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(54) **DAMPING SEPARATOR ELEMENT FOR PRODUCING DELIMITING OR PROTECTIVE BARRIERS**

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(57) **ABSTRACT**

The invention concerns a damping separator element for producing delimiting or protective barriers, for example for road traffic lanes or motor sports tracks. The element includes an elongated horizontal section and a cover, preferably made of flexible plastic material. The central reinforcement or hollow core, preferably made of metal, produced in the form of a flattened sheath and extended from one end to the other of the element, is housed inside the cover. The reinforcement provides a space between the cover and the central flattened hollow reinforcement, the space being filled or to be filled with a plastic foam such as, for example, a polyethylene foam.

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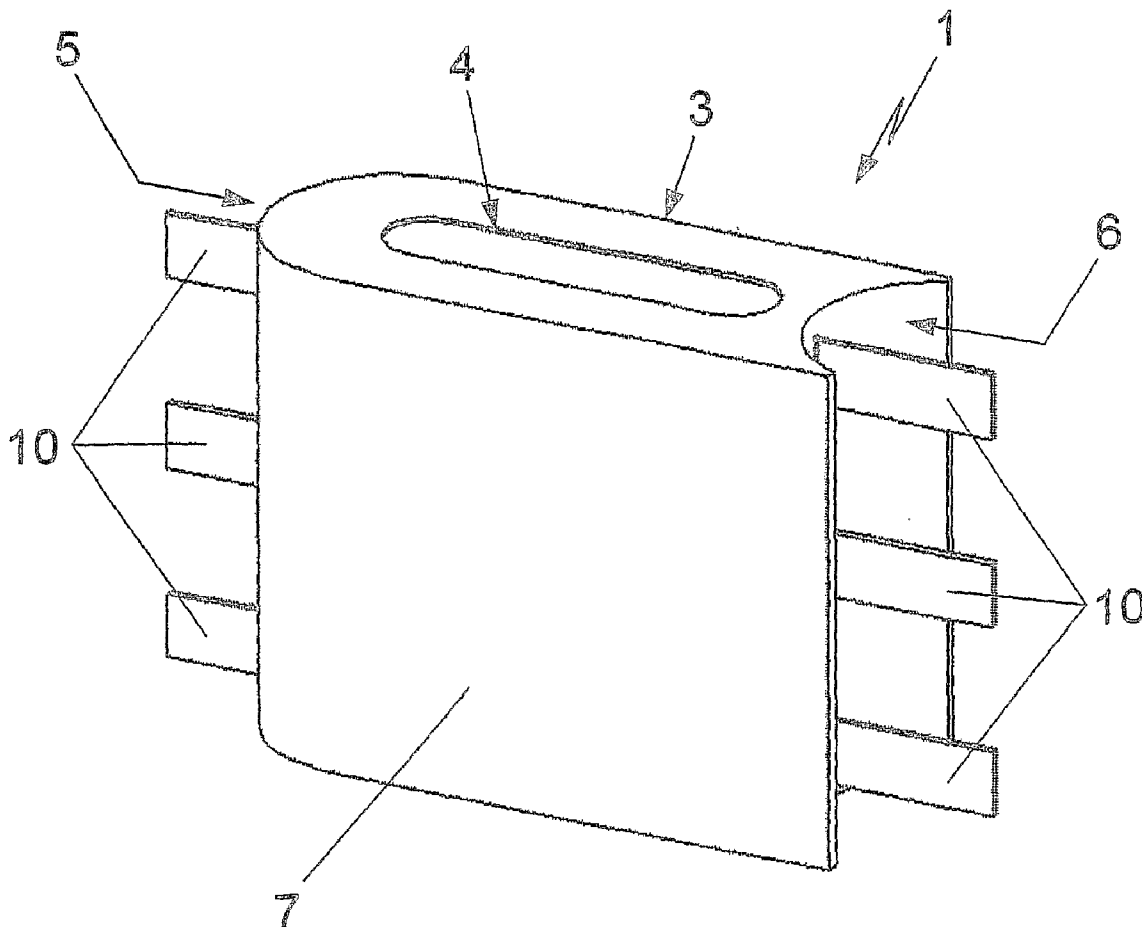


Fig. 1

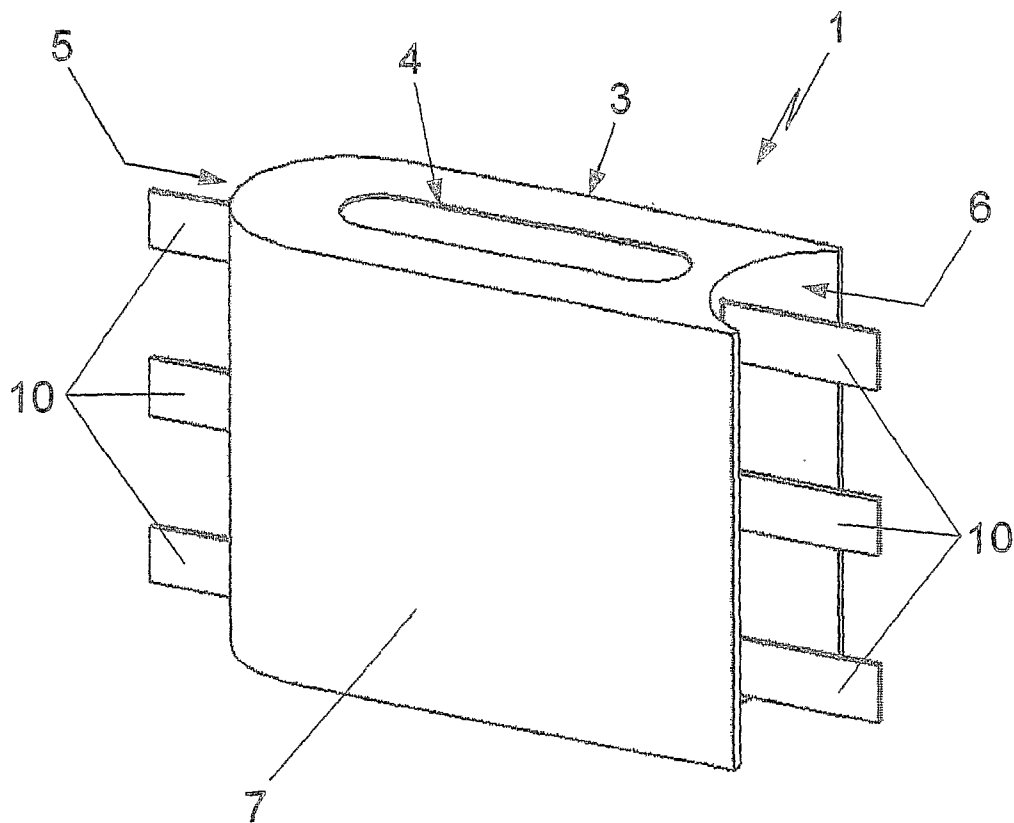


Fig. 2

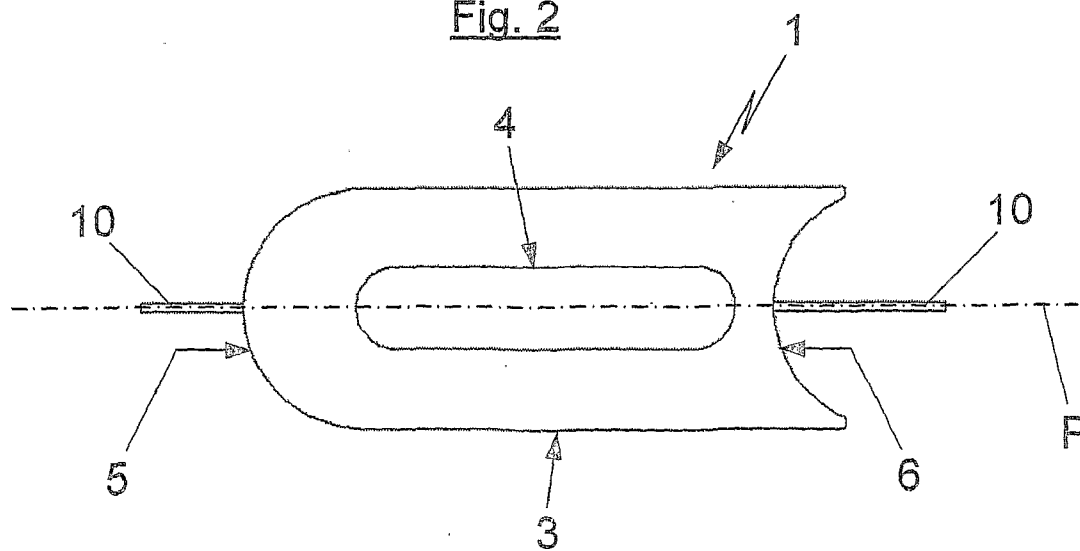


Fig. 3

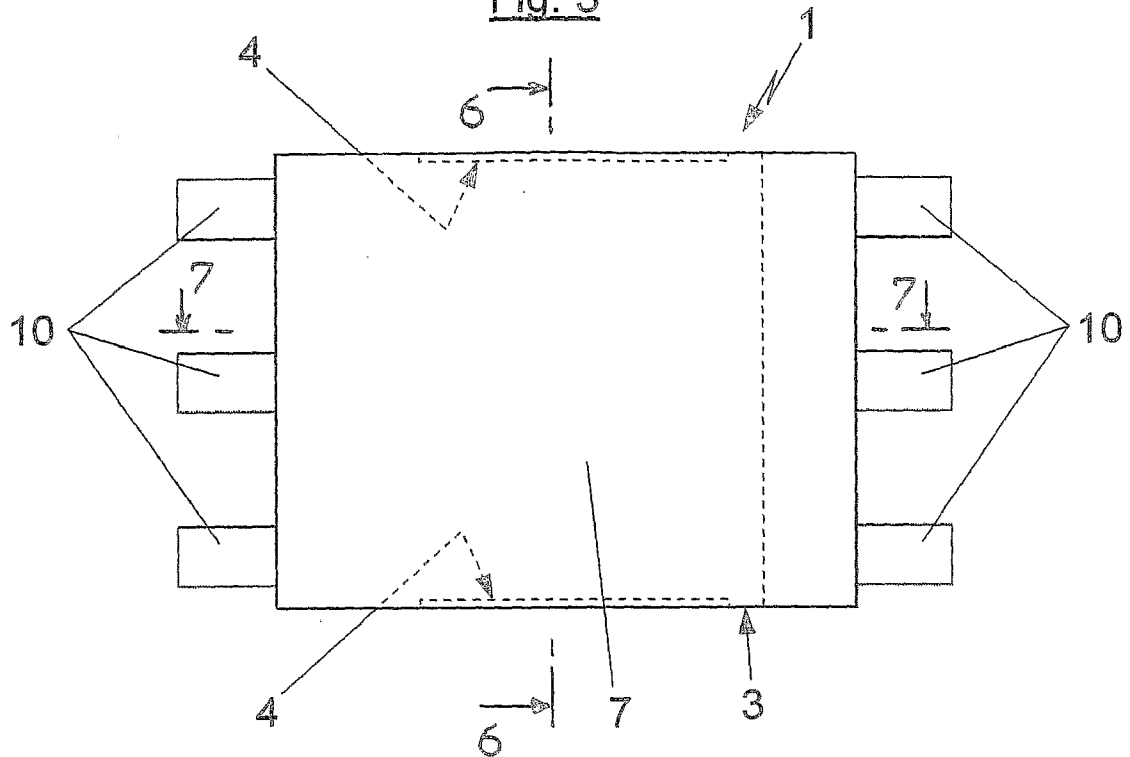


Fig. 4

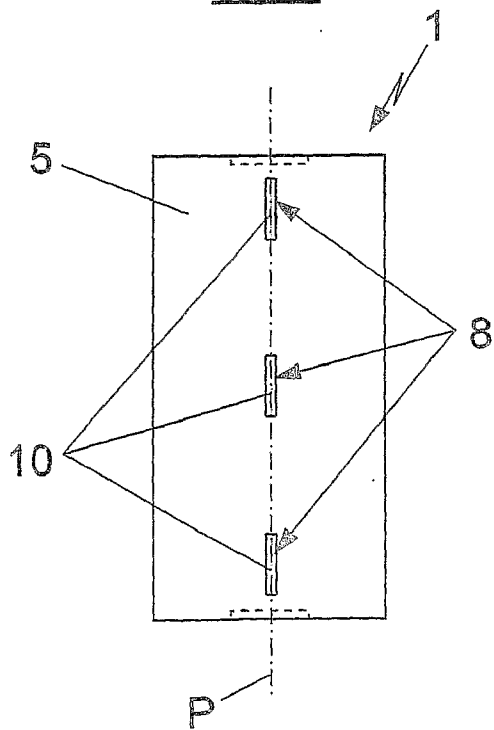


Fig. 5

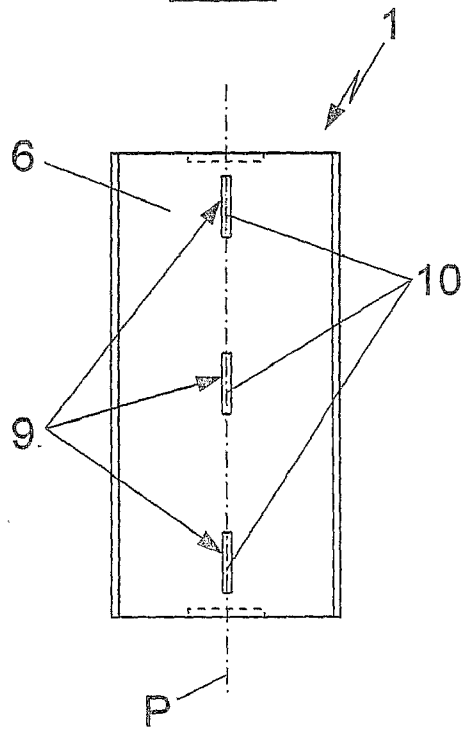


Fig. 6

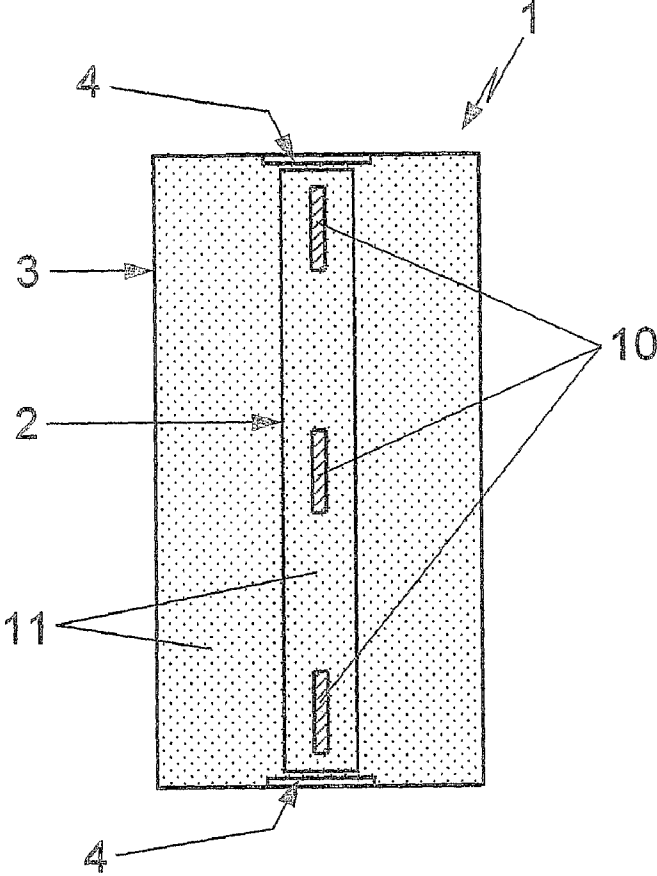


Fig. 7

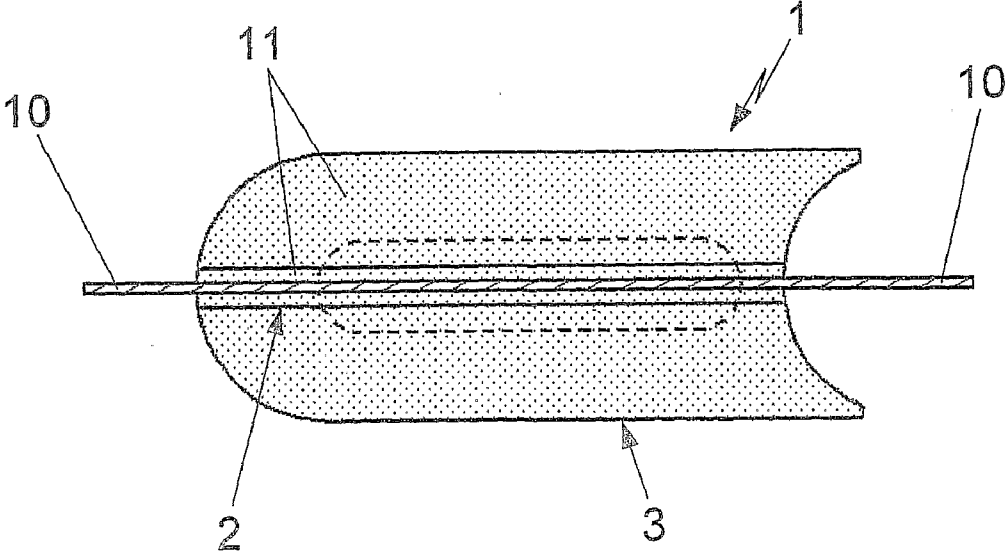
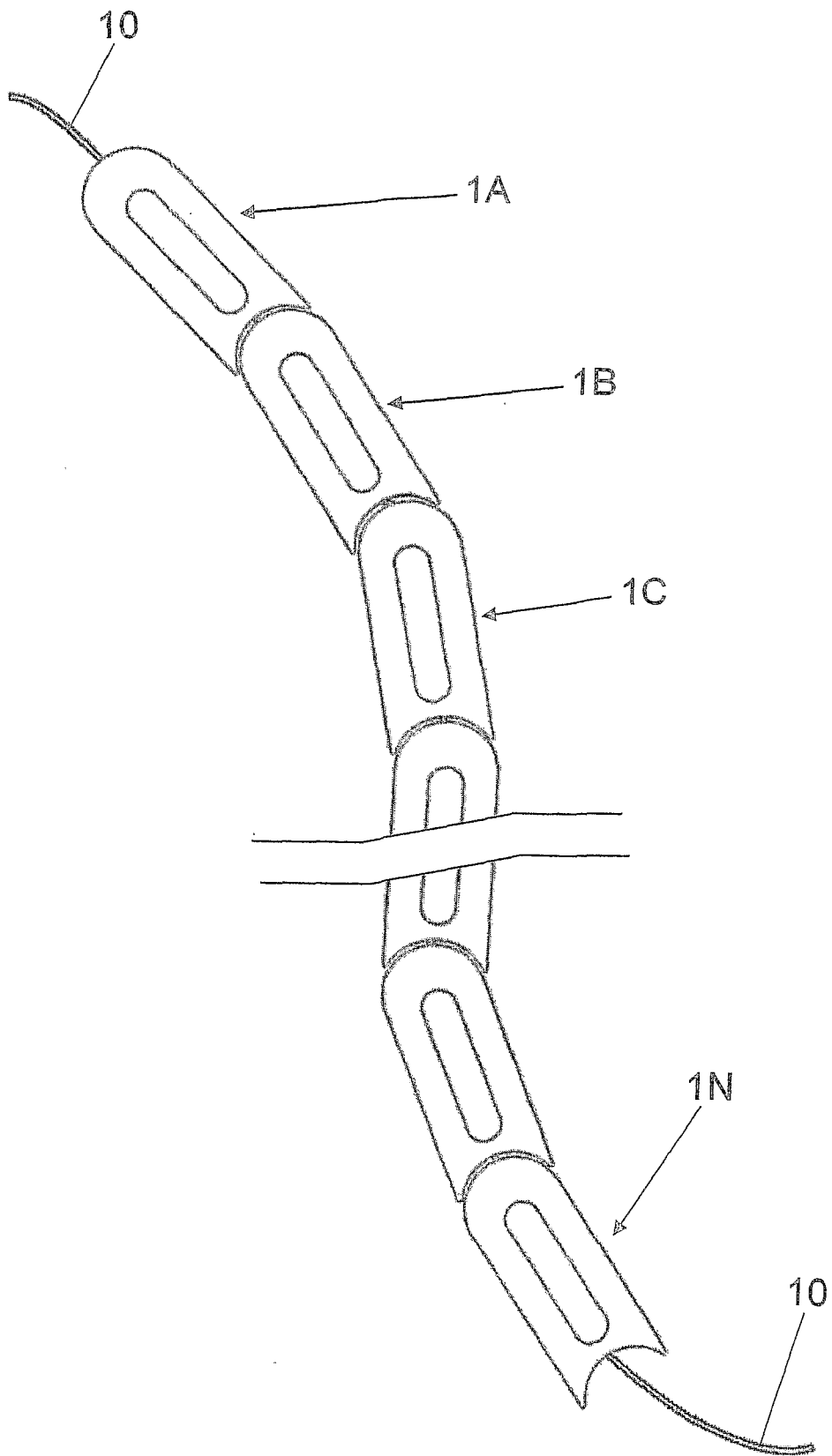


Fig. 8



DAMPING SEPARATOR ELEMENT FOR PRODUCING DELIMITING OR PROTECTIVE BARRIERS

CROSS-REFERENCE TO RELATED U.S. APPLICATIONS

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

NAMES OF PARTIES TO A JOINT RESEARCH AGREEMENT

[0003] Not applicable.

REFERENCE TO AN APPENDIX SUBMITTED ON COMPACT DISC

[0004] Not applicable.

BACKGROUND OF THE INVENTION

[0005] 1. Field of the Invention

[0006] This invention concerns a separator element or road stud intended to form a barrier. The barrier is produced by juxtaposing such separator elements by an articulated connection. This barrier is intended for delimiting roadways or race tracks, parking areas, piers, airstrips, etc., as well as for protection of users, in other words, drivers, pedestrians, pilots, or spectators, especially by restraining vehicles in case they leave the track.

[0007] The invention also concerns a manufacturing method of such a barrier and of the separator elements claimed that form the barrier.

[0008] 2. Description of Related Art Including Information Disclosed Under 37 CFR 1.97 and 37 CFR 1.98.

[0009] It has been proposed, in Publication Document WO 99/53145, a barrier intended for the same applications, which consists of several separator elements juxtaposed one after the other, and connected with supple cross straps. These separator elements have an oblong longitudinal section and comprise one convex cylindrical end and one concave cylindrical end intended to form an articulated interlocking with the concave cylindrical end and the convex cylindrical end, respectively, of neighboring, identical or similar separator elements. One characteristic of these separator elements resides in the fact that they are equipped with a hollow body containing a volume of air designed to act as a shock absorber.

[0010] The dampening provided by a barrier consisting of these separator elements is, however, only of mediocre effectiveness, given that such separator elements lack mechanical strength. In fact, these elements are poorly suited to effectively withstand violent shocks caused, for example, by a Formula 1 race car leaving the track. The cover of the separator element exploding is, in this case, unavoidable, which reduces its shock dampening capacity to zero.

[0011] Thus, if the separator elements and the articulated barrier proposed in Publication Document WO 99/53145 are useful for setting boundaries of roadways and protecting pilots and spectators in certain sport competitions, such as go-kart races where vehicles are lightweight, they are not very effective in auto sporting events involving powerful and

heavier cars, such as, for example, automobiles, motorcycles, trucks and more particularly, Formula 1 race cars.

BRIEF SUMMARY OF THE INVENTION

[0012] The invention proposes solving this problem by making a separator element whose mechanical properties and, more particularly, its damping and shock-resistant functions, are greatly improved.

[0013] The objective is achieved, according to the invention, with a separator element that has an oblong horizontal section comprising a cover, preferably made from plastic, supple and flexible, containing a central reinforcement or hollow core in its middle section, preferably metallic, made as a flattened sheath extending from one end to the other of the element. Between such cover and such tubular central reinforcement, there are spaces that are filled or intended to be filled with a damping material.

[0014] The mechanical strength and damping capabilities of the separator element are thus highly increased. A barrier equipped with separator elements according to the invention allows for absorbing and damping violent shocks, such as those that can occur, for example, when cars leave the track in Formula 1 car races.

[0015] According to a preferred execution method, the cover and also, preferably, the flattened hollow core of the claimed separator element are filled with a damping material, preferably consisting of plastic foam, for example, polyethylene foam.

[0016] The presence of this supple material in the separator element further improves shock damping and consequently reduces risk of damage that can occur in a violent collision resulting, for example, from a vehicle leaving the road or the race track.

[0017] According to an advantageous form of execution, the separator element, in accordance with the invention, contains at least two stacked passages or orifices, made in each of its ends. Such passages allowing the crossing of said element by at least two stacked links, preferably consisting of supple straps or flexible metal bands allowing to connect it to a set of identical or similar separator elements successively arranged one after the other to create a hinged barrier.

[0018] According to another form of execution, the ends of the flattened hollow core are laid out so as to allow the securing of at least two, and preferably three, stacked flexible metal ties, preferably constructed as flat bands, allowing the separator elements to be connected to one another.

[0019] According to an interesting form of execution, each of the separator elements, according to the invention, includes one convex cylindrical end and one concave cylindrical end, so that they may abut and be fitted successively to one another by said ends that form an articulated interlocking or cylindrical articulation with the concave cylindrical end and with the convex cylindrical end, respectively, of neighboring separator elements.

[0020] Shipping and handling of the separator elements on the installation site can, however, be difficult, when they are filled with a damping material, as is the case for the separator elements proposed by the invention. Their weight is, in fact, significantly higher than that, for example, of separator elements comprising only a hollow body.

[0021] The manufacturing method of separator elements according to the invention intends to remove this difficulty in order to facilitate handling and shipping of such elements.

[0022] This goal is achieved through a remarkable manufacturing process in that it consists of producing an element comprising the cover and the central hollow core in a plant, for instance by rotary molding. The introduction of the supple material into the free internal space of said separator element is done, for example, by injection on the sites where barriers are assembled and positioned after the supple or flexible links ensuring the linkage of the elements have been installed.

[0023] This method is particularly advantageous in the sense that it facilitates handling and shipping of the separator elements to the location where the barrier is supposed to be placed. Likewise, the manual positioning work of the separator elements, one after another, before their assembly by insertion of supple or flexible links to form the barrier, will be less onerous.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0024] The aforementioned goals, characteristics and advantages and additional ones, will become more apparent from the description below and attached drawings illustrating an interesting, although by no means limiting example, of the implementation of the separator element and its manufacturing method according to the invention.

[0025] FIG. 1 is the elevation view of a separator element crossed by three supple or flexible links.

[0026] FIG. 2 is the top view of this separator element.

[0027] FIG. 3 is the front view of the separator element.

[0028] FIG. 4 is the left-side view of the separator element.

[0029] FIG. 5 is the right-side view of the separator element.

[0030] FIG. 6 is the cross sectional view according to Line 6-6 of FIG. 3.

[0031] FIG. 7 is the longitudinal cross-sectional view according to Line 7-7 of FIG. 3.

[0032] FIG. 8 is a top view showing an articulated barrier resulting from the assembly of several separator elements.

DETAILED DESCRIPTION OF THE INVENTION

[0033] These drawings describe an advantageous example, although being by no means limiting, of construction of a damping separator element and a protective or demarcation barrier produced according to the invention.

[0034] This damping separator element 1 comprises a supple cover 3 with an oblong horizontal section and a core or central hollow reinforcing piece constructed as a flattened sheath in a middle portion of the element. The element has a rectangular section, extending practically from one end to the other of the element 1, with the supple cover 3 and the flattened central tubular reinforcing piece 2 defining filled spaces or spaces meant to be filled by damping material 11.

[0035] Cover 3 may be constructed of a supple and flexible material, preferably shatterproof, for example, low-density polyethylene that, besides its aforementioned qualities, has the property of appropriately tearing if it breaks, preventing its fragmentation or shattering. The thickness of the cover may vary depending on the intended use of the separator elements. It may be between 5 and 8 mm, for example.

[0036] The reinforcing piece 2 is advantageously made of metal, preferably of steel, to provide good mechanical resistance to impacts. It may have a thickness and width that can vary depending on the intended use of separator elements. Solely by way of example, it may have a thickness on the

order of 2 mm to 5 mm and a width on the order of 1 cm to 10 cm. It extends approximately over the entire height of the element.

[0037] The central reinforcing piece 2 is integrated into cover 3, when the latter is constructed, for example, by a known rotary moulding process.

[0038] Separator element 1 thus obtained, has, for example, a height on the order of 1200 mm, a length of 1500 mm and a width of 600 mm.

[0039] Cover 3 consists of lower and upper bases comprising, for example, a wide oblong rib 4. These ribs 4 are designed, on the one hand, to reinforce the rigidity of said cover 3 and, on the other hand, to incorporate, for example, a logo or other distinctive sign.

[0040] Cover 3, in other words, separator element 1, comprises a convex cylindrical end 5 and a concave cylindrical end 6, with an identical radius, connected by two large flat lateral and parallel faces 7.

[0041] Thus, it is possible to abut and interlock multiple identical or similar separator elements 1A, 1B, 1C, . . . , 1N, one after another to make up a demarcation or protective barrier, with the convex cylindrical ends 5 and concave cylindrical ends 6 of each intermediary separator element thus forming an articulated interlocking or cylindrical articulation with the concave cylindrical end and with the convex cylindrical end, respectively, of two identical or similar separator elements between which it is situated.

[0042] According to the advantageous execution method retained, by way of example, for the presentation and illustration of the invention, each of the two ends 5 and 6 of the damping separator element has at least two and, preferably, three passages or orifices, respectively 8 and 9, preferably stacked and spaced at regular intervals, formed in a vertical rectangular shape, and arranged in the median vertical plane P-P of separator element 1. These passages or orifices 8 and 9 allow the crossing of cover 3 and reinforcing piece 2 by three supple or flexible links, advantageously and preferably consisting of straps or flat bands 10. These bands or straps may advantageously have a width on the order of 50 mm and are arranged so that their width is placed in a vertical or substantially vertical plane, as notably shown by FIG. 1.

[0043] The supple straps may be made from synthetic fabrics or fibers, such as polyamides, polyesters or others, and they have, in this case, a certain stretching capability, playing a role in shock damping.

[0044] Flexible bands 10 may also consist of metal bands, for example, steel or other metal types of strips.

[0045] Orifices 8 or 9 are arranged one near the upper edge of the element, another near the base of the latter, and the third one at mid height of said element. Thus, when they are in place, the straps or flat bands 10 cover the entire height of the barrier and any tendency of the elements to rotate or of the barrier to twist in case of impact is thereby eliminated.

[0046] Flat bands or straps 10 allow connecting multiple identical or similar separator elements 1A, 1B, 1C, . . . , 1N, interlocked one after the other to make an articulated demarcation or protection barrier (FIG. 8) in which the configuration can be quickly and easily adapted to the needs.

[0047] Following a variant of execution (not illustrated), the ends of the flattened hollow core or central reinforcing piece 2 are laid out to allow the attachment, for example, in a detachable manner, of flexible metal ties, preferably made as flat bands, to connect the elements to one another. The ends are matched in a complementary way to allow for this attach-

ment. The attachment of these flexible metal ties on two successive elements may, for example, be done by bolts or some other form of assembly.

[0048] Separator element 1 finally comprises a supple damping material 11, preferably made of plastic foam, for example, polyethylene foam, filling the empty space between cover 3 and reinforcing piece 2, as shown by FIGS. 6 and 7. The internal space of reinforcing piece 2 may also be filled with this supple dampening material 11, notably in the case where said reinforcing piece 2 has a width of more than 5 cm.

[0049] It was previously indicated that, according to an example of implementation of the process of the invention, an element is proposed to be built, in an initial phase, comprising cover 3 and flattened central tubular reinforcing piece 2 in a plant, for example, by a rotary molding process. The second phase consists of filling cover 3 and hollow core 2 with damping material 11, being performed, for example by injection, on site, i.e. where the barriers are assembled and positioned, after installation of supple or flexible connecting links 10.

[0050] To carry out this second phase, the separator elements are, first of all, arranged adjacent to one another, then straps 10 are inserted across each of them, in other words, through passages or orifices 8 and 9, so that they cross the reinforcing piece 2 and cover 3 of each separator element 1 lengthwise. The ends of said reinforcing piece provide a common opening or individual openings for this purpose, allowing the passage of straps between the large vertical faces of the latter.

[0051] Finally the supple damping material 11 is inserted in separator element 1 by injection through one or several orifices (not shown) made in cover 3, preferably in its upper wall. When desired, one or several orifices (not shown) are made in one of the walls of said reinforcing piece 2, preferably in its upper wall, to allow penetration of said supple damping material 11 into the internal space of said reinforcing piece 2. This injection is preferably performed under pressure so that the damping provided by the supple damping material 11 will be optimal in case of impact.

[0052] It is possible to assemble, easily and quickly, barriers or portions of barriers consisting of multiple elements, for example, of thirty elements assembled one after another, with the barrier portions thus obtained being themselves able to be assembled through truss rods known as such.

[0053] Because of the junction of separator elements through a ball and joint or cylindrical articulation, these elements can have various inclinations in relation to the other ones so that it is possible to quickly install straight or curved protective barriers with radii that are more or less short, depending for example on the layout of tracks or circuits.

1. Separator and dampening element for producing delimiting or protective barriers used in roadways or motor sports tracks, the element comprising:

- a cover with an oblong horizontal section and middle portion, said cover having side walls and being formed from supple plastic material; and
- a central reinforcing piece or hollow metal core, made as a flattened sheath, extending from one end to an opposite end of said element, the core having a space filled or intended to be filled by a damping material contained in said middle portion of said cover, said damping material being comprised of a plastic foam, said plastic foam being contained between said side walls of said cover and said flattened metal sheath.

2. Separator element according to claim 1, said central reinforcing piece being hollow and being filled by a damping material.

3. Separator element according to claim 1, further comprising:

- at least two stacked passages or orifices provided in each ends thereof, said at least two stacked passages being crossed, and
- three stacked links being comprised of supple straps or flexible metal bands, connecting said element to other identical or similar separator elements to make a barrier.

4. Separator element according to claim 3, wherein the central reinforcing piece has ends having one or several openings allowing passage of straps or flexible bands, or other supple or flexible links between vertical faces of said central reinforcing piece.

5. Separator element according to claim 3, wherein the passages or orifices have ends, said ends being arranged at an upper edge of the element, another end near a base of the element, and a third one at mid height of the element.

6. Separator element according to wherein said flattened sheath has ends laid out so as to allow attachment of said at least two stacked flexible metal ties, the ties being flat bands, allowing interconnection of separator elements.

7. Separator element according to claim 1, wherein said cover is comprised of a non-frangible material.

8. Separator element according to claim 1, wherein said cover contains at least one orifice, said orifice being placed in an upper wall of said cover, allowing injection of plastic foam.

9. Separator element according to claim 1, wherein the reinforcing piece contains at least one orifice, said orifice being contained in an upper wall of the reinforcing piece, allowing injection of plastic foam.

10. Separator element according to claim 1, the element having one convex cylindrical end and one concave cylindrical end, so that the wherein multiple elements can be abutted and interlocked with one another by sa adjacent ends forming an articulated interlocking or cylindrical articulation with the concave cylindrical end and the convex cylindrical end of adjacent separator elements.

11. Articulated delimiting or protective barrier, used for roadways or motor sports tracks, said barrier comprising:

- a plurality of separator elements, according to claim 1, abutted and interlocked with one another through an articulated interlocking or cylindrical articulation, said separator elements being connected through at least two stacked supple or flexible links crossing, preferably, the passages or orifices made on the ends of the separator elements.

12. Barrier according to claim 11, wherein the supple or flexible links are comprised of flat supple straps or flexible metal bands.

13. Manufacturing process of a barrier of multiple separator elements, according to a separator element of claim 1, the process comprising:

- producing the cover and the reinforcing piece of each separator element in a plant, by rotary moulding; and
- inserting supple damping material into internal empty spaces of the cover by injection on the sites where barriers are assembled and positioned, after the installation of supple or flexible links.