(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 239 402 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.11.2017 Bulletin 2017/44

(51) Int Cl.:
E01F 9/669 *(2016.01)*

(21) Application number: **17000428.7**

(22) Date of filing: **16.03.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **23.03.2016 PL 41660616**

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(54) **A LIGHT MARKING ASSEMBLY FOR A TRAFFIC SAFETY BARRIER AND A ROAD TRAFFIC SAFETY BARRIER WITH SUCH LIGHT MARKING ASSEMBLY**

(57) Road light marking assembly for a traffic safety barrier, having a light subassembly (6) housed in a cavity (2) of a shaped guardrail (1) of a barrier (4), provided with at least one LED, and having a power supply subassembly (7) comprising a photovoltaic element and an electric energy accumulating element, electrically coupled with a control module. Said light subassembly (6) is positioned within a first casing, and said power supply subassembly (7) is positioned within a second casing, where said first casing and said second casing are separate and are spaced apart so as to enable arranging said light subassembly (6) at the side of said shaped guardrail (1) of said traffic safety barrier (4) facing the road, and arranging said power supply subassembly (7) at the opposite side of said shaped guardrail (1) of said traffic safety barrier (4), where said first casing is provided with fastening means in a through hole (3) or in close proximity of a through hole (3), where said through hole (3) is positioned within the region of said cavity (2) of said shaped guardrail (1) of said traffic safety barrier (4), and said second casing is provided with fastening means to said traffic safety barrier (4) at the opposite side of said shaped guardrail (1) of said traffic safety barrier (4), where said light subassembly (6) and said power supply subassembly (7) are releasingly connected to each other by means of a flexible conductor (8) to be guided through said through hole (3) arranged within the region of said cavity (2) of said shaped guardrail (1) of said traffic safety barrier (4).

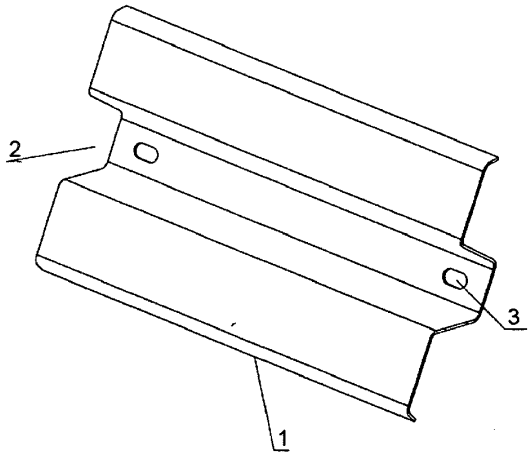

fig.1a

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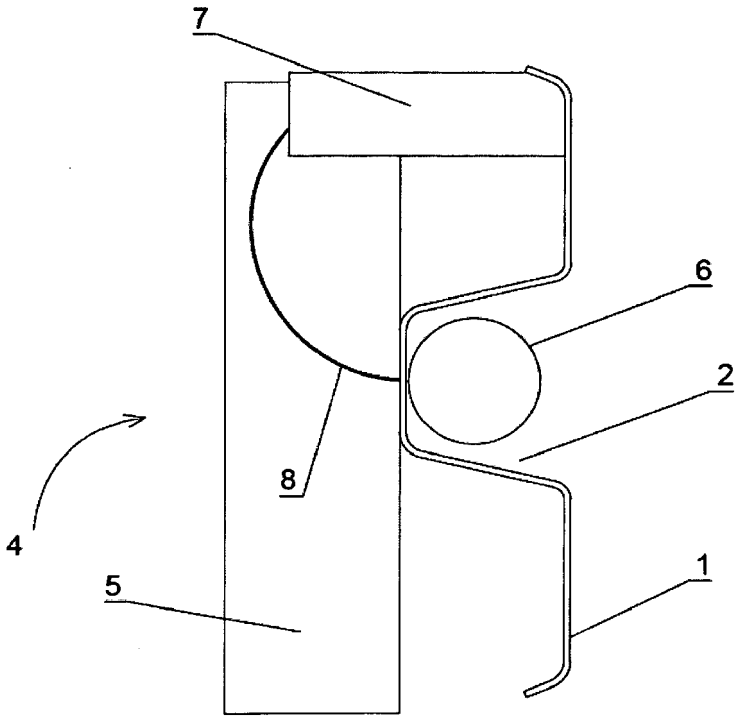

fig.2

Description

[0001] The invention provides a light marking assembly for a traffic safety barrier, comprising a light subassembly housed within a cavity of the shaped barrier guardrail, provided with at least one LED, and comprising a power supply subassembly comprising a photovoltaic element and an electric energy accumulating element, electrically coupled with a control module, and it also provides a method for installation and maintenance of a light marking assembly.

[0002] Traffic safety barriers positioned along roads contribute to enhancing traffic safety and are designed so as to prevent a moving vehicle to leave the road accidentally and unintentionally, in particular a fast moving vehicle, as well as they alleviate consequences of a possible collision. Such barriers are usually positioned along roads with separated lines for opposite directions of traffic (e.g. in motor-highways, expressways, on bridges, flyovers, mountain roads, etc.). The applicable legal regulations recommend providing putting reflective markings within the cavity of the shaped guardrail of a traffic safety barrier, suitably spaced apart, for example on straight segments and arches of a radius R>1500 m spaced at a distance of at most 50 m, and on arches with R<150m at a distance corresponding to 0.1 R, and additionally at the beginning and at the end of the barrier.

[0003] Greater safety of the road traffic is ensured by means of marking barriers with the use of markings provided with light emitting elements that have solar energy-powered photovoltaic cells. Light emitting markings are optionally equipped also with retroreflectors that reflect the light emitted by vehicles and this ensures operation of the road markings even in the case of malfunction of subassemblies responsible for providing electric energy to light emitting elements. As a result of prolonged operation under the road conditions, optical efficiency of retroreflectors also deteriorates due to erosion of reflective surfaces.

[0004] Positioning of a marking within the cavity of a shaped traffic safety barrier does not provide complete protection for the marking against damage caused by a snow plough or other vehicle scraping on the barrier, by a projecting load or as a result of bad weather conditions.

[0005] Patent application FR 2697364 reports a light device positioned along a road and provided with a solar panel that supplies energy, and a light source such as a LED. The device is housed within a casing and it may be attached to a longitudinal segment of the traffic safety barrier at the side where vehicles are moving.

[0006] International application publication WO 2015/059587 indicates that assembling and maintenance of light markings mounted on traffic safety barriers is time-consuming and may be dangerous when work is to be done in proximity of moving vehicles or onerous for vehicle users if a necessity arises to close a road. Moreover, solar systems require frequent maintenance. The invention of WO 2015/059587 discloses a light system comprising a light source powered by a solar panel and a fixing element to attach the device to the barrier. According to that solution, solar panels and lights are housed in one casing which is formed so as to allow fast mounting to the barrier. The device is equipped with fixing means, for example snap fasteners or fast mounting strips and it is formed in conformity with the curvature and dimensions of the barrier. The device comprises a battery and optionally may be equipped with a retroreflector.

[0007] International application publication WO 2011/050511 discloses a light road marking comprising a casing formed in conformity with the shape of the respective traffic safety barrier and equipped with a photovoltaic panel and at least one light source on the outer surface of the casing. Inside the casing there is an electric energy accumulating element and a control assembly on a printed circuit board. The electric energy accumulating element may be a battery or a capacitor. The light source may be a LED. The marking may be equipped with a reflective element.

[0008] It is the object of this invention to provide a light marking assembly for a traffic safety barrier and a method for installation and maintenance of a light marking assembly.

[0009] A light marking assembly for a safety road barrier, comprising a light subassembly housed in a cavity of a shaped guardrail of the traffic safety barrier, provided with at least one LED, and having a power supply subassembly comprising a photovoltaic element and an electric energy accumulating element, electrically coupled with a control module, according to the invention, is characterized in that the light subassembly is positioned within a first casing and the power supply subassembly is positioned within a second casing, where the first and second casings are separated and are so spaced apart to enable positioning of the light subassembly at the side of the shaped guardrail of the traffic safety barrier facing the road, and positioning of the power supply subassembly at the opposite side of the shaped guardrail of the traffic safety barrier, where the first casing is provided with fastening means in a through hole or directly adjacent such through hole, said through hole being localized within a cavity region of the shaped guardrail of the traffic safety barrier, and the second housing is provided with fastening means for fixing to the traffic safety barrier at the opposite side of the shaped guardrail of the traffic safety barrier, and the light and power supply subassemblies are releasingly mutually electrically connected via a flexible conductor to be guided through the mentioned through hole positioned within the cavity region of the shaped guardrail of the traffic safety barrier. Preferably, in the course of the flexible conductor there is an electric connection, substantially watertight and capable to effect at least several electric disconnecting/connecting cycles of the releasable flexible conductor. In particular, the fastening means for fastening the first casing in the through hole comprise a bracket provided with a mechanical fas-

tener to be guided via the through hole. Alternatively, the fastening means of the first casing directly adjacent the through hole comprise a bracket provided with adhesive elements selected from the group comprising magnetic fasteners, binder-based fasteners, mechanical adherence fasteners and combinations thereof.

[0010] Preferably, the first casing has bilaterally positioned flattened lamp shields, transparent for visible light, under which at least one LED is provided, where the flattened lamp shields contact a substantially nontransparent body of the first casing, to which body a bracket is connected where the bracket has a sufficient length to reach the shaped guardrail of a traffic safety barrier. The first casing has, preferably, bilaterally positioned retroreflector elements.

[0011] Preferably, the bracket is made of a elastic-flexible material.

[0012] Preferably, in the first casing said bilaterally positioned flattened lamp shields rest in planes that are approximately parallel or mutually inclined at an angle of 0.1-45°.

[0013] Preferably, the second casing that houses the power supply subassembly comprising a photovoltaic element and an electric energy accumulating element, also comprises a control module. In particular, the second casing has a substantially flat upper part in which a visible light-transparent cover is seated, to which from below the photovoltaic element is adjacent and has a substantially non transparent body housing the electric energy accumulating element and the control module arranged in a printed circuit board, where the body has at least one outer shaped surface to adjoin the shaped guardrail or post of the traffic safety barrier as well as fastening means for fixing the adjoining location of the second casing of the shaped guardrail or post of the traffic safety barrier, and it has an externally seated electrical output compatible to the releasable connector. Within the body, in particular, a chamber is defined which is limited by vertical partitions, where the chamber is filled with a sealing compound to cover the energy accumulating element and the control module set on the printed circuit board. Fastening means for fixing the location of adhesion of the second casing to the shaped guardrail or post of a traffic safety barrier are selected from the group comprising mechanical fasteners, permanent magnets, curable binders and combinations thereof.

[0014] Preferably, flattened lamp shields of the first casing and the transparent cover of the second casing are made of a material selected from the group comprising polymethacrylate, polycarbonate, siloxane-modified polycarbonate copolymer, polyester-modified polycarbonate copolymer, and the bodies of the first and second casings are made of thermoplastic organic plastics and/or glass fiber-reinforced organic plastics.

[0015] Preferably, the flattened lamp shield of the first casing is integrally formed with a retroreflector element at the inner side of the flattened lamp shield, and the flattened lamp shield has a centrally positioned window to accommodate at least one LED so that the retroreflector element surrounds at least one LED.

[0016] Preferably, in the power supply subassembly the electric energy accumulating element to energize LEDs is a supercapacitor of a capacitance of at least 100 F.

[0017] Road traffic safety barrier according to the invention is characterized in that it is provided with at least one light marking assembly of the road traffic safety barrier, as defined above. Preferably, in the road traffic safety barrier, the photovoltaic element is positioned approximately in a horizontal plane with a deviation from this plane not greater than $\pm 5°$.

[0018] A method for installation of a light marking assembly for a road traffic safety barrier, which marking assembly has a light subassembly with at least one LED, and has a power supply subassembly comprising a photovoltaic element and an electric energy accumulating element, electrically coupled with a control module, and the traffic safety barrier has at least a shaped guardrail supported on posts, which shaped guardrail has a cavity and through holes typically arranged within the region of the cavity, in accordance with the invention is characterized by: (a) use of a light subassembly positioned within a first casing provided with fastening means in the through hole or in close proximity of the through hole, and use of a power supply subassembly positioned within a second casing provided with fixing means for fixing to a traffic safety barrier, which first casing and second casing are separate but they are equipped with means for electric connection comprising a flexible conductor with a releasable connector extending from the first casing and a compatible electrical output from the second casing; (b) seating the first casing at the side of a traffic safety barrier facing the road, in a cavity of a shaped guardrail in close proximity of the through hole, guiding the flexible conductor with the releasable connector through the through hole and installing the fastening means in the through hole or in close proximity of the through hole of a traffic safety barrier; (c) positioning the second casing at a distance from the first casing, at the side of the traffic safety barrier which is opposite to the road, at a place limited by the range of length of the flexible conductor of the electrical connection, and determining the position of the second casing when installing fastening means to the shaped guardrail or the post of a traffic safety barrier, and connecting electrically the first casing with the second casing by coupling releasable connector extending from the first casing with the compatible electrical output from the second casing. Optionally, if in step (a) the light marking assembly is provided along with the first and second casings electrically connected, before step (b) the releasable connector of the first casing is retracted from the electrical output of the second casing. Preferably, the fastening means of the first casing in the through hole comprise a bracket provided with a mechanical coupling element to be guided through the through hole. Optionally, the fastening means of the first casing in close

proximity of the through hole comprise a bracket provided with adhesion means selected from the group comprising magnetic engagement means, binder-based engagement means, mechanical engagement means and combinations thereof. The second casing is fixed to the shaped guardrail or the post of the traffic safety barrier, and as the fastening means of the second casing to the traffic safety barrier means are used the latter being selected from the group comprising mechanical couplings, permanent magnets, curable binders. Preferably, the second casing is used which apart from the power supply subassembly comprising a photovoltaic element and an electric energy accumulating element, also accommodates a control module. In particular, the second casing is positioned on the shaped guardrail or on a post of the traffic safety barrier so as to position the photovoltaic element approximately in a horizontal plane with a deviation from the plane which is not larger than $\pm 5°$.

[0019] A method for maintenance of a light marking of a road traffic safety barrier equipped with at least one light marking assembly of a road traffic safety barrier, as defined above, in accordance with the invention is characterized in that in the case of electrical failure or mechanical defect of the light marking assembly the following steps are executed: retracting a releasable connector of a first casing electrically from electrical output of a second casing, performing maintenance operation to restore operation of a subassembly selected from the group comprising a light subassembly and a power supply subassembly, coupling a releasable connector extending from the first casing to a compatible electrical output of the second casing. In the case of electrical failure or mechanical defect of the light subassembly, maintenance operation comprises steps in which the fastening means of the first casing are dismounted, the flexible conductor with electric connector is retracted from the through hole in the shaped guardrail of the traffic safety barrier and the first casing is removed, then a new first casing with an operable light subassembly is seated, where the new first casing has a flexible conductor with electric connector compatible with the electrical output of the second casing within the cavity of the shaped guardrail of the traffic safety barrier, at a location of fixing of the remover light subassembly, the flexible conductor with the electric connector is guided through the through hole in the shaped guardrail and the fixing means of the first casing are installed in the through hole or in close proximity to the through hole. Optionally, maintenance operation comprises steps in which: the mechanical or magnetic fastening means of the second housing for fixing it to the shaped guardrail or to a post of the traffic safety barrier are dismounted, and the second casing is removed, a new second casing comprising operable power supply subassembly is positioned on the shaped guardrail or on a post of the traffic safety barrier, at the side opposite to the road, at a location determined by the range of the flexible conductor of the electrical connection, and the position of the second casing is fixed by installing the fastening means to the shaped guardrail or a post of the traffic safety barrier.

[0020] Steel traffic safety barriers are complex construction, designed and implemented in a manner so that a vehicle that trespasses the traffic lane and hits the steel shaped guardrail of the barrier it gets stopped there or directed again to the traffic lane, where the impact energy is absorbed to a significant extend as a result of deformation of the steel construction. All the constructive elements of a traffic safety barrier are hot galvanized with zinc to provide protection against corrosion. In practice, under normal air contamination level, the barrier construction fully maintains its performance properties for at least 20 years provided that during its installation or maintenance the anticorrosion protective coating is not damaged. Minor local defects may be subject to refurbishment by careful applying a zinc coating according to PN-EN 1461.

[0021] With regard to the above, when arranging light markings of a traffic safety barrier, similarly as during installation of the barrier, it is inadmissible to perform works leading to impairing zinc-coated surfaces, in particular making any openings, cutouts or cuts that break zinc coating of the individual elements of the barrier.

[0022] Markings may be thus positioned solely with the use of the existing shaping of a traffic safety barrier. Additional difficulty is caused by the fact that shaped guardrails of the traffic safety barriers are made in at least two shape varieties such as: A-profile (Armco Flex-beam) and B-profile (Bethlehem Safety-Beam).

[0023] The use of the light markings in one casing requires thus preparing varied kinds of markings that fit the shaping used for the shaped guardrail of the traffic safety barrier. Moreover, the photovoltaic panel, if placed along with the markings in one casing, has its active surface always facing the road and inclined towards the road, and this may render effective absorption of solar radiation difficult, in particular under poor sunlight exposure conditions (for example in central- and north-European countries during autumn-winter seasons).

[0024] The solution of the invention contemplates the use of the light marking assembly for a road traffic safety barrier, where the light subassembly provided with at least one LED is positioned in a first casing, and a power supply subassembly comprising a photovoltaic panel and an electric energy accumulating element is positioned in a second casing. The light marking assembly also comprises a control module electrically coupled with the remaining elements of the marking. Preferably, the control module is placed in the second casing. Both casings are separate so that they may be positioned on the traffic safety barrier at a distance from each other, in mutual positions adjusted to the shaping of the traffic safety barrier at a given location. The light and power supply subassemblies are releasingly connected electrically to each other via a flexible conductor.

[0025] Unexpectedly, the solution in accordance to the invention provides several advantages related to the use

of such markings and also related to installation, operation and maintenance, in particular in the case of damage of any of the components of the assembly. Since at the road side solely the first casing with the light subassembly is installed, then solely the light subassembly is prone to mechanical failure as a result of being caught by a snow plough, as a result of load of snow being pushed aside (towards the traffic safety barrier) by a snow plough (in particular wet snow), as a result of being hit by a part of a load projecting from a vehicle or as a result of a vehicle scraping with its side against the shaped guardrail. If a necessity arises to replace the light subassembly, the cost of marking restoring operations is several times less than for replacement of the marking along with its photovoltaic panel. Moreover, independent (with regard to location of the light marking) positioning of the photovoltaic panel on the barrier allows for placing the panel at an optimum position for absorption of solar radiation.

[0026] The invention will be discussed with reference to the appended drawing where figs. 1a and 1b show shaped guardrails for a traffic safety barrier, fig. 2 shows schematically a traffic safety barrier provided with a light marking assembly in accordance to the invention, fig. 3 shows a first casing of the marking assembly of the invention comprising a light subassembly, fig. 4 shows a first casing in an embodiment, in an exploded view, figs. 5a and 5b show another embodiment of the first casing, in side and rear views, respectively, fig. 6 shows schematically a power supply subassembly for a marking assembly of the invention, in a cross-section, figs. 7a and 7b show a practical implementation of a second casing of the power supply subassembly, in side and sectional views, figs. 8a, 8b, 8c show another embodiment of the second casing, in side views, fig. 9 shows another embodiment of a second casing, and fig. 10 shows a cap to the web of a post of a traffic safety barrier, used in an embodiment of the second casing of fig. 9.

[0027] Figs. 1a and 1b show known shaped guardrails of a traffic safety barrier, in two varieties A and B. In each of these varieties the guardrail 1 has a longitudinally extending cavity 2, and in the region of said cavity 2 there are through holes 3, typically intended for fixing reflective marking and/or couplings for support posts, optionally other couplings. Through holes 3 for fixing reflective marking are usually of an oval shape that corresponds to a shape constituted by a rectangle and two semicircles adjoined at two opposite sides of the rectangle.

[0028] Fig. 2 shows schematically a traffic safety barrier 4 having a shaped guardrail 1 supported on a post 5 of the barrier 4, which barrier 4 is equipped with a light marking assembly according to the invention. The mentioned light marking assembly comprises a light subassembly 6 accommodated in a cavity 2 of the shaped guardrail 1 of the traffic safety barrier 4, as well as a power supply subassembly 7 positioned at the other side of the shaped guardrail 1 of the barrier 4 (i.e. at the side opposite to the course of the road). Both the light subassembly 6 and the power supply subassembly 7 are electrically connected *via* a flexible conductor 8 guided through a through hole 3.

[0029] Fig. 3 shows a light subassembly 6 housed in a first casing 9, from which a flexible conductor 8 is extended to connect it electrically to the power supply subassembly 7. The flexible conductor 8 is terminated in a releasable electric connector 10. The first casing 9 is provided with fastening means to fix the first casing 9 in the through hole 3 or in its close proximity. The fastening means comprise preferably a bracket 11 arranged so that it reaches the shaped guardrail 1 within the cavity 2. Furthermore, the bracket 11 is provided with coupling elements or adherence elements to fix the fastening of the bracket 11 to the shaped guardrail 1 of the barrier 4. The coupling elements are intended to be guided through the through hole 3 and locked when seated in the through hole 3, enabling guiding the flexible conductor 8 through the though hole 3. For example, the coupling element is a threaded spindle with a nut for seating the bracket, where the diameter of the spindle and the nut are selected so as not to close completely the clearance of the through hole 3 and leave a void for guiding the flexible conductor 8. In another embodiment the coupling element is a threaded spindle with a nut, internally hollow to provide a through channel along the spindle axis, to accommodate a flexible conductor 8. A solution of this kind may be particularly useful if the light subassembly 6 is to be seated in the opening intended for fastening the shaped guardrail 1 to a post 5 of the barrier 4, or in an opening intended to accommodate the couplings for the barrier 4. In another embodiment, the coupling element is a flattened spindle with a transverse opening in its ending, for guiding a transverse wedge, pin or a clamp to lock retraction of the spindle. In still another embodiment, the coupling element is a spindle that has a longitudinal cut and lateral protrusions at the ending of the spindle, positioned at opposite sides relative to the cutting so as to snap-lock the spindle positioned in the through hole 3. In the two latter solutions the diameter and shape of the spindle are selected so as not to close the clearance of the through hole 3, and to leave space for guiding the flexible conductor 8, or the flexible conductor 8 is guided from the body 13 *via* a channel formed in the spindle. Regardless of the route for guiding out the flexible conductor 8 from the body 13 of the first casing 9, the flexible conductor 8 is provided with a releasable electric connector 10, preferably in a watertight form, arranged on the ending of the mentioned flexible conductor 8.

[0030] The adherence elements are intended for seating the first casing 9 in close proximity of the through hole 3 where the flexible conductor 8 is guided through the through hole 3. The adherence elements are selected from the group comprising magnetic elements such as permanent magnets, binder-based elements such as adhesive compositions-coated surfaces, adhesive tapes, mechanical adherence means, such as hook and loop fasteners and combinations of the mentioned elements.

[0031] The bracket 11 fulfills a function of mechanical

seating of the first casing 9 of the light subassembly 6 on the shaped guardrail 1 and it may be embodied in numerous forms. Preferably, the bracket 11 may be formed of an elastomeric material that shows flexibility-elasticity properties so that, in the case of being caught or scraped by a vehicle, the light subassembly becomes deflected by a force that deforms the bracket, and when the external force ceases, the bracket 11 flexibly regains its original shape and maintains fastening to the first casing 9 of the light subassembly 6 in the original position.

[0032] The first casing 9 has bilaterally arranged flattened lamp shields 12, transparent for visible light, under which at least one LED is arranged. The flattened lamp shields 12 are in close proximity of the body 13 of the first casing 9, and the body 13 is made of a substantially non-transparent material. From the body 13 of the first casing 9 a bracket 11 extends. Leading surfaces of the flattened lamp shields 12 may have a shape of geometric figures selected from the group comprising circle shape, an elliptical shape, a polygonal shape. Preferably, the flattened lamp shields have a circular, triangle, quadrilateral shape. A quadrilateral shape is in particular a shape of an isosceles trapezoid where t bases of which face the interior of the cavity 2 of the shaped guardrail 1 of the traffic safety barrier 4. Flattened lamp shields 12 of the light subassembly 6 are usually arranged in planes perpendicular to the road surface and preferably parallel to each other, in particular when the markings according to the invention are arranged on the shaped guardrail 1 extending along a rectilinear sector of the road, remotely from road forks. Alternatively, on arched sectors, and in particular on sharp curves and/or at the vicinity of road forks, flattened lamp shields 12 are arranged in planes orthogonal to the road surface, but preferably not parallel to each other, for example mutually inclined at an angle of 0.1 to 45°.

[0033] Preferably, the first casing 9 is provided with at least one retroreflector element. More preferably, the retroreflector element is arranged at the inner side of at least one flattened lamp shield 12. Particularly preferably, the flattened lamp shield 12 is formed integrally with the retroreflector element.

[0034] Flattened lamp shield 12 is preferably formed of a transparent organic plastics, for example material selected from the group comprising polymethacrylate, polycarbonate, siloxane-modified polycarbonate copolymer, polyester-modified polycarbonate copolymer.

[0035] Preferably, substantially non-transparent body 13 of the first casing 9 is formed from organic plastics, optionally reinforced with glass fiber. In particular, the body 13 is formed from thermoformed organic plastic.

[0036] Fig. 4 shows in a exploded view a light subassembly 6 in accordance with the invention, in one embodiment. Under flattened lamp shields 12 of an oval shape, formed integrally with retroreflector elements, there are arranged LEDs 14 electrically connected to an electrical output from the first casing in a flexible conductor 8 (not shown). The body 13 of the first casing 9 is composed of two blocks 13.1 and 13.2, between which a bracket arm 11 is fastened. When coupled with the bracket 11, the blocks 13.1 and 13.2 of the body 13 are ultrasound-welded, and then to such coupled body 13 flattened lamp shields 12 are attached by gluing or by ultrasound welding methods. The internal volume of the body 13 may be filled with a sealing compound to protect it against ingress of moisture.

[0037] The bracket 11 is provided with a foot 15 with a recess 16 for introduction of a coupling element and for guiding a flexible conductor 8 to the other side of the shaped guardrail 1 of the barrier 4 (as shown in fig. 2), through the through hole 3.

[0038] The LEDs 14 are diodes with a light distribution angle of $\pm 7.5°$, if a light subassembly 6 is intended for markings for rectilinear road sectors, or a light distribution angle of $\pm 30°$, if a light subassembly 6 is intended for markings for curved road sectors. In the embodiment of fig. 4, flattened lamp shields 12 are arranged in planes substantially parallel to each other, but in the case of markings intended for curved sector or for arranging in road fork regions, flattened lamp shields 12 are inclined to each other, for example at an angle adjusted to the curvature of the road arch. The mutual inclination of the flattened lamp shields 12 is obtained by coupling the body 13 of the first casing 9 from blocks 13.1 and 13.2, at least one of them having a wedge shape when seen from above.

[0039] In the invention it is contemplated that the LEDs 14 are diodes selected from white LEDs and color LEDs, for example emitting orange, red, green or blue light. Preferably, the LEDs 14 are diodes selected from white and red LEDs, optionally also orange LEDs.

[0040] Figs. 5a and 5b show a side and rear view of a light subassembly 6 in accordance with the invention in another embodiment of a first casing 9. Under flattened lamp shields 12 having a shape of an isosceles trapezoid, formed integrally with retroreflector elements (positioned at bottom side of the flattened lamp shields 12), there are LEDs (not shown). From a first casing 9 a bracket 11 extends that is so arranged that it reaches a shaped guardrail 1 within a cavity 2. The bracket 11 has a form of a flattened spindle with a central channel 17 and it has a flange 18 adjoining the body 13 and a transverse opening at the vicinity of the end of the bracket 11, for guiding transversely a pin 19 to lock retracting of the bracket 11. The pin 19 is provided with lateral hook-like protrusions 20 that lock retracting of the pin 19. The central channel 17 within the bracket 11 ensures a passage volume for guiding a flexible conductor 8 ending in an electric connector 10 out of the first casing 9.

[0041] In an alternative embodiment of a body 13 of a first casing 9 (relative to the one of fig. 5a) of the light subassembly 6, a side surface (having a shape of an isosceles trapezoid) of the body 13 of the first casing 9 adjoins flattened lamp shields 12 of a rectangular shape the small sides of which reach the vertical edges of the side surface (corresponding to bases of the isosceles

trapezoid). Adjacent to the flattened lamp shield 12 (for example, above or below the flattened lamp shield 12), on the side surface of the body 13 of the first casing 9, a retroreflector element is arranged. For example, the mentioned surface is externally covered with a reflective film (in a form of a film section of an approximately triangular shape). In this embodiment, a flattened lamp shield 12 is not provided with a retroreflector element underneath.

[0042] In solutions of the light subassembly 6 according to figs. 5a and 5b LEDs are used with a light distribution angle of ±7,5°, if a light subassembly 6 is intended for markings on rectilinear road sectors, or a light distribution angle of ±30°, if a light subassembly 6 is intended for markings for curved road sectors. The flattened lamp shields 12 are arranged in planes substantially parallel to each other, or in an alternative embodiment, flattened lamp shields 12 are inclined to each other. Reciprocal inclination of the flattened lamp shields 12 is obtained by forming the body 13 of the first casing 9 in a wedge-like shape.

[0043] The light subassembly 6 is electrically connected by means of a flexible conductor 8 to a power supply subassembly 7 positioned at the outer side of a shaped guardrail 1 of a traffic safety barrier 4, i.e. at a side opposite the side of the shaped guardrail 1 which faces the road. In order to position the power supply subassembly 7 at the outer side of a shaped guardrail 1 of a traffic safety barrier 4, preferably the power supply subassembly 7 is seated on an upper edge of the shaped guardrail 1, or adjacent to the shaped guardrail 1 in its upper part, or is seated on a post 5 of the traffic safety barrier 4, more preferably at the upper part of the post 5. The power supply subassembly 7, as schematically shown in cross-section in fig. 6, is positioned in a second casing 21 and it has a substantially flat upper part 22 in which a cover 23 transparent for visible light is seated, to which cover 23 a photovoltaic element 24 adjoins from the bottom. Moreover, the second casing 21 has a substantially non-transparent body 25 of the second casing 21 provided with a chamber 26 that accommodates an electric energy accumulating element 27 and a control module 28, preferably set on a printed circuit board. The body 25 of the second casing 21 has at least one outer shaped surface (not show but illustrated in figs. 7 and 8 that show embodiments) to adjoin the shaped guardrail 1 or post 5 of the traffic safety barrier 4 as well as fixing means to fix the adjoining position of the second casing 21 to the shaped guardrail 1 or post 5 of the traffic safety barrier 4.

[0044] At least one outer shaped surface of the second casing 21, which surface is intended to adjoin the shaped guardrail 1 or post 5 of the traffic safety barrier 4, is made suitably to the shape of the position intended for placing the second casing 21 of the power supply subassembly 7. Preferably, the second casing 21 of the power supply subassembly 7 is placed in a manner that a cover 23 transparent for visible light, and thus also the photovoltaic element 24 adjoining the cover 23 from the bottom, are approximately in a horizontal plane, where deviation from this plane does not exceed ±5°. Positioning in a plane which is close to horizontal provides optimum sunlight access, taking into consideration changes in sunlight exposure due to a specific time of day, and therefore optimum sunlight energy absorption by the photovoltaic element 24.

[0045] Conveniently, the second casing 21 of the power supply subassembly 7 is so positioned on the shaped guardrail 1 or post 5 of the traffic safety barrier 4 to provide optimum access for sunlight, for example near the upper edge of the shaped guardrail 1 (as shown in fig. 2), optionally below the edge, adjacent the shaped guardrail 1, or in an upper part of the post 5.

[0046] Fastening means for establishing the position of adjacency of the second casing 21 to the shaped guardrail 1 or post 5 of the traffic safety barrier 4 are selected suitably to the selection of this position and the shape of the shaped guardrail 1 or post 5, within the fixing region of the power supply subassembly 7. Fastening means are selected from the group comprising clamping elements, such as bolt and spring clamps, magnetic elements, such as permanent magnets, binder-based elements, such as adhesive composition-coated surfaces, adhesive tapes, mechanical adherence elements such as hook and loop fasteners or combinations of the mentioned elements.

[0047] Transparent cover 23 is made of a material selected from the group comprising polymethacrylate, polycarbonate, siloxane-modified polycarbonate copolymer, polyester-modified polycarbonate copolymer. If desired, the transparent cover 23 may be made of plastics selected from the above indicated group and showing high mechanical resistance within a broad temperature range, also at temperatures within a range of temperatures below zero as expressed in °C, while maintaining high transparence, in particular from polycarbonate or siloxane-modified polycarbonate copolymer, for example polycarbonate copolymer as disclosed in international publications WO 2011/031846, WO 2014/191973 of patent applications and/or US patent application US 2014/0329920. Preferable material is a siloxane-modified polycarbonate copolymer, for example such as Lexan™ EXL 1434T, available from SABIC Innovative Plastics IP B.V. of Bergen op Zoom, the Netherlands.

[0048] Preferably, a substantially non-transparent body 25 of the second casing 21 is made of organic plastics, optionally reinforced with glass fiber. In particular, the body is made of thermoformed organic plastic.

[0049] The body 25 of the second casing 21 has an electric outlet (not shown, but illustrated in figs. 7 and 8, showing embodiments) to be coupled with a connector 10 of a flexible conductor 8 extending from the body 13 of the first casing 9. In one embodiment, the body 25 of the second casing 21 has a flexible electric outlet terminated with a socket compatible for coupling with the connector 10 of the flexible conductor 8. Alternatively, more preferably, the body 25 of the second casing 21 is provided with an electric outlet in a form of a socket embed-

ded in the body 25 of the second casing 21, which electric socket is compatible with the connector 10 so that electric coupling of the light subassembly 6 with the power supply subassembly 7 with the use of flexible conductor 8 with the connector 10, consists on inserting the connector 10 into the socket in the body 25 of the second casing 21.

[0050] Preferably, in the power supply unit 7 the electric energy accumulating element 27 and energizing LEDs element is a supercapacitor of a capacitance of at least 100 F.

[0051] Preferably, in the power supply subassembly 7 the photovoltaic element is YH193x36, with maximum voltage of 3 V and maximum input current of 300 mA.

[0052] Fig. 7a show a second casing 21 in a side view, in an embodiment of a power supply subassembly 7 according to the invention. A body 25 of the second casing 21 is provided with at least one outer shaped surface 29 to be adjacent to a shaped guardrail 1 of a traffic safety barrier 4. The shaped surface 29 is made so that the body 25 of the second casing 21 is seated on an upper edge of the shaped guardrail 1 of the traffic safety barrier 4. Fastening means provided for determining the position of adjacency of the second casing 21 to the shaped guardrail 1 of the traffic safety barrier 4 are mechanical clamping means. Specifically, the body 25 has a projection 30, extending laterally, which projection 30 has an elongated recess 31 adjusted to be slid over the upper edge of the shaped guardrail 1 so that the edge of the shaped guardrail 1 is accommodated within the internal volume of the mentioned recess 31. The body 25 of the second casing 21 is provided with bolt clamps 32 that clamps the shaped surface 29 of the recess 31 to the shaped guardrail 1. Preferably, the shaped surface 29 of the recess 31 (arranged to interact with the shaped guardrail 1) is made so as to provide effective adherence between the shaped surface 29 of the recess 31 and the outer surface of the shaped guardrail 1. For example, the shaped surface 29 is corrugated, or it is covered with a layer of material that enhances adherence, for example a rubber-like plastics layer.

[0053] The body 25 of the second casing 21 (of the power supply subassembly 7) has an electric outlet 33 in a form of a socket for inserting an electric connector 10 with a flexible conductor 8 extending from the first casing 9 of the light subassembly 6.

[0054] Fig. 7b shows an embodiment of a second casing 21 and a power supply subassembly 7, in a cross-section along plane B-B shown in fig. 7a. A second casing 21 has a substantially non-transparent body 25 of the second casing 21, covered from above with a substantially flat cover 23 transparent for visible light. From below to the cover 23 a photovoltaic element 24 is adjoined. An upper part of the second casing 21, including the flat cover 23, is considerably elongated and along substantially its entire length is provided laterally with a protrusion 30 (shown in fig. 7a). In a downwardly tapering part of the body 25 of the second casing 21, below the photovoltaic element 24, a chamber 26 is defined, bounded vertical partitions 34. In the chamber 26 an electric energy accumulating element 27 is arranged (capacitor of a capacitance of at least 100 F, for example 200 F or 350 F), as well as a control module 28 set on a printed circuit board. The internal volume of the chamber 26 is filled with a sealing compound 35 that fills the chamber 26 so as to cover the electric energy accumulating element 27, the printed circuit board of the control module 28 and electric contacts. From the internal volume of the chamber 26 filled with the sealing compound 35 only electric connections for the photovoltaic element 24 are guided, and electric connections (*via* a sealed passage recess in the partition 34) to the external electric outlet 33, being a socket arranged in a side wall of the body 25 of the second casing 21.

[0055] The body 25 of the second casing 21, in particular the part of the body 25 which is exposed on the surface of the shaped guardrail 1 and spaced apart from the surface, preferably has at least rounded external surface, and more preferably corresponds to a solid of an oval shape so as to reduce effects of atmospheric factors on the second casing, in particular to reduce the wind pressure and protect the second casing 21 (and thereby also the power supply subassembly 7) against unwanted movement or even breaking away from the second casing 21 of the power supply subassembly 7 from the shaped guardrail 1 of the traffic safety barrier 4.

[0056] Figs. 8a, 8b, 8c show a second casing 21 in side views, in another embodiment of the power supply subassembly 7 according to the invention. Body 25 of a second casing 21 is provided with at least one outer shaped surface 29 (shown in fig. 8c) to adjoin a shaped guardrail 1 of a traffic safety barrier 4. The shaped surface 29 is made in a manner so that the body 25 of the second casing 21 may be seated on a vertical segment of an upper part (above a cavity 2, at the side opposite to the cavity 2) of the shaped guardrail 1 of the traffic safety barrier 4. Fastening means intended for fixing the position of adjacency of the second casing 21 to the shaped guardrail 1 of the traffic safety barrier 4 are means selected from a group comprising magnetic coupling means, binder-based coupling means and mechanical adherence means. Moreover, the body 25 of the second casing 21 of the power supply subassembly 7 is provided with a passage recess 36, by means of which the body 25 of the second casing 21 may be fastened to the shaped guardrail 1 of the traffic safety barrier 4, or to a post 5 of the traffic safety barrier 4, by means of mechanical coupling means, for example threaded bolts, rivets, etc.

[0057] In the solution of the second casing 21 in this embodiment of the power supply subassembly 7, external electric outlet 33 has a form of a short section of a flexible conductor terminated with a socket compatible with a connector 10.

[0058] Fig. 9 shows a second casing 21 of a power supply subassembly 7 in a side view, in another embodiment of the invention. The solution of fig. 9 provides a second casing 21 of a type as shown in fig. 8a, but with

a shaped surface 29 made especially so as to seat the second casing 21 of the power supply subassembly 7 on a post 5 of a traffic safety barrier, by positioning the body 25 of the second casing 21 from above onto a web of the post 5. More specifically, the body 25 at its bottom side gas a protrusion 30, with an elongated recess 31 suitable for sliding over the web of the post 5 so that the web of the post 5 is accommodated within the internal volume of the mentioned recess 31. The body 25 of the second casing 21 is equipped with bolt clamps 32 to press the shaped surface 29 of the recess 31 to the post 5. Preferably, the shaped surface 29 of the recess 31 (i.e. the surface arranged for interaction with the post 5) is made so as to ensure effective adherence between the shaped surface 29 of the recess 31 and the outer surface of the post 5, for example it is corrugated or is covered with a layer of material that enhances adherence, for example a layer of a rubber-like plastics.

[0059] The solution according to fig. 9 may be provided in a form of a second casing 21 having a body 25 the bottom part of which is specifically arranged for interaction with a post 5, or it may be provided in a form that grasps the second casing 21 having a body 25 in the embodiment of fig. 8a, as well as grasping an attachment 37 (shown in fig. 10) to be fixed to the body 25 directly before mounting of the marking assembly according to the invention on a traffic safety barrier 4.

[0060] Installation of a light marking assembly according to the invention on a traffic safety barrier 4 is easy and allows for performing of at least a part of the installation operations outside the road area, and thus it does not require any holdup or limitation of traffic on the road. If necessary (i.e. if the light marking assembly is provided in a form of electrically connected light 6 and power supply 7 subassemblies), before installation electric connector 10 is with drawn from electric outlet 33 of the second casing 21. Electrically disconnected first casing 9 (encompassing the light subassembly 6) is seated at the side of a traffic safety barrier 4 facing the road, within a cavity 2 of the shaped guardrail 1 of the barrier 4 with the use of a through hole 3 which is a standard equipment of any shaped guardrail 1 of a traffic safety barrier 4. Installation consists on guiding a flexible conductor along with an electric connector 10 through the through hole 3 in a shaped guardrail 1 of a traffic safety barrier 4 and fixing of fastening means within the through hole 3, such as a bracket 11 provided with a mechanical coupling element guided through the hole, or fixing means in close proximity of the through hole 3, such as the bracket 11 with the use of coupling means selected from a group comprising magnetic coupling means, binder-based coupling means and mechanical adherence means. In turn, a second casing 21 (encompassing the power supply subassembly 7) is positioned remotely from the first casing 9, at the opposite side (i.e. the side opposite to the one facing the road) of the shaped guardrail 1 of the traffic safety barrier 4. With the use of the flexible conductor 8 pre-guided through the through hole 3, and terminated in a releasable electric connector 10, the second casing 9 is connected to the first casing 21 when coupling the electric connector 10 with an electric outlet 33 of the second casing 21. Positioning of the second casing 21 (on the shaped guardrail 1 or post 5 of the traffic safety barrier 4 at the side opposite to the road) is fixed by mounting the second casing 21 with the use of fastening means to the shaped guardrail 1 or post 5 of the barrier 4. Independent fixing of the second casing 21 of the power supply subassembly 7 in selected fixing positions with the use of varied fixing means ensures obtaining of a positioning of the second casing 21 of the power supply subassembly 7 that takes account of the level of sunlight exposure available at a given location and within a geographic zone, and thereby obtaining enhancement of operative effectiveness of the photovoltaic element 24.

[0061] The solution of a light marking assembly according to the invention is configured in a manner so as to ensure service life lengthening of a marking assembly for a barrier. A light subassembly 6 comprising at least one LED 14 and possibly a retroreflector element, is mostly prone to mechanical damage, but it may be seated on a flexible bracket 11 to reduce a possibility of mechanical damage to the light subassembly 6. In the case of damage of the light subassembly 6, the repair cost for a light marking assembly according to the invention is minimized since it covers solely replacement of the light subassembly 6, and such cost constitutes a small fraction of the entire marking assembly and usually corresponds to 10-20% of the value of the entire light marking assembly. In turn, the power supply subassembly 7, constituting 80-90% of the value of the en tire marking assembly, is protected against mechanical damage since it is positioned at the opposite side of the shaped guardrail 1 (for example at the edge of the shaped guardrail 1) or on a post 5 of a traffic safety barrier 4. Moreover, a power supply subassembly 7 embodied according to the invention ensures unattended operations for several years, and any possible replacement is effected at the outer side of the shaped guardrail 1 of a traffic safety barrier 4, and therefore the servicing technician does not have to be present within the road area which directly enhances safety of maintenance and servicing of the marking.

[0062] Conveniently, in the invention it is contemplated that in the case of electric failure or mechanical damage of the light marking assembly in accordance with the invention, seated on a traffic safety barrier 4, the releasable electric connector 10 of the first casing 9 is withdrawn from the electric outlet 33 of the second casing 21, a maintenance operation is carried out to restore operation of the assembly, and the releasable electric connector 10 of the first casing 9 is coupled with the compatible electric outlet 33 of the second casing 21. Maintenance operation (in the case of an electric failure or mechanical damage of the light subassembly 6) comprises steps in which fixing means of the first casing 9 are dismounted, the flexible conductor 8 with the electric connector 10 is withdrawn from the through hole 3 in the shaped guardrail

1 of the traffic safety barrier 4 and the first casing 9 is removed, and then the first casing 9 comprising an operable light subassembly 6 is seated, with a flexible conductor 8 with the electric connector 10 compatible with the electric outlet 33 of the second casing 21, within the cavity 2 of the shaped guardrail 1 of the traffic safety barrier 4, at the position of earlier fixing of the light subassembly, guiding the flexible conductor 8 with the electric connector 10 through the through hole 3 in the shaped guardrail 1 and the fastening means of the first casing 9 are installed in the through hole 3 or in close proximity of the through hole 3.

[0063] Fastening means of the first casing 9 comprise preferably a bracket 11 so arranged that it reaches the shaped guardrail 1 within the cavity 2. The bracket 11 is equipped with coupling elements or adherence elements, for fixing the fastening of the bracket 11 to the shaped guardrail 1 of the barrier 4. The coupling elements are intended to be guided through the through hole 3 with locking the insertion into the through hole 3, while enabling guiding the flexible conductor 8 through the through hole 3. For example, the coupling element is a threaded spindle with a nut for seating the bracket, where the diameters of the spindle and nut are selected so as not to close entirely the clearance of the through hole 3, to leave a void for guiding the flexible conductor 8. In another embodiment, the coupling element is a threaded spindle with a nut, which is hollow and provided with a cylindrical through channel along the axis of the spindle for accommodating the flexible conductor 8. Solution of this kind may be especially useful if the light subassembly 6 is to be seated in a hole intended for fastening of the shaped guardrail 1 to the post 5 of the barrier 4, or in a hole intended for accommodating couplings for the barrier 4. In another embodiment, the coupling element is a flattened spindle with an end with a transverse opening for guiding a lateral wedge, pin or clamp to lock retraction of the spindle. In still another embodiment, the coupling element is a spindle with a longitudinal cut, with lateral projections at the end of the spindle arranged at opposite sides relative to the cut for snap-locking the spindle when it is inserted into the through hole 3. In the two latter solutions the diameter of the spindle is selected to as not to close the clearance of the through hole 3, and to leave space for guiding the flexible conductor 8, or the flexible conductor 8 is led out from the body in a channel made in the spindle. Regardless of the way for leading our the flexible conductor 8 from the body 13 of the first casing 9, flexible conductor 8 is provided with a releasable electric connector 10, seated on the end of the mentioned flexible conductor 8.

[0064] The adherence elements are intended for fixing of the first casing 9 in close proximity of the through hole 3 while guiding the flexible conductor 8 through the through hole 3. The adherence elements are selected from the group comprising magnetic elements such as permanent magnets, binder-based elements, such as adhesive composition-coated surfaces, adhesive tapes, mechanical adherence means such as hook and loop fasteners or combinations of the mentioned elements.

[0065] Alternatively, a maintenance operation (in the case of failure of the power supply subassembly 7) comprises steps in which mechanical or magnetic fastening means of the second casing 21 to the shaped guardrail 1 or post 5 of a traffic safety barrier 1 are dismounted and the second casing 21 is removed, and then the second housing 21 comprising an operable power supply subassembly 7 is placed on the shaped guardrail 1 or post 5 of the traffic safety barrier 4, at the side opposite to the road, in a position determined by the reach of the flexible conductor 8 of the electric connection, and the position of the second casing 21 is determined by installing fastening means to the shaped guardrail 1 or post 5 of the traffic safety barrier 4.

[0066] Fastening means for fixing the position of adjacency of the second casing 21 to the shaped guardrail 1 or post 5 of the traffic safety barrier 4 are selected suitably to the selection of this position and to the shape of the shaped guardrail 1 or post 5, within the fixing region of the power supply subassembly 7. Fastening means are selected from the group comprising clamping elements, such as bolt and spring clamps, magnetic elements such as permanent magnets, binder-based elements, such as adhesive composition-coated surfaces, adhesive tapes, mechanical adherence elements such as hook and loop fasteners or combinations of the mentioned elements.

Claims

1. A light marking assembly for a road traffic safety barrier, having a light subassembly housed within a cavity of the shaped guardrail of the barrier, provided with at least one LED, and having a power supply subassembly comprising a photovoltaic element and an electric energy accumulating element, electrically coupled with a control module, **characterized in that** the light subassembly (6) is positioned within a first casing (9) and the power supply subassembly (7) is positioned within a second casing (21), which first (9) and second (21) casings are separate and are spaced apart so as to place said light subassembly (6) at the side of said shaped guardrail (1) of said traffic safety barrier (4) facing the road, and to place said power supply subassembly (7) at the opposite side of said shaped guardrail (1) of said traffic safety barrier (4), where said first casing (9) is provided with fastening means in a through hole (3) or in close proximity of a through hole (3), which through hole (3) is arranged within the region of a cavity (2) of said shaped guardrail (1) of said traffic safety barrier (4), and said second casing (21) is provided with fastening means to said traffic safety barrier (4) at the opposite side of said shaped guardrail (1) of said traffic safety barrier (4), where said light subassembly (6) and said power supply subassembly (7) are releas-

ingly coupled with each other with a flexible conductor (8) to be guided through said through hole (3) arranged within the area of said cavity (2) of said shaped guardrail (1) of said traffic safety barrier (4).

2. A light marking assembly for a road traffic safety barrier according to claim 1, **characterized in that** in the course of the flexible conductor (8) there is an electric connector (10), substantially watertight, arranged for at least several connection/disconnection cycles of said releasable connector flexible conductor (8).

3. A light marking assembly for a road traffic safety barrier according to claims 1 or 2, **characterized in that** fastening means of said first casing (9) in said through hole (3) or in close proximity of said through hole (3), comprise a bracket (11) provided with a coupling mechanical element to be guided through said through hole (3), or a bracket (11) provided with adherence elements for coupling said bracket (11) with the surface of said cavity (2) of said shaped guardrail (1) in close proximity of said through hole (3), which adherence elements are selected from the group comprising magnetic coupling means, binder-based coupling means, mechanical adherence means or combinations thereof.

4. A light marking assembly for a road traffic safety barrier according to claims 1, or 2, or 3, **characterized in that** said first casing (9) has bilaterally arranged flattened lamp shields (12), transparent for visible light, under which at least one LED (14) is provided, and which flattened lamp shields (12) adjoin a substantially non-transparent body (13) of said first casing (9), and to said body (13) said bracket (11) is connected, the latter being of a sufficient length so as to reach said shaped guardrail (1) of said traffic safety barrier (4).

5. A light marking assembly for a road traffic safety barrier according to claims 1-4, **characterized in that** the said first casing (9) has bilaterally arranged retroreflector elements.

6. A light marking assembly for a road traffic safety barrier according to claims 2-5, **characterized in that** said bracket (11) is made of an elastic-flexible material.

7. A light marking assembly for a road traffic safety barrier according to claims 4-6, **characterized in that** in said first casing (9) said bilaterally arranged flattened lamp shields (12) lay in planes approximately parallel to each other or inclined to each other at an angle of 0.1-45°.

8. A light marking assembly for a road traffic safety barrier according to claim 1, **characterized in that** said second casing (21) that houses said power supply subassembly (7) comprising said photovoltaic element (24) and said electric energy accumulating element (27), also comprises a control module (28).

9. A light marking assembly for a road traffic safety barrier according to claim 8, **characterized in that** said second casing (21) has a substantially flat upper part (22) in which a cover (23) is seated, the latter being transparent for visible light and to which from the bottom said photovoltaic element (19) adjoins, and which has a substantially non-transparent body (25) that accommodates said electric energy accumulating element (27) and said control module (28) set on a printed circuit board, where said body (25) has at least one outer shaped surface (29) to adjoin said shaped guardrail (1) or post (5) of said traffic safety barrier (4) as well as coupling means for fixing the position of adjacency of said second casing (21) to said shaped guardrail (1) or post (5) of said traffic safety barrier (4), and it has an embedded external electric outlet (33) compatible with said releasable connector (10).

10. A light marking assembly for a road traffic safety barrier according to claims 8 or 9, **characterized in that** within said body (25) a chamber (26) is defined, bounded by vertical partitions (34), which chamber (26) is filled with a sealing compound (35) that covers said electric energy accumulating element (27) and said control module (28) set on said printed circuit board.

11. A light marking assembly for a road traffic safety barrier according to claims 1 or 8-10, **characterized in that** coupling means for fixing the position of adjacency of said second casing (21) to said shaped guardrail (1) or post (5) of said traffic safety barrier (4) are selected from the group comprising mechanical couplings, permanent magnets, curable binders and combinations thereof.

12. A light marking assembly for a road traffic safety barrier according to claims 4-11, **characterized in that** said flattened lamp shields (12) of said first casing (9) and said transparent cover (23) of said second casing (21) are made of a material selected from the group comprising polymethacrylate, polycarbonate, siloxane-modified polycarbonate copolymer, polyester-modified polycarbonate copolymer, and the bodies of said first casing (9) and of said second casing (21) are made of thermoplastic organic plastics and/or glass fiber-reinforced organic plastics.

13. A light marking assembly for a road traffic safety barrier according to claims 4, **characterized in that** a flattened lamp shield (12) of said first casing (9) is

formed integrally with a retroreflector element at the inner side of said flattened lamp shield (12), where said flattened lamp shield (12) has a centrally arranged window to accommodate at least one LED (14) so that said retroreflector element surrounds at least one LED (14).

14. A road traffic safety barrier equipped with at least one light marking assembly of a road traffic safety barrier as defined in claims 1-13.

15. A road traffic safety barrier according to claim 14, **characterized in that** said photovoltaic element (24) is positioned approximately in a horizontal plane; with deviation from this plane not exceeding $\pm 5°$.

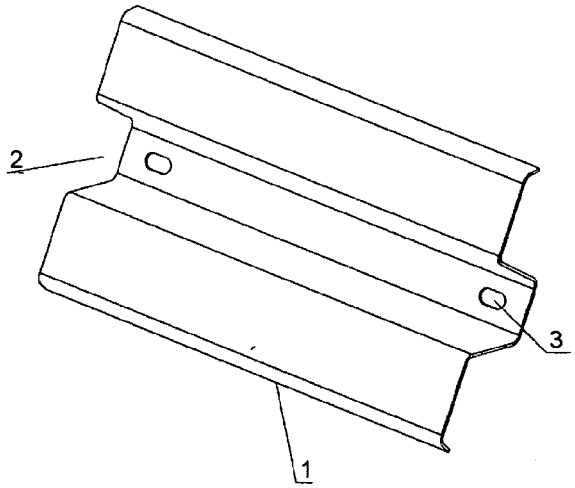

fig.1a

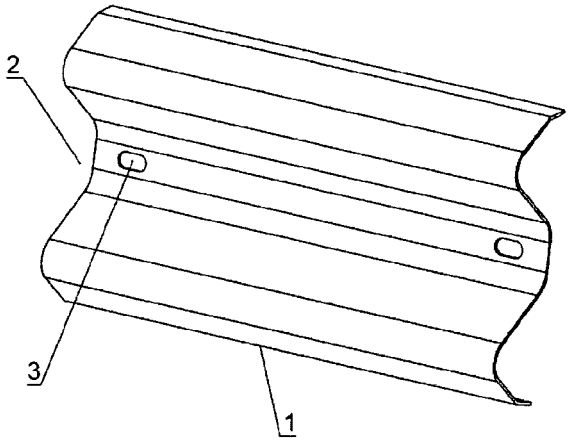

fig.1b

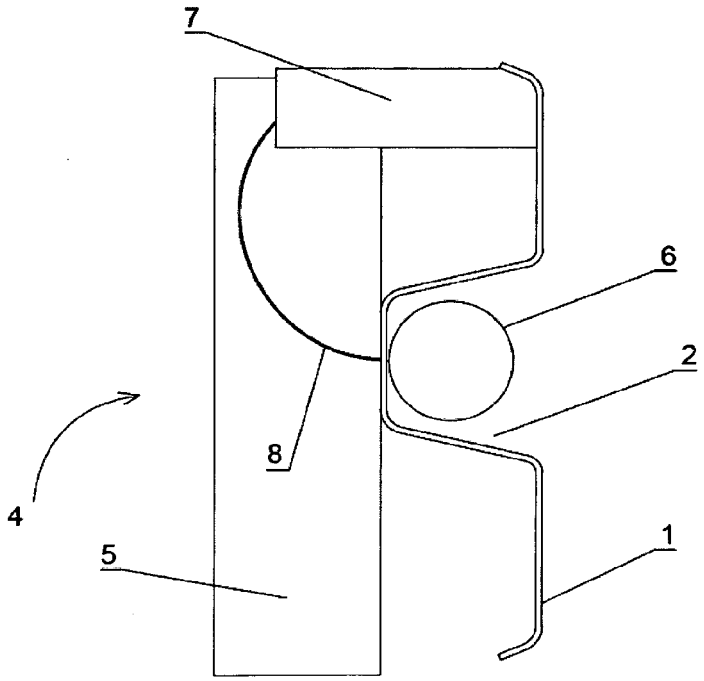

fig.2

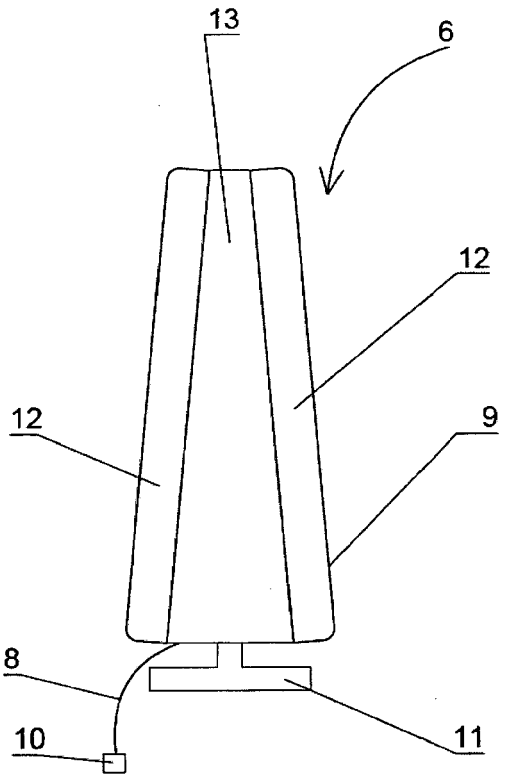

fig.3

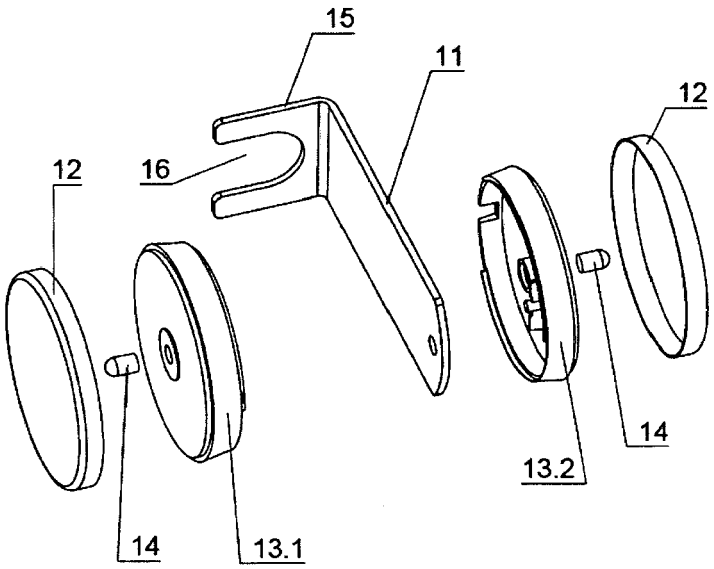

fig.4

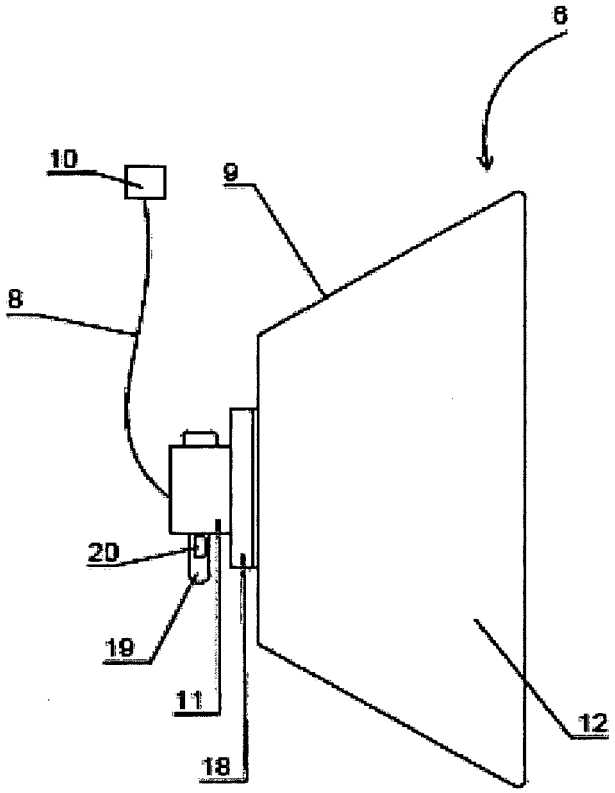

fig.5a

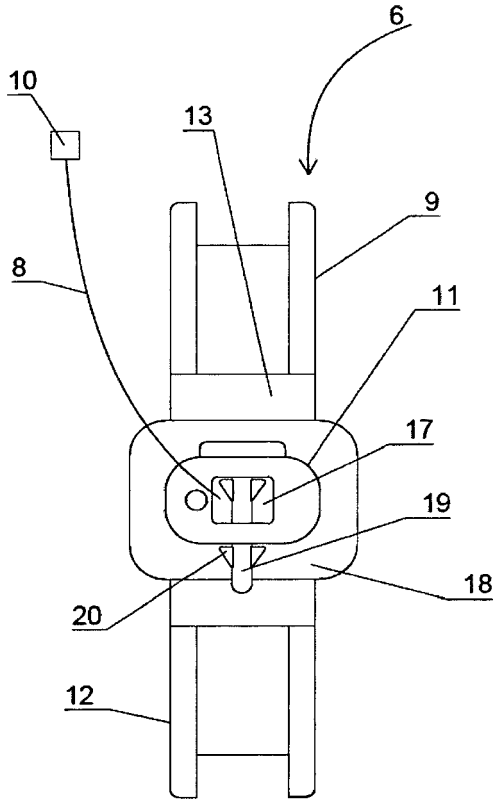

fig.5b

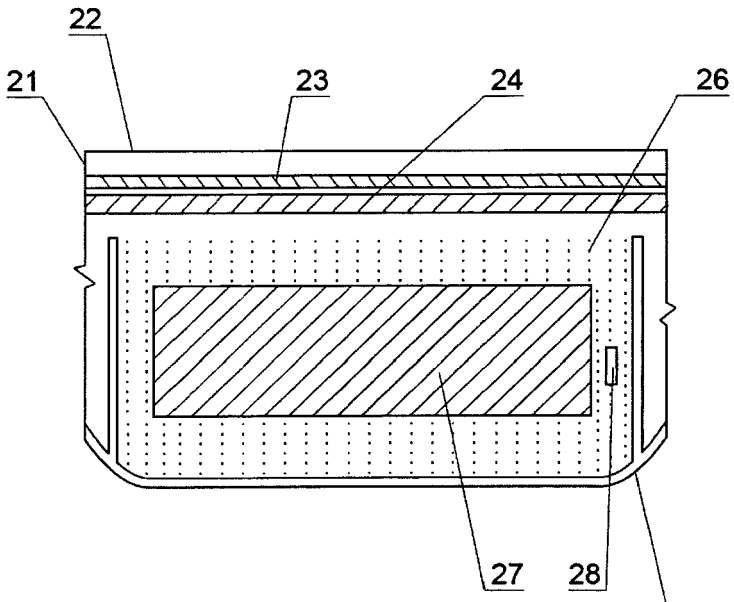

fig.6

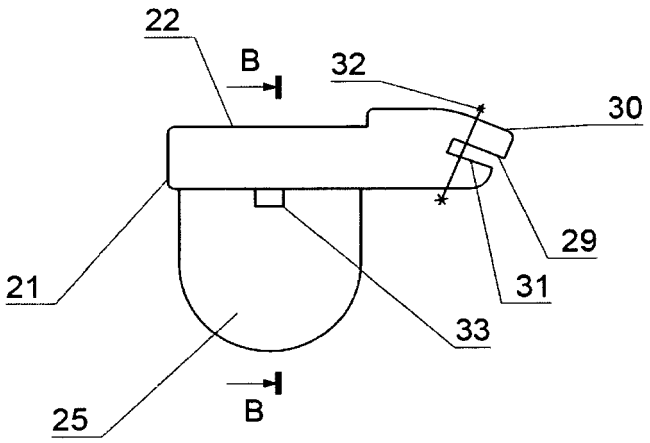

fig.7a

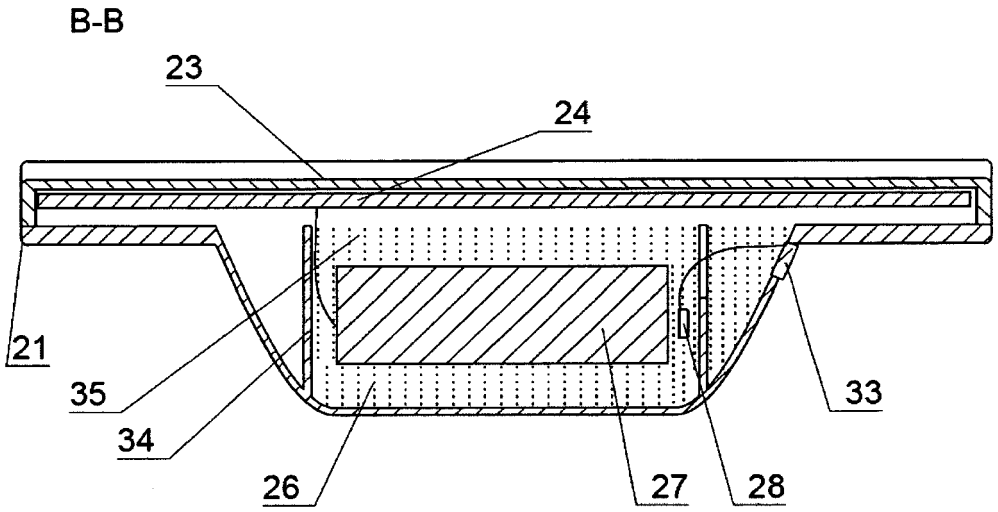

fig.7b

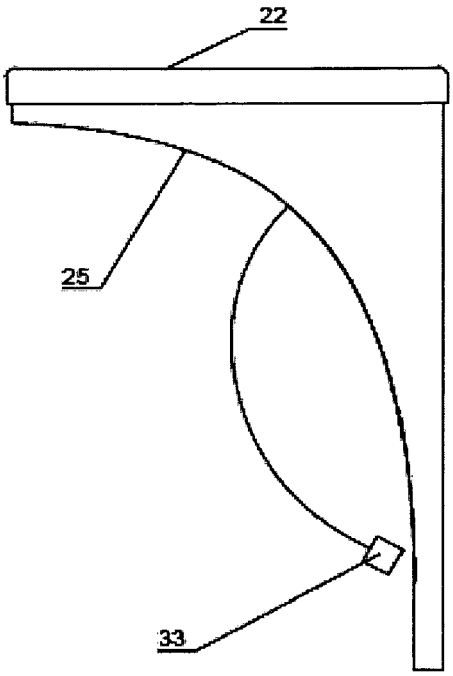

fig.8a

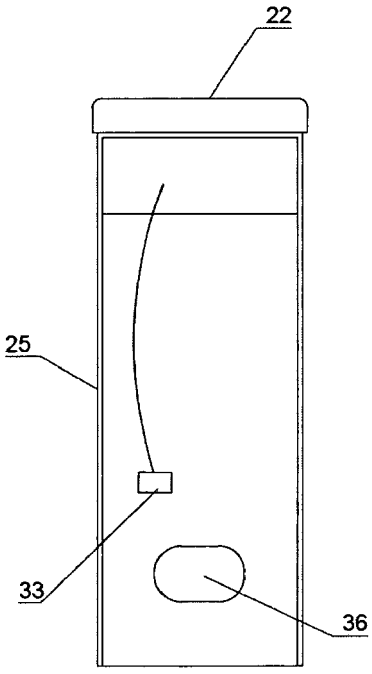

fig.8b

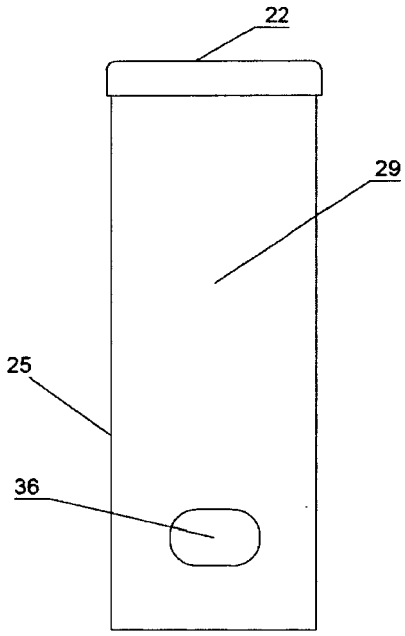

fig.8c

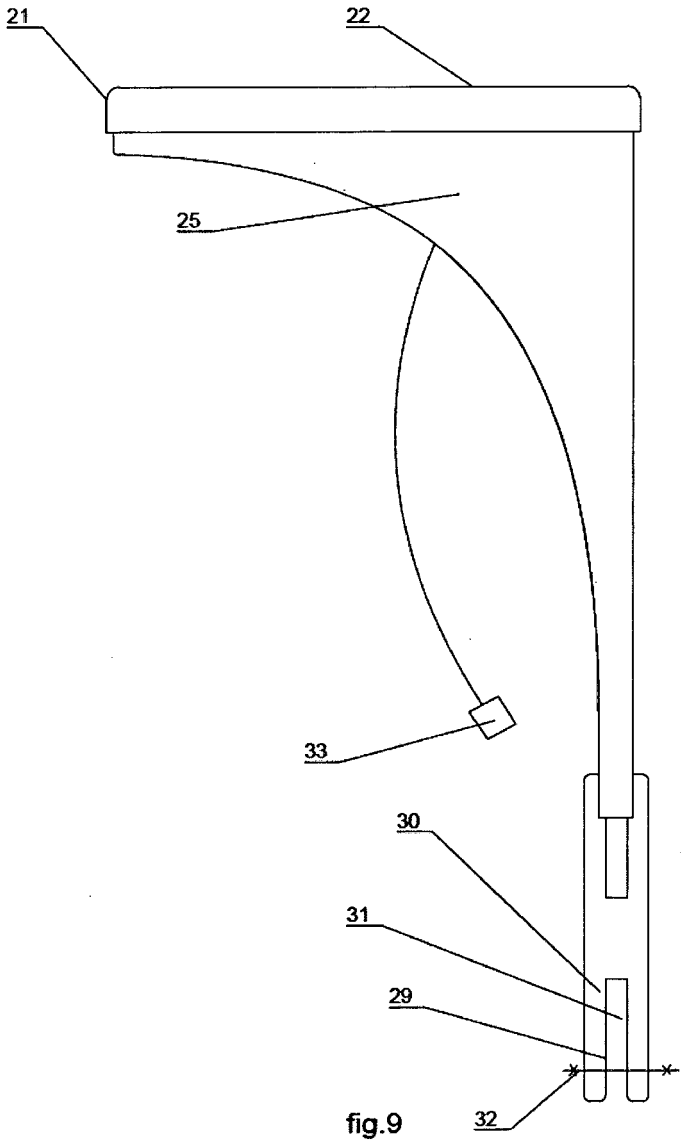

fig.9

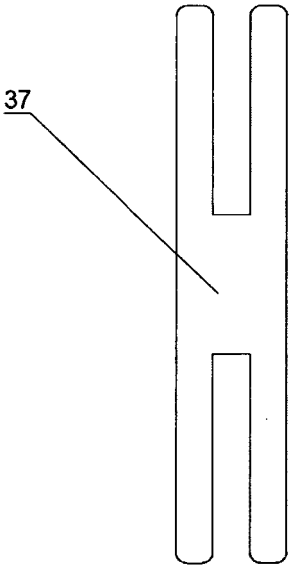

fig.10

Europäisches Patentamt
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EUROPEAN SEARCH REPORT

Application Number
EP 17 00 0428

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 August 2017	Kremsler, Stefan

CATEGORY OF CITED DOCUMENTS

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