[0068] The determination of when a user 3 is in a first activity state is preferably done using movement data gathered by the airbag system 100. The movement data used to determine the activity state of the user (e.g. walking or bicycling) may be retrieved from the at least one sensor 80 and/or from at least one additional sensor 85. The control unit 50 is configured to receive the movement signal(s) and process the signal(s) to determine if it corresponds to a predetermine pattern indicating the first activity state.

[0069] The additional sensor 85 may be an accelerometer, a gyro, an air ultrasonic transducer, radar and/or a laser or any other suitable sensor. The movement signals used to determine the activity state of the user may comprise information relating to acceleration, angular speed and/or the distance from the ground to the collar.

[0070] Hence, when the airbag system is in an active ON-state, the control unit 50 is configured to determine if the user 3 is in a first activity state not corresponding to the intended activity by processing the output from the at least one sensor 80, 85. If the control unit 50 detects that the user 3 is in a first activity state, the control unit 50 is configured to alert the user 3.

[0071] The airbag system 100 may further comprise a user interface 95. The user interface 95 produces a signal detectable by the user, so as to alert the user 3 with different information. The user interface 95 may be configured to alert the user 3 to turn the airbag system 100 into an active state or turn it off. The user interface 95 may also be configured to indicate the status of the airbag system, i.e. the battery level, if the battery is in need for change or charging, if the inner elements of the helmet

is intact or not, and if the system 100 is turned on. As will further be described with reference to the interlocking means 30 shown in Fig. 4, the user interface 95 may be used to alert the user 3 that the airbag system 100 is turned on in an active state in response to changing the position of the parts of the interlocking means 30.

[0072] The alert signal could be in the form of an audible signal such as siren, a haptic signal such as a vibration, a visual signal such as a strobe light or color indication, or other sensory alarm that could be arranged on a user in the form of an airbag system 100.

[0073] The user interface 95 may comprise one or a plurality of light emitting diodes (LED), which indicate information using light signal(s). Different colors of the light or flashing signals may for example indicate different information. The user interface 95 may also comprise a speaker sending out a sound signal, such as a buzz, or a device sending out a vibrating signal or a spoken phrase.

[0074] Fig. 3 shows interlocking means 30 for an airbag system 100 according to a prior art example. The airbag system 100 forms an apparel having the shape of a collar 10 which is worn around the neck 2 of a user 3. Upon inflation, the apparel transforms into an inflated helmet.

[0075] The collar 10 is placed around the neck 2 of the user 3 and has for that purpose a sealable opening, normally at the front of the collar 10. The opening is sealed using interlocking means 30 to connect the ends of the collar 10. The interlocking means 30 facilitates easy dressing and undressing of the collar 10 on the user 3.

[0076] The interlocking means 30 further comprises a male connector of a metal snap button 33. The female connector of the button 33 is arranged on the front of the collar 10 and is operatively connected to electronic components. When the male connector of the button 33 is inserted into the female connector, a circuit is closed and the airbag system 100 is put into an active state.

[0077] A problem with this prior art solution is that external forces may accidentally close the circuit, activating the system 100 at an inopportune time. Another issue is that metal snap buttons 33 may be difficult to use, especially pushing hard at a neck area. Further improvements are thusly needed.

[0078] Fig. 4a shows a front view of an airbag system 100. The system 100 forms an apparel having the shape of a collar 10 which is worn around the neck 2 of a user 3. Upon inflation, the apparel transforms into an inflated helmet.

[0079] The collar 10 is placed around the neck 2 of the user 3 and has for that purpose a sealable opening, normally at the front of the collar 10. The opening is sealed using interlocking means 30 to connect the ends of the collar 10. The interlocking means 30 is e.g. a zipper that facilitates easy dressing and undressing of the collar 10 on the user 3.

[0080] The collar 10 comprises a first fastening body 31 and a second fastening body 32 arranged separately from the interlocking means 30. The first fastening body

31 is arranged as a set of components attached directly on the collar 10. The second fastening body 32 is arranged as a flap attached to the collar 10 at one edge closest to the interlocking means 30, the flap 32 being foldable across the interlocking means 30 to engage with the first fastening body 31.

[0081] The first fastening body 31 comprises two magnets 35 arranged on different sides of a sensor 36. The second fastening body 32 comprises a shield 34 operable to magnetically shield the sensor 36 from the two magnets 35. The first fastening body 31 is a female connector and the second fastening body 32 is a male connector operable to engage with the first fastening body 31. This engagement will be further discussed with regards to Figs. 5a-b.

[0082] The shield 34 may be shaped as a cup or a cylinder. The shield 34 may comprise any material suitable for shielding magnetic fields. Examples of suitable materials are any conductors arranged as a Faraday cage, such as metals like copper, silver and gold; or conducting carbon structures such as graphene or carbon nanotubes.

[0083] The first fastening body 31 further comprises an LED indicator 95. The LED indicator 95 displays a first color of light when the airbag system 100 in an active state and a second color of light to indicate an error. The LED indicator 95 may further display the battery level of the system 100.

[0084] Fig. 4b shows a front view of an alternative airbag system 100. The collar 10 comprises a first fastening body 31, and a second fastening body 32 arranged as a part of the interlocking means 30.

[0085] The first fastening body 31 is arranged as a set of components attached directly on the collar 10. The first fastening body 31 comprises a single magnet 35. The second fastening body 32 is arranged as a flap attached to the interlocking means 30. When the interlocking means 30 is fully closed, the second fastening body 32 is at a suitable distance to engage with the first fastening body 31.

[0086] Fig. 4c shows a front view of an alternative airbag system 100. The collar 10 comprises a first fastening body 31 and a second fastening body 32, both being arranged as a part of the interlocking means 30.

[0087] The first fastening body 31 is arranged as a set of components attached directly on the collar 10. The second fastening body 32 is arranged as a flap being the interlocking means 30. The flap 32 comprises a shield 34 and a series of buttons 33 arranged to engage with buttons attached directly on the collar 10 to connect the ends of the collar 10. The first fastening body 31 and the shield 34 of the second fastening body 32 are arranged in series with the buttons 33 and operable to engage with each other in a similar manner.

[0088] Fig. 5a shows a schematic illustration of the first fastening body 31. The first fastening body 31 comprises a circuit board with two sensors 36 and an LED 95 mounted on the board and acting as a user interface. The first

fastening body 31 may comprise any number of sensors 36 and LEDs 95, including zero.

[0089] The first fastening body 31 further comprises two magnets 35 arranged on either side of the sensors 36. Preferably, the two magnets 35 are arranged at the same radius from the circuit board, but spaced apart by an angle, such as in the range of 90-270°. The first fastening body 31 may comprise any number of magnets 35 and the magnets 35 may be aligned in any number of ways. The embodiment shown with two aligned magnets 35 have proven beneficial, as a high yet shieldable magnetic field is generated.

[0090] The sensors 36 are arranged on either side of the LED 95. The sensors 36 may be Hall sensors configured to detect a magnetic field made by the magnets 35. The sensors 36 may be arranged in any number of ways. The configuration shown has proven beneficial, as they are less prone to unintended activation due to external magnetic fields.

[0091] The airbag system 100 in Fig. 5a is in an idle state. The at least one sensor 36 detects a magnetic field of the at least one magnet 35. A controller 50 is operatively connected to at least the sensors 36. The controller 50 is configured to put the airbag system 100 in an idle state as long as the sensors 36 detect the magnetic field of the magnets 35. When the system 100 is in an idle state, the airbag 15 is prevented from being inflated.

[0092] Fig. 5b shows a schematic illustration of the fastening bodies 31, 32 engaged with each other. When the fastening bodies 31, 32 are engaged, the shield 34 is arranged to magnetically shield the at least one sensor 36 from the magnet(s) 35.

[0093] The airbag system 100 in Fig. 5b is in an active state. The at least one sensor 36 does not detect a magnetic field of the at least one magnet 35. A controller 50 is configured to arrange the airbag system 100 in an active state as long as the sensors 36 do not detect the magnetic field. When the system 100 is in an active state, the airbag 15 will be inflated upon detection of an abnormal movement.

[0094] The shield 34 in Fig. 5b comprises a transparent portion 34a. When the fastening bodies 31, 32 are engaged, the transparent portion 34a is arranged to cover the LED indicator 95. This allows the LED indicator 95 to be visible while the fastening bodies 31, 32 are engaged, which in this embodiment also means while the airbag system 100 is in an active state.

[0095] The transparent portion 34a may comprise glass, plastic or gas. The transparent portion 34a may be arranged to be in front of the LED indicator 95 or to surround it. In another embodiment, the shield 34 is hollow, such that the transparent portion 34a is formed by a void, or a lack of material.

[0096] Fig. 6a is a schematic illustration of locking means 37. The fastening bodies 31, 32 are engaged with each other and the shield 34 is arranged to magnetically shield the at least one sensor 36. The shield 34 is arranged as two separate units, however any number of

units are possible

[0097] The locking means 37 are arranged to keep the fastening bodies 31, 32 engaged with each other. The locking means 37 comprise at least one spring-loaded protrusion 38 arranged to engage with at least one receiving hole 39 on the second fastening body 32.

[0098] The spring-loaded protrusions 38 are protrusions with slanted edges and spring means. When the second fastening body 32 is inserted into the first fastening body 31, the second fastening body 32 pushes the spring-loaded protrusions 38 and compresses the spring means. Once the receiving holes 39 are aligned with the protrusions 38, the spring means will push the protrusions into the holes 39 and keep the fastening bodies 31, 32 engaged with each other.

[0099] The locking means 37 are arranged on the collar 10 and has one spring-loaded protrusion 38 on each side of the shield 34. The shield 34 comprises a receiving hole 39 on each side arranged to engage with the protrusions 38.

[0100] Fig. 6b is a schematic illustration of locking means 37 according to an alternate embodiment. The first fastening body 31 comprises the locking means 37 to keep said second fastening body 32 engaged.

[0101] The locking means 37 are configured to engage with the shield 34. The locking means 37 comprise spring-loaded protrusions 38 arranged to engage with receiving holes 39 on the shield 34 from inside of the shield 34.

[0102] Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Moreover, although the foregoing descriptions and the associated drawings describe exemplary embodiments in the context of certain exemplary combinations of elements and/or functions, it should be appreciated that different combinations of elements and/or functions may be provided by alternative embodiments without departing from the scope of the appended claims. In this regard, for example, different combinations of elements and/or functions than those explicitly described above are also contemplated as may be set forth in some of the appended claims. In cases where advantages, benefits or solutions to problems are described herein, it should be appreciated that such advantages, benefits and/or solutions may be applicable to some example embodiments, but not necessarily all example embodiments. Thus, any advantages, benefits or solutions described herein should not be thought of as being critical, required or essential to all embodiments or to that which is claimed herein. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes

of limitation.

Claims

1. Airbag system for protecting a body part of a user (3) in case of an accident, comprising an airbag (15) arranged as a collar (10), wherein said collar (10) comprises a first fastening body (31) and a second fastening body (32); and
characterized in that
said first fastening body (31) comprises at least one magnet (35) arranged near at least one sensor (36), and said second fastening body (32) comprises a shield (34) operable to magnetically shield said at least one sensor (36) from said at least one magnet (35).
2. The airbag system according to claim 1, wherein the system further comprises a control unit (50) configured to:

 arrange the airbag system (100) in an idle state when said at least one sensor (36) detects a magnetic field of said at least one magnet (35); and

 arrange the airbag system (100) in an active state when said at least one sensor (36) does not detect said magnetic field.
3. The airbag system according to claim 2, wherein when the system (100) is in the idle state, the control unit (50) is configured to prevent the airbag (15) from being inflated, and/or wherein when the system (100) is in the active state, the control unit (50) is configured to allow the airbag (15) to be inflated.
4. The airbag system according to any one of the preceding claims, further comprising interlocking means (30) arranged to connect the ends of the collar (10), wherein said interlocking means (30) comprise at least one of said fastening bodies (31, 32).
5. The airbag system according to any one of the preceding claims, wherein said second fastening body (32) is operable to engage with said first fastening body (31).
6. The airbag system according to claim 5, wherein when said fastening bodies (31, 32) are engaged, said shield (34) is arranged to magnetically shield said at least one sensor (36).
7. The airbag system according to claim 5 or 6, wherein said first fastening body (31) further comprises locking means (37) to keep said second fastening body (32) engaged.

8. The airbag system according to claim 7, wherein said locking means (37) are configured to engage with said shield (34).
9. The airbag system according to claim 7 or 8, wherein said locking means (37) comprise at least one spring-loaded protrusion (38) arranged to engage with at least one receiving hole (39) on said second fastening body (32).
10. The airbag system according to any one of the preceding claims, comprising at least two magnets (35) arranged on different sides of the sensor (36).
11. The airbag system according to any one of the preceding claims, wherein said shield (34) is shaped as a cup or cylinder, and/or wherein said shield (34) comprises metal.
12. The airbag system according to any one of the preceding claims, wherein said at least one sensor (36) is a Hall sensor.
13. The airbag system according to any one of the preceding claims, wherein said first fastening body (31) is a female connector and said second fastening body (32) is a male connector, and/or wherein said first fastening body (31) further comprises an LED indicator (95).
14. The airbag system according to claim 13, wherein said LED indicator (95) displays a first color of light when the airbag system (100) in an active state and a second color of light to indicate an error.
15. The airbag system according to claim 13 or 14, wherein said second fastening body (32) is operable to engage with said first fastening body (31);

 wherein said shield (34) further comprises a transparent portion (34a); and

 wherein when said fastening bodies (31, 32) are engaged, said transparent portion (34a) is arranged to cover said LED indicator (95).

Patentansprüche

1. Airbagsystem zum Schutz eines Körperteils eines Benutzers (3) im Falle eines Unfalls, aufweisend einen als Kragen (10) angeordneten Airbag (15), wobei der Kragen (10) einen ersten Befestigungskörper (31) und einen zweiten Befestigungskörper (32) aufweist; und
dadurch gekennzeichnet, dass
der erste Befestigungskörper (31) zumindest einen Magneten (35) aufweist, der in der Nähe von zumindest einem Sensor (36) angeordnet ist, und der zwei-

- te Befestigungskörper (32) eine Abschirmung (34) aufweist, die dazu dient, den zumindest einen Sensor (36) magnetisch von dem zumindest einen Magneten (35) abzuschirmen.
2. Airbagsystem nach Anspruch 1, wobei das System ferner eine Steuerungseinheit (50) aufweist, die konfiguriert ist, um:
 - das Airbagsystem (100) in einen Ruhezustand zu versetzen, wenn der zumindest eine Sensor (36) ein Magnetfeld des zumindest einen Magneten (35) detektiert; und
 - das Airbagsystem (100) in einen aktiven Zustand zu versetzen, wenn der zumindest eine Sensor (36) das Magnetfeld nicht detektiert.
 3. Airbagsystem nach Anspruch 2, wobei, die Steuerungseinheit (50) konfiguriert ist, um zu verhindern, dass der Airbag (15) aufgeblasen wird, wenn sich das System (100) im Ruhezustand befindet, und/oder wobei die Steuerungseinheit (50) konfiguriert ist, um zu ermöglichen, dass der Airbag (15) aufgeblasen wird, wenn sich das System (100) im aktiven Zustand befindet.
 4. Airbagsystem nach einem der vorstehenden Ansprüche, ferner aufweisend Verriegelungsmittel (30), die derart angeordnet sind, dass sie die Enden des Kragens (10) verbinden, wobei die Verriegelungsmittel (30) zumindest einen der Befestigungskörper (31, 32) aufweisen.
 5. Airbagsystem nach einem der vorstehenden Ansprüche, wobei der zweite Befestigungskörper (32) bedienbar ist, um mit dem ersten Befestigungskörper (31) in Eingriff zu gelangen.
 6. Airbagsystem nach Anspruch 5, wobei die Abschirmung (34) derart angeordnet ist, dass sie den zumindest einen Sensor (36) magnetisch abschirmt, wenn die Befestigungskörper (31, 32) in Eingriff stehen.
 7. Airbagsystem nach Anspruch 5 oder 6, wobei der erste Befestigungskörper (31) ferner Verriegelungsmittel (37) aufweist, um den zweiten Befestigungskörper (32) in Eingriff zu halten.
 8. Airbagsystem nach Anspruch 7, wobei die Verriegelungsmittel (37) konfiguriert sind, um mit der Abschirmung (34) in Eingriff zu gelangen.
 9. Airbagsystem nach Anspruch 7 oder 8, wobei die Verriegelungsmittel (37) zumindest einen federbelasteten Vorsprung (38) aufweisen, der angeordnet ist, um in zumindest ein Aufnahmeloch (39) an dem zweiten Befestigungskörper (32) einzugreifen.
 10. Airbagsystem nach einem der vorstehenden Ansprüche, aufweisend zumindest zwei Magnete (35), die auf unterschiedlichen Seiten des Sensors (36) angeordnet sind.
 11. Airbagsystem nach einem der vorstehenden Ansprüche, wobei die Abschirmung (34) die Form einer Schale oder eines Zylinders hat und/oder wobei die Abschirmung (34) Metall aufweist.
 12. Airbagsystem nach einem der vorstehenden Ansprüche, wobei der zumindest eine Sensor (36) ein Hall-Sensor ist.
 13. Airbagsystem nach einem der vorstehenden Ansprüche, wobei der erste Befestigungskörper (31) ein Buchsenverbinder und der zweite Befestigungskörper (32) ein Steckverbinder ist, und/oder wobei der erste Befestigungskörper (31) ferner eine LED-Anzeige (95) aufweist.
 14. Airbagsystem nach Anspruch 13, wobei die LED-Anzeige (95) eine erste Lichtfarbe anzeigt, wenn das Airbagsystem (100) in einem aktiven Zustand ist, und eine zweite Lichtfarbe anzeigt, um einen Fehler anzuzeigen.
 15. Airbagsystem nach Anspruch 13 oder 14, wobei der zweite Befestigungskörper (32) bedienbar ist, um mit dem ersten Befestigungskörper (31) in Eingriff zu gelangen;
 - wobei die Abschirmung (34) ferner einen transparenten Abschnitt (34a) aufweist; und
 - wobei, wenn die Befestigungskörper (31, 32) in Eingriff stehen, der transparente Abschnitt (34a) derart angeordnet ist, dass er die LED-Anzeige (95) abdeckt.

Revendications

1. Système de coussin de sécurité gonflable pour protéger une partie de corps d'un utilisateur (3) en cas d'accident, comprenant un coussin de sécurité gonflable (15) agencé comme un collier (10), dans lequel ledit collier (10) comprend un premier corps de fixation (31) et un deuxième corps de fixation (32) ; et **caractérisé en ce que** ledit premier corps de fixation (31) comprend au moins un aimant (35) agencé près d'au moins un capteur (36), et ledit deuxième corps de fixation (32) comprend un élément de protection (34) pouvant fonctionner pour protéger magnétiquement ledit au moins un capteur (36) dudit au moins un aimant (35).
2. Système de coussin de sécurité gonflable selon la revendication 1, dans lequel le système comprend

en outre une unité de commande (50) configurée pour :

- agencer le système de coussin de sécurité gonflable (100) dans un état inactif lorsque ledit au moins un capteur (36) détecte un champ magnétique dudit au moins un aimant (35) ; et agencer le système de coussin de sécurité gonflable (100) dans un état actif lorsque ledit au moins un capteur (36) ne détecte pas ledit champ magnétique.
3. Système de coussin de sécurité gonflable selon la revendication 2, dans lequel lorsque le système (100) est dans l'état inactif, l'unité de commande (50) est configurée pour empêcher le coussin de sécurité gonflable (15) d'être gonflé, et/ou dans lequel lorsque le système (100) est dans l'état actif, l'unité de commande (50) est configurée pour permettre au coussin de sécurité gonflable (15) d'être gonflé.
 4. Système de coussin de sécurité gonflable selon l'une quelconque des revendications précédentes, comprenant en outre des moyens d'enclenchement (30) agencés pour relier les extrémités du collier (10), dans lequel lesdits moyens d'enclenchement (30) comprennent au moins un desdits corps de fixation (31, 32).
 5. Système de coussin de sécurité gonflable selon l'une quelconque des revendications précédentes, dans lequel ledit deuxième corps de fixation (32) permet d'être en prise avec ledit premier corps de fixation (31) .
 6. Système de coussin de sécurité gonflable selon la revendication 5, dans lequel lorsque lesdits corps de fixation (31, 32) sont en prise, ledit élément de protection (34) est agencé pour protéger magnétiquement ledit au moins un capteur (36).
 7. Système de coussin de sécurité gonflable selon la revendication 5 ou 6, dans lequel ledit premier corps de fixation (31) comprend en outre des moyens de verrouillage (37) pour maintenir ledit deuxième corps de fixation (32) en prise.
 8. Système de coussin de sécurité gonflable selon la revendication 7, dans lequel lesdits moyens de verrouillage (37) sont configurés pour être en prise avec ledit élément de protection (34).
 9. Système de coussin de sécurité gonflable selon la revendication 7 ou 8, dans lequel lesdits moyens de verrouillage (37) comprennent au moins une saillie à ressort (38) agencée pour être en prise avec au moins un trou de réception (39) sur ledit deuxième corps de fixation (32).

10. Système de coussin de sécurité gonflable selon l'une quelconque des revendications précédentes, comprenant au moins deux aimants (35) agencés sur différents côtés du capteur (36).

11. Système de coussin de sécurité gonflable selon l'une quelconque des revendications précédentes, dans lequel ledit élément de protection (34) est formé comme un gobelet ou cylindre, et/ou dans lequel ledit élément de protection (34) comprend du métal.

12. Système de coussin de sécurité gonflable selon l'une quelconque des revendications précédentes, dans lequel ledit au moins un capteur (36) est un capteur à effet Hall.

13. Système de coussin de sécurité gonflable selon l'une quelconque des revendications précédentes, dans lequel ledit premier corps de fixation (31) est un connecteur femelle et ledit deuxième corps de fixation (32) est un connecteur mâle, et/ou dans lequel ledit premier corps de fixation (31) comprend en outre un indicateur à DEL (95).

14. Système de coussin de sécurité gonflable selon la revendication 13, dans lequel ledit indicateur à DEL (95) affiche une première couleur de lumière lorsque le système de coussin de sécurité gonflable (100) est dans un état actif et une deuxième couleur de lumière pour indiquer une erreur.

15. Système de coussin de sécurité gonflable selon la revendication 13 ou 14, dans lequel ledit deuxième corps de fixation (32) peut fonctionner pour être en prise avec ledit premier corps de fixation (31) ;

dans lequel ledit élément de protection (34) comprend en outre une partie transparente (34a) ; et dans lequel lorsque lesdits corps de fixation (31, 32) sont en prise, ladite partie transparente (34a) est agencée pour couvrir ledit indicateur à DEL (95).

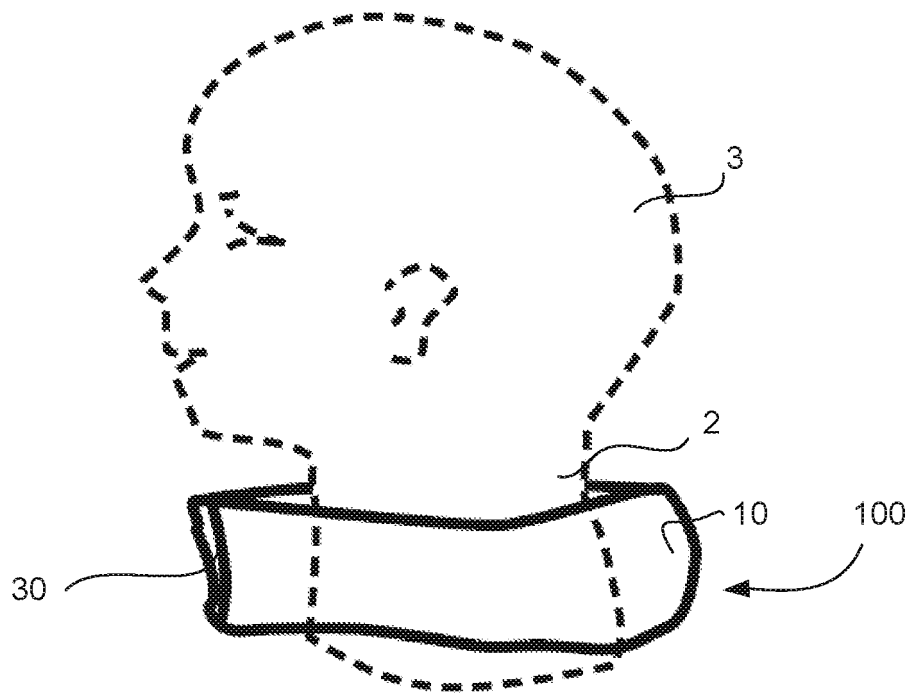


Fig. 1a

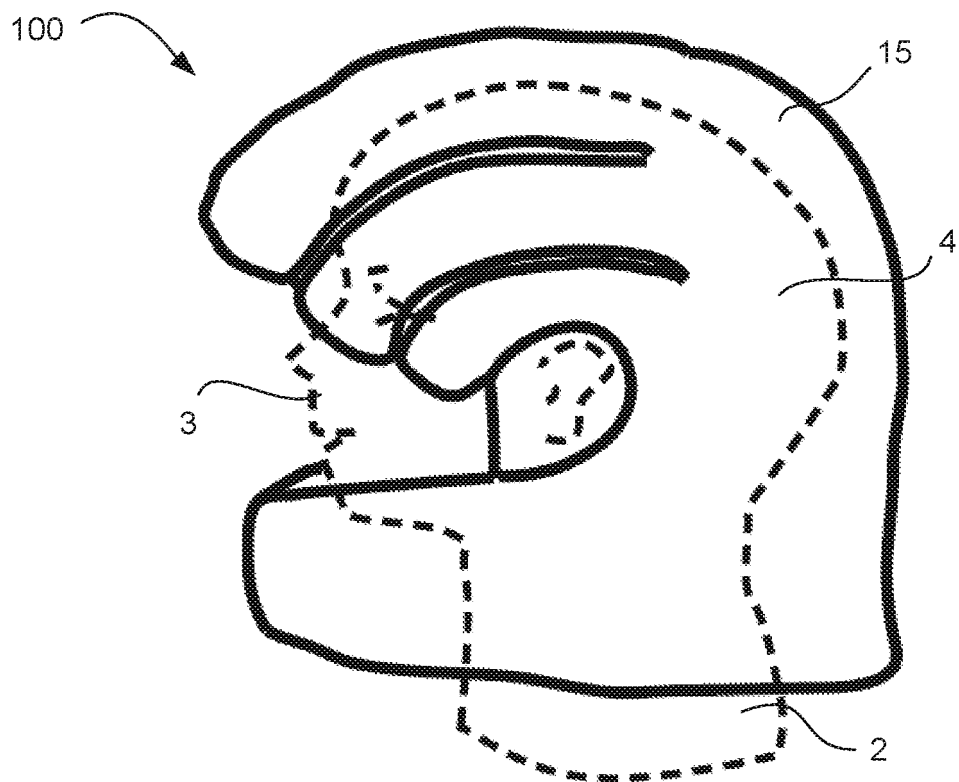


Fig. 1b

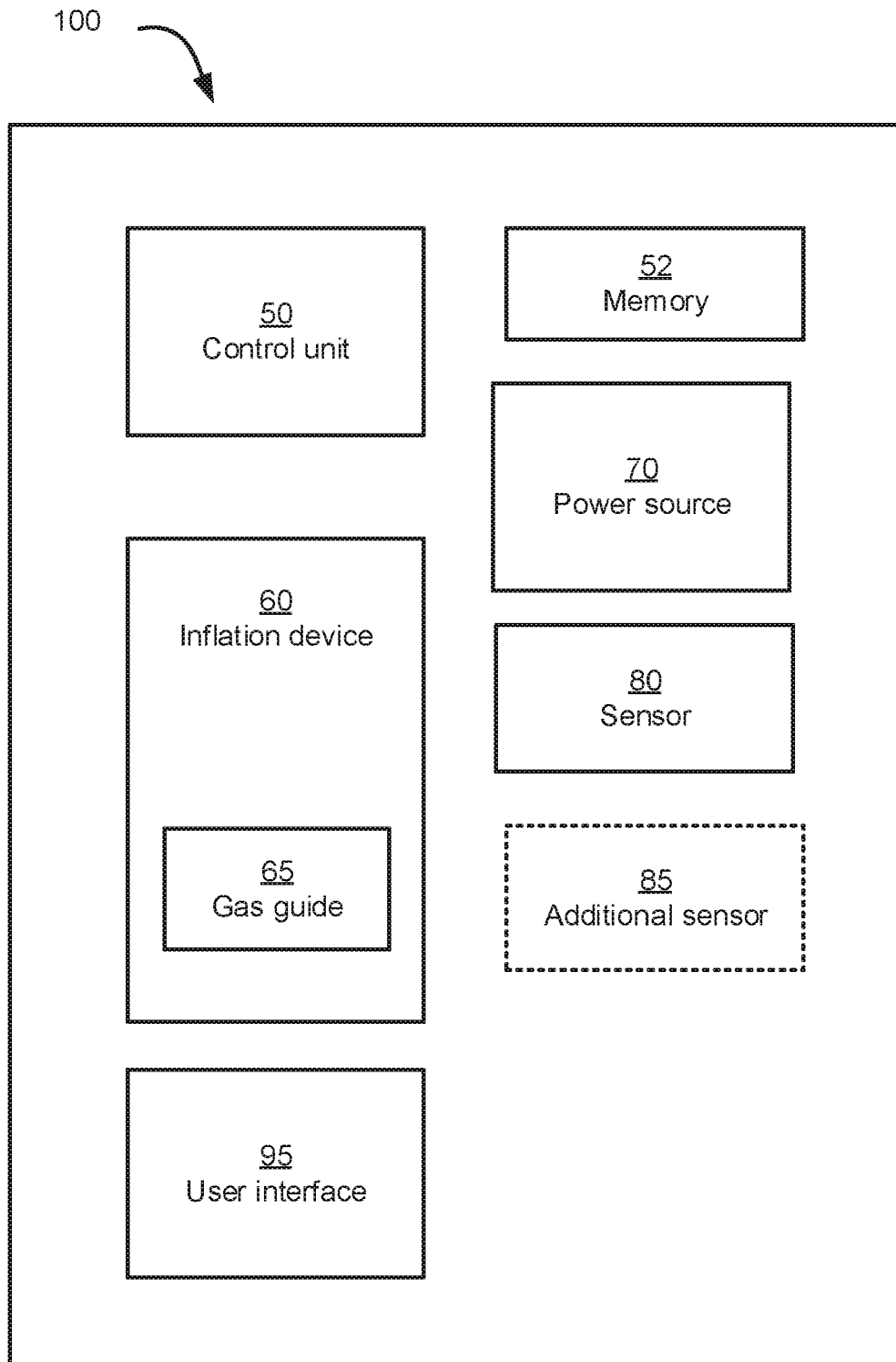


Fig. 2

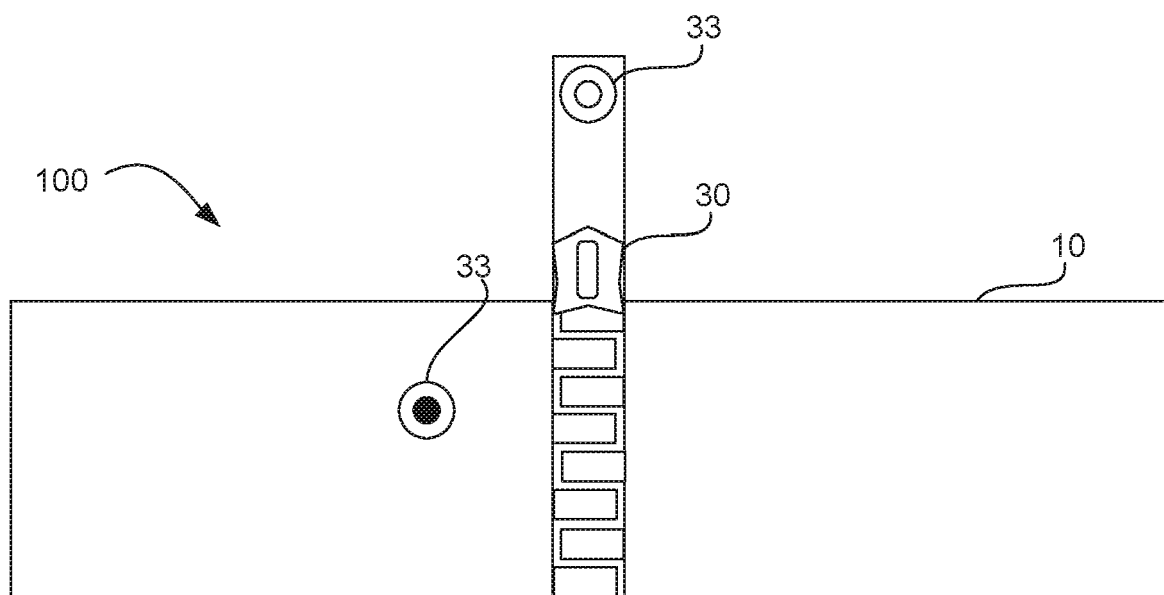


Fig. 3
(Prior Art)

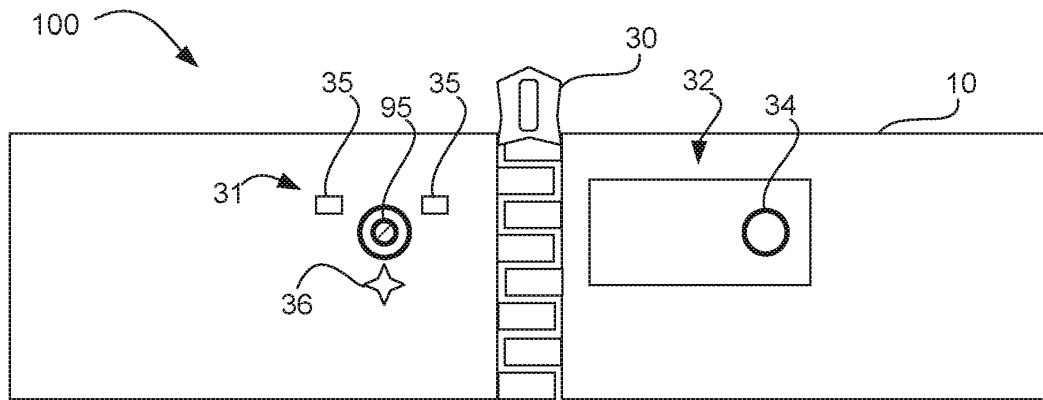


Fig. 4a

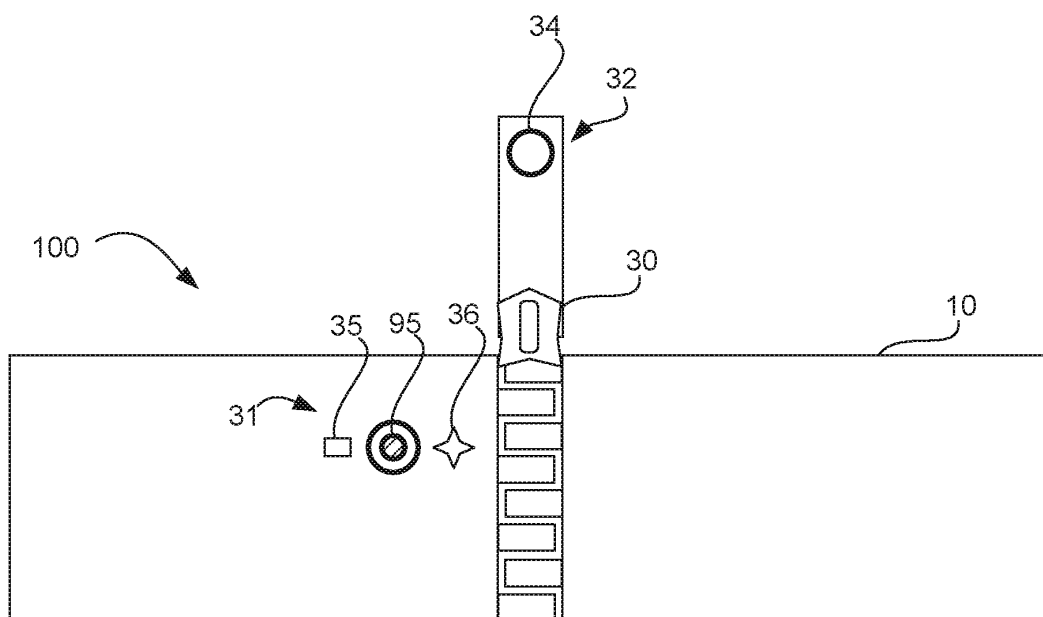


Fig. 4b

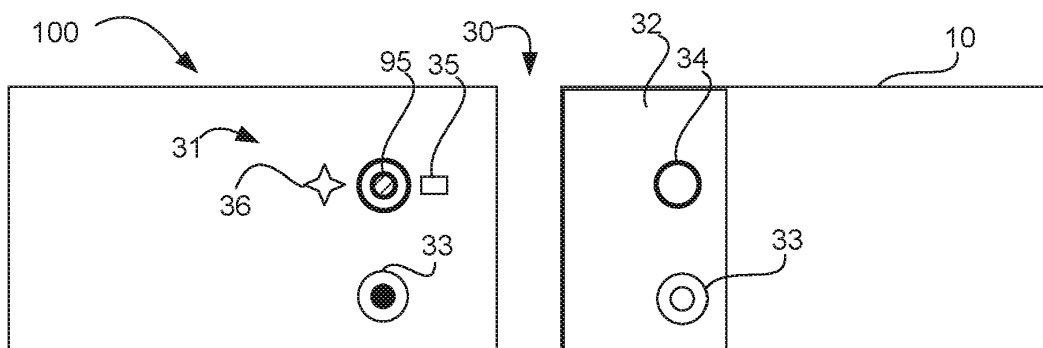
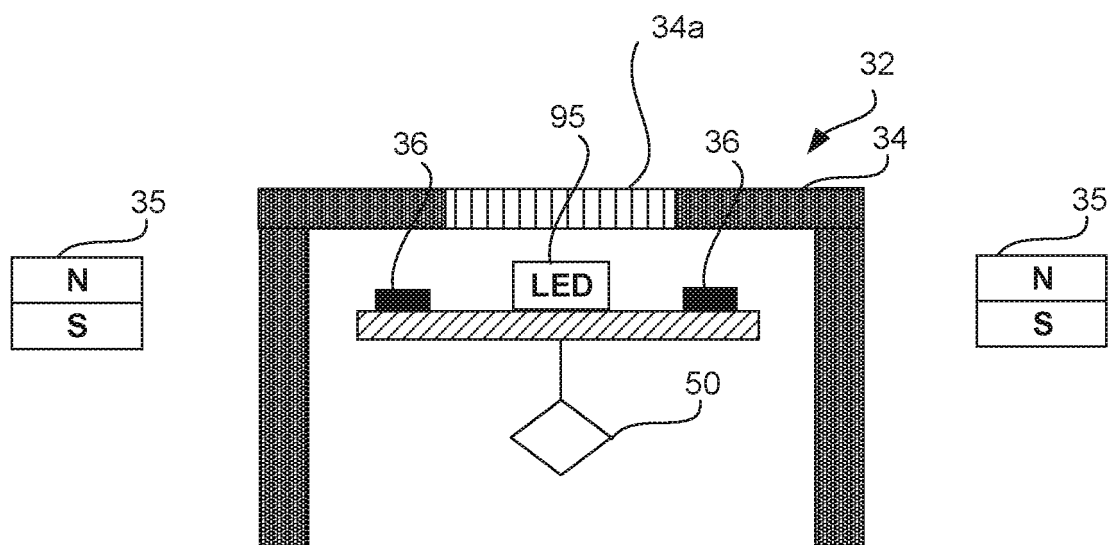
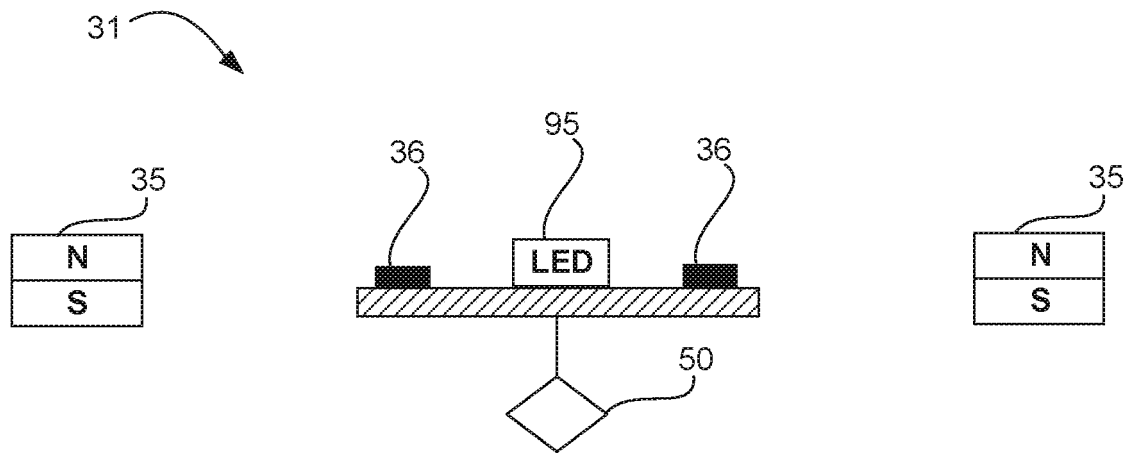
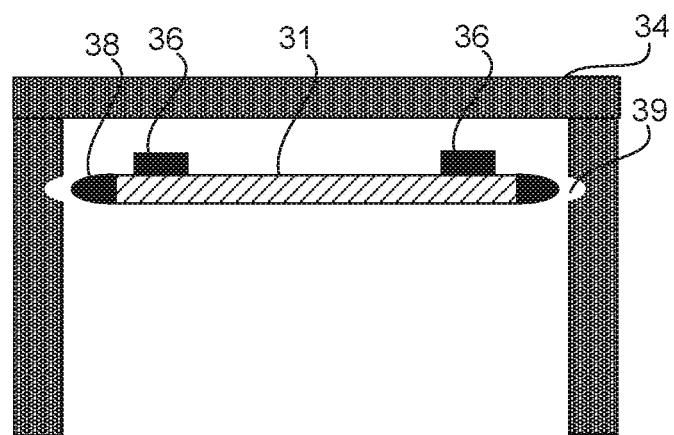
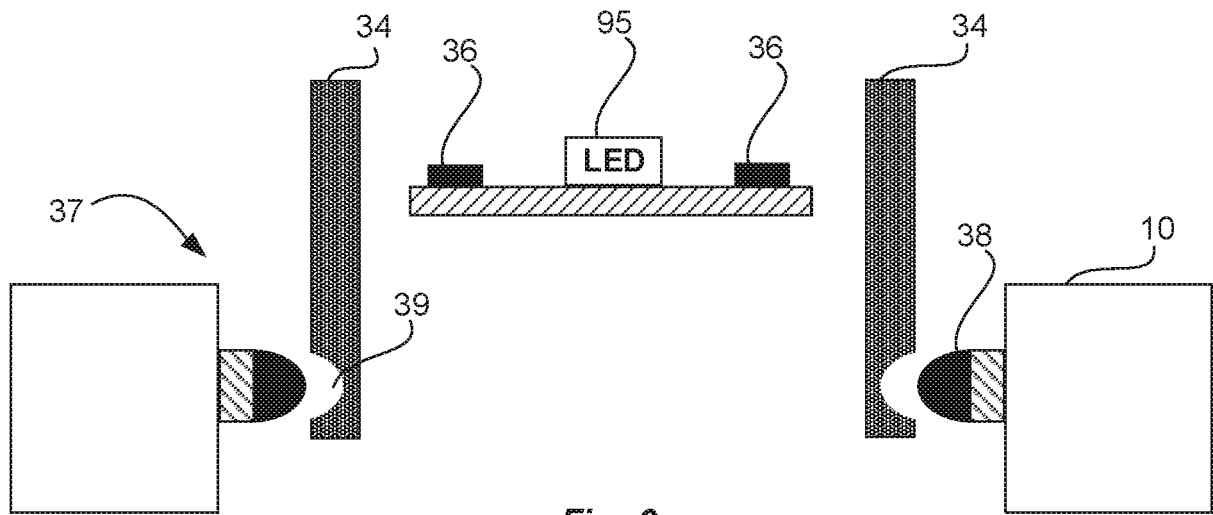


Fig. 4c





REFERENCES CITED IN THE DESCRIPTION

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