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(54) **A SECURITY BARRIER**

SICHERHEITSSPERRE

BARRIÈRE DE SÉCURITÉ

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Description

[0001] The present invention relates to a barrier for use in or near roadways with the aim of preventing vehicles from crossing a threshold.

[0002] Previously disclosed security barriers comprise a concrete or brick wall or a resilient metal strip. Such barriers can be found at the sides of roads or in central reservations or at the perimeters of sites which are to be protected from attack.

[0003] Existing barriers of the construction described above have two major disadvantages: they require a lot of time, preparation and materials to install; and because of their strength can cause significant damage to a vehicle that impacts upon them. Previously proposed vehicle barriers are described in DE-U-20204649, WO2007/104304, EP-A-0,343,091 and US4,982,931.

[0004] It is an aim of the present invention to provide a security barrier for use on or near a roadway which can be installed quickly and easily.

[0005] It is a further aim of the present invention to provide a security barrier for use on or near a roadway which minimises the damage caused to vehicles and the occupants of vehicles which impact upon the barrier.

[0006] Accordingly the present invention is directed to a security barrier as set out in Claim 1. Further advantageous features are set out in the subsequent claims. Such a barrier is constructed from an elastomeric material, comprising two elongate elements, substantially equal in width, connected together substantially edge to edge to form a barrier with a substantially perpendicular or V-shaped cross-section.

[0007] Preferably, the elastomeric material is a natural or man-made rubber.

[0008] In a preferred embodiment, the rubber is reclaimed rubber from vehicle tyres.

[0009] Advantageously, the angle between the elongate elements is chosen such that the centre of mass of the security barrier lies above the lower of the two elongate elements.

[0010] Preferably, the angle between the elongate elements is substantially a right angle. A right angle between the elongate elements provides the advantage of good stability.

[0011] In a preferred embodiment, one or both of the inwardly-facing surfaces of the elongate elements is concave in the region nearest the connection between them and convex in the region furthest away from the connection between them.

[0012] Advantageously, one or both of the outwardly-facing surfaces of the elongate elements is convex in the region nearest the connection between them and concave in the region furthest away from the connection between them.

[0013] Preferably, the region of the connection between the two elongate elements has a convex outer surface and a concave inner surface.

[0014] This configuration provides stability once the security barrier is in the desired position because the barrier rests on the ground on two parts of the lower of the elongate elements. Because the parts of the elongate element near the ground form an arched profile the barrier can rest stably on uneven or contoured ground.

[0015] The arched profile also allows for deformation during a vehicle impact, enabling the barrier to remain in frictional contact with the ground so as to minimise the displacement of the barrier caused by the vehicle impact.

[0016] In a preferred embodiment, the part of the elongate elements furthest away from the connection between the elongate elements may have a cross section which forms a section of a circle.

[0017] The configuration also enables the barrier to be light relative to previously disclosed barriers.

[0018] Advantageously, the security barrier is constructed in sections, the sections may be joined by a joining means.

[0019] Preferably, the joining means is one or more chains or ropes or rods passed through one or more openings within the barrier.

[0020] Alternatively, the joining means is one or more chains or ropes or rods attached externally to the barrier.

[0021] In a first mode of use, the security barrier is arranged so that the lower elongate element faces outwards towards potentially oncoming vehicles.

[0022] If a vehicle impacts the barrier substantially in parallel with it, the vehicle will bounce back away from the barrier to rejoin the roadway or the vehicle's wheels will become trapped between the elongate elements so that the vehicle then continues in parallel with the barrier before coming to a halt. The downward force provided by the vehicle's wheel or wheels may deform the barrier generating friction between the barrier and the wheel or wheels of the vehicle, slowing the vehicle.

[0023] In a second mode of use, the security barrier is arranged so that the lower elongate element faces inwards away from potentially oncoming vehicles, and the upper elongate faces outwards towards potentially oncoming vehicles.

[0024] If a vehicle impacts the barrier with a significant momentum perpendicular to the barrier, the barrier will roll in the direction of the vehicle's momentum. The size of the security barrier will be chosen so as to suit the likely size and speed of potentially-impacting vehicles. In most cases the vehicle will come to a stop with the security barrier underneath the vehicle. This limits further movement by the impacting vehicle.

[0025] In a third mode of usage, not forming part of the invention, the security barrier is arranged so that both elongate elements rest on the ground to form an inverted V-shape.

[0026] In any of the three usage modes, if a vehicle impacts the barrier substantially perpendicular to it and with sufficient momentum, the vehicle may proceed fully over the top of the barrier. It is likely in this situation that the barrier will roll in the direction of travel of the impacting vehicle. The vehicle is likely to have lost a significant

proportion of its momentum during this process. Therefore a second barrier may be arranged at a distance preferably more than the length of the vehicle behind the first barrier relative to the direction of vehicle approach. Therefore if the first barrier has reduced the vehicle's momentum sufficiently, the vehicle will not proceed fully over the top of the second barrier. The distance between the barriers is unlikely to be sufficient to enable the vehicle to build up sufficient momentum to get over the second barrier nor to reverse back over the first barrier. Therefore the vehicle should now be trapped between the two barriers. Accordingly, another aspect of the present invention is directed to the use of a first and second barrier, each according to the present invention, arranged substantially in parallel a distance apart from each other.

[0027] The two barriers may be arranged so that the first barrier is outwardly facing and the second barrier is inwardly facing in respect of the likely direction of vehicular approach.

An embodiment of the present invention may have an elongate member width of approximately 450-500 mm. This size may be suitable for use in town centres and for vehicles travelling at approximately 15-20 miles per hour (24 - 32 km/h).

[0028] This or any other embodiment may further comprise fixings in order to incorporate fencing.

[0029] An embodiment for use with higher speed vehicles on main roads may have an elongate member width of approximately 800-850 mm.

[0030] This invention has particular application to the security field.

[0031] In this field previous barriers had the disadvantage that they can be breached by fast moving vehicles due to nature of the materials from which these barriers are constructed. Furthermore often when an attack is conducted with vehicle borne improvised explosive devices a first vehicle is sent through to create a breach for a second vehicle to pass through. Finally, when a vehicle is exploded in close proximity to a concrete barrier, the barrier may disintegrate and provide extra flying debris which will injure people in the immediate vicinity.

[0032] It is an aim of the present invention to provide a solution to this.

[0033] The barrier of the present invention is of an elastomeric material. This provides the advantage that upon explosion any flying material created is of a softer nature. Furthermore due to the resilience of the elastomeric material in tests it has been found that such material does not disintegrate upon explosion and the barriers remain intact. This provides the further advantage that if a two vehicle packet is used to attack a facility, the barrier is not destroyed by the first vehicle in the packet, and the barrier remains intact against the second vehicle. Furthermore if the barrier is used in the method described in the application in a two barrier chain, the first barrier removes the speed and the second barrier due to the nature of it being linked provides the stopping power for the residual momentum of the vehicle. It has been found upon tests that once the first vehicle has been destroyed the barrier remains sufficiently in tact to stop a second vehicle which is attempting to breach the barrier.

[0034] An embodiment of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a portion of a security barrier according to the present invention;

Figure 2 is a cross-sectional view of a portion of a security barrier according to the present invention;

Figure 3 shows an example of a situation of a vehicle coming into parallel contact with a security barrier according to the present invention;

Figure 4 shows an example of a situation of a vehicle coming into perpendicular contact with a security barrier according to the present invention;

Figure 5 shows an example of a configuration of two security barriers according to the present invention arranged in parallel; and

Figure 6 shows the same configuration as Figure 5 with a vehicle having overcome the first barrier.

Figure 7 shows a security barrier according to the present invention further incorporating a fence element.

[0035] Figure 1 shows a portion of a security barrier 2 according to the present invention, comprising two parallel elongate elements 10, with edges joined at connection 12. The angle between elongate elements 10 is approximately ninety degrees. The inwardly-facing surfaces 14 of each elongate element 10 are tightly concave near the connection 12 and convex further away from the connection 12. The outwardly-facing surfaces 16 of each elongate element 10 is convex near the connection 12 and concave further away from the connection 12. The interface between the inwardly-facing and outwardly-facing surfaces of each elongate element 10 form a tightly-curving convex surface 18. Portions of security barrier 2 can be joined together by inserting a chain, rope, rod or any other suitable joining means through bores 20. Bores 20 are substantially cylindrical and have a diameter chosen to suit the chosen joining means. Bores 20 may be located near the connection 12 and near the part of the elongate elements 10 furthest away from the connection 12. Joining the portions of a security barrier 2 with more than one joining means results in greater stability of the security barrier as a whole.

[0036] Figure 2 shows a portion of a security barrier 2 according to the present invention, comprising two parallel elongate elements 10, joined at connection 12. The

angle between elongate elements 10 is approximately ninety degrees. The inwardly-facing surfaces 14 of each elongate element 10 are tightly concave near the connection 12 and convex further away from the connection 12. The outwardly-facing surfaces 16 of each elongate element 10 is convex near the connection 12 and concave further away from the connection 12. The interface between the inwardly-facing and outwardly-facing surfaces of each elongate element 10 form a tightly-curving convex surface 18. Portions of security barrier 2 can be joined together by inserting a chain, rope, rod or any other suitable joining means through bores 20. Bores 20 are substantially cylindrical and have a diamter chosen to suit the chosen joining means. Bores 20 may be located near the connection 12 and near the part of the elongate elements 10 furthest away from the connection 12. Joining the portions of a security barrier 2 with more than one joining means results in greater stability of the security barrier as a whole.

[0037] Figure 3 shows a series of three stages wherein a vehicle 22 approaches an example of the security barrier 2 according to the present invention from substantially parallel to it. In Figure 3a the same vehicle 22 is travelling substantially in parallel to the security barrier 2. In Figure 3b the same vehicle 22 is adjacent to the security barrier 2. In Figure 3c the wheels 24 on one side of the same vehicle 22 have mounted the lower inwardly-facing surface 14a. The weight of the vehicle 22 has compressed the material of the security barrier 2 causing the upper inwardly-facing surface 14b to fold inwards towards the wheels 24 of the vehicle 22. The compression of the material of the security barrier 2 and the inward folding causes the upper inwardly-facing surface 14b to engage with the wheels 24 of the vehicle 22, slowing the vehicle 22.

[0038] Figure 4 shows a series of four stages wherein a vehicle 22 approaches at a fairly low speed a security barrier 2 according to the present invention from substantially perpendicular to it.

[0039] Figure 4a shows the vehicle 22 a short distance away from the security barrier 2.

[0040] Figure 4b shows the front wheels 24 about to engage the security barrier 2.

[0041] Figure 4c shows the vehicle 22 mounting the security barrier 2. The front wheels 24 have mounted the lower inwardly-facing surface 14a of the security barrier 2. At the same time the nose 26 of the vehicle has engaged with the upper inwardly-facing surface 14b of the security barrier 2. The momentum of the vehicle 22 causes the upper inwardly-facing surface 14b of the security barrier 2 to deform to increase the angle between the upper inwardly-facing surface 14b and the lower inwardly-facing surface 14a.

[0042] Figure 4d shows the situation shortly after the vehicle 22 has engaged with the security barrier 2. Because of the resilience of the material used to construct the security barrier 2, the upper inwardly-facing surface 14b has exerted a force on the nose 26 of the vehicle 22 to slow the vehicle 22 and to cause it to reverse course away from the security barrier 22.

[0043] Figure 5 shows a first barrier 2a and a second barrier 2b according to the present invention. Barrier 2a faces outward in respect of the direction of vehicular approach 28. Barrier 2b faces inward in respect of the direction of vehicular approach 28. A vehicle 22 approaches the first barrier 2a in a direction 28 perpendicular to the first barrier 2a.

[0044] Figure 6 shows the same first barrier 2a and second barrier 2b and vehicle 22 as in Figure 5, after the vehicle 22 has overcome the first barrier 2a. The first barrier 2a has rolled in the direction 28 of vehicular approach. The vehicle 22 is now between the first barrier 2a and the second barrier 2b. The vehicle 22 has not been completely stopped by the first barrier 2a. However it does not have enough momentum to overcome the second barrier 2b. The second barrier 2b is deformed by the impact. The resilience of the material of the barriers enables the second barrier 2b to return a force back onto the vehicle 22 to assist in stopping it.

[0045] Figure 7 shows a security barrier 2 with a fence element 30 attached to its top.

Claims

1. A security barrier (2) comprising two elongate elements (10), substantially equal in width, connected together edge to edge (12) to form a barrier (2) with a substantially perpendicular or V-shaped cross-section, wherein the outwardly-facing surfaces (16) of the elongate elements (10) form a deformable arched profile extending between two parts such that the security barrier (2) in an installed condition, rests on the ground on the two parts of the lower of the elongate members (10), **characterized in that** the security barrier (2) is constructed from an elastomeric material.

2. A security barrier according to Claim 1 wherein the elastomeric material is natural or man-made rubber.

3. A security barrier according to Claim 2 wherein the rubber is reclaimed rubber from vehicle tyres.

4. A security barrier according to any preceding claim wherein the angle between the elongate elements (10)is chosen such that the centre of mass of the security barrier (2) lies above the lower of the two elongate elements (10).

5. A security barrier (2) according to Claim 4 wherein the angle between the elongate elements (10) is substantially a right angle.

6. A security barrier (2) according to any preceding claim wherein one or both of the inwardly-facing sur-

faces (14) of the elongate elements (10) is concave in the region nearest the connection (12) between them and convex in the region (18) furthest away from the connection (12) between them.

7. A security barrier (2) according to any preceding claim wherein the region of the connection (12) between the two elongate elements (10) has a convex outer surface (16) and a concave inner surface (14).

8. A security barrier (2) according to any preceding claim wherein the part (18) of the elongate elements (10) furthest away from the connection between (12) the elongate elements (10) have a cross section which forms a section of a circle.

9. A security barrier (2) according to any preceding claim wherein the security barrier (2) is constructed in sections, the sections may be joined by a joining means.

10. A security barrier (2) according to Claim 9 wherein the joining means is one or more chains or ropes or rods passed through one or more openings (20) within the barrier (2).

11. A security barrier (2) according to Claim 9 wherein the joining means is one or more chains or ropes or rods attached externally to the barrier (2).

12. A security barrier (2) according to any preceding Claim in which the width of the elongate elements (10) is substantially between 800 mm and 850 mm.

13. A security barrier (2) according to any of Claims 1 to 11 in which the width of the elongate elements (10) is substantially between 450 mm and 500 mm.

Patentansprüche

1. Sicherheitsbarriere (2), die zwei langgestreckte Elemente (10) aufweist, deren Breite im Wesentlichen gleich ist und die Kante-zu-Kante (12) miteinander verbunden sind, um eine Barriere (2) mit einem im Wesentlichen rechtwinkligen oder V-förmigen Querschnitt zu bilden, wobei die nach außen gewandten Oberflächen (16) der langgestreckten Elemente (10) ein verformbares gekrümmtes Profil bilden, welches sich zwischen zwei Teilen derart erstreckt, dass die Sicherheitsbarriere (2) im angebrachten Zustand auf den zwei Teilen des unteren der langgestreckten Bauelemente (10) auf dem Boden ruht, **dadurch gekennzeichnet, dass** die Sicherheitsbarriere (2) aus einem Elastomer-Material konstruiert ist.

2. Sicherheitsbarriere nach Anspruch 1, wobei das Elastomer-Material natürlicher oder synthetischer Gummi ist.

3. Sicherheitsbarriere nach Anspruch 2, wobei der Gummi recycelter Gummi aus Fahrzeugreifen ist.

4. Sicherheitsbarriere nach einem der vorangehenden Ansprüche, wobei der Winkel zwischen den langgestreckten Elementen (10) derart gewählt ist, dass das Massenzentrum der Sicherheitsbarriere (2) über dem unteren der beiden langgestreckten Elemente (10) liegt.

5. Sicherheitsbarriere (2) nach Anspruch 4, wobei der Winkel zwischen den langgestreckten Elementen (10) im Wesentlichen ein rechter Winkel ist.

6. Sicherheitsbarriere (2) nach einem der vorangehenden Ansprüche, wobei eine oder beide der nach innen gewandten Oberflächen (14) der langgestreckten Elemente (10) im Bereich nächst der Verbindung (12) zwischen diesen konkav und im Bereich (18) am weitesten weg von der Verbindung (12) zwischen ihnen konvex sind.

7. Sicherheitsbarriere (2) nach einem der vorangehenden Ansprüche, wobei der Bereich der Verbindung (12) zwischen den zwei langgestreckten Elementen (10) eine konvexe äußere Oberfläche (16) und eine konkave innere Oberfläche (14) hat.

8. Sicherheitsbarriere (2) nach einem der vorangehenden Ansprüche, wobei der Teil (18) der langgestreckten Elemente (10), der am weitesten weg von der Verbindung (12) zwischen den langgestreckten Elementen liegt, einen Querschnitt hat, der einen Kreisabschnitt bildet.

9. Sicherheitsbarriere (2) nach einem der vorangehenden Ansprüche, wobei die Sicherheitsbarriere (2) in Abschnitten konstruiert ist, wobei die Abschnitte durch eine Verbindungseinrichtung verbunden sein können.

10. Sicherheitsbarriere nach Anspruch 9, wobei die Verbindungseinrichtung eine oder mehrere Kette/n oder Seil/e oder Stange/n ist, die/das durch eine oder mehrere Öffnungen (20) innerhalb der Barriere (2) hindurchgeht/hindurchgehen.

11. Sicherheitsbarriere (2) nach Anspruch 9, wobei die Verbindungseinrichtung eine oder mehrere Kette/n oder Seil/e oder Stange/n ist, die außen an der Barriere (2) angebracht ist/sind.

12. Sicherheitsbarriere (2) nach einem der vorangehenden Ansprüche, wobei die Breite der langgestreckten Elemente (10) im Wesentlichen zwischen 800 mm und 850 mm liegt.

13. Sicherheitsbarriere (2) nach einem der Ansprüche 1 bis 11, wobei die Breite der langgestreckten Elemente (10) im Wesentlichen zwischen 450 mm und 500 mm liegt.

Revendications

1. Barrière de sécurité (2) comprenant deux éléments allongés (10) de largeur sensiblement égale, raccordés ensemble bord à bord (12) pour constituer une barrière (2) ayant une section transversale sensiblement perpendiculaire ou en forme de V, dans laquelle les surfaces (16) tournées vers l'extérieur des éléments allongés (10) constituent un profil cintré déformable s'étendant entre deux parties, de telle sorte que la barrière de sécurité (2), quand elle est installée, repose sur le sol sur les deux parties du plus bas des éléments allongés (10), **caractérisée en ce que** la barrière de sécurité (2) est construite à partir d'une matière élastomère.

2. Barrière de sécurité selon la revendication 1, dans laquelle la matière élastomère est du caoutchouc naturel ou synthétique.

3. Barrière de sécurité selon la revendication 2, dans laquelle le caoutchouc est du caoutchouc régénéré provenant de pneus de véhicule.

4. Barrière de sécurité selon l'une quelconque des revendications précédentes, dans laquelle l'angle entre les éléments allongés (10) est choisi de telle sorte que le centre de gravité de la barrière de sécurité (2) se trouve au-dessus du plus bas des éléments allongés (10).

5. Barrière de sécurité (2) selon la revendication 4, dans laquelle l'angle entre les éléments allongés (10) est pratiquement un angle droit.

6. Barrière de sécurité (2) selon l'une quelconque des revendications précédentes, dans laquelle une des surfaces (14) tournées vers l'intérieur, ou les deux, des éléments allongés (10) est concave dans la zone la plus proche de la jonction (12) entre eux et convexe dans la zone (18) la plus éloignée de la jonction (12) entre eux.

7. Barrière de sécurité (2) selon l'une quelconque des revendications précédentes, dans laquelle la zone de la jonction (12) entre les deux éléments allongés (10) a une surface extérieure (16) convexe et une surface intérieure (14) concave.

8. Barrière de sécurité (2) selon l'une quelconque des revendications précédentes, dans laquelle les parties (18) des éléments allongés (10) les plus éloignées de la jonction (12) entre les éléments allongés (10) ont une section transversale qui forme un secteur circulaire.

9. Barrière de sécurité (2) selon l'une quelconque des revendications précédentes, dans laquelle la barrière de sécurité (2) est construite en sections et les sections peuvent être assemblées par un moyen d'assemblage.

10. Barrière de sécurité (2) selon la revendication 9, dans laquelle le moyen d'assemblage est constitué d'une ou plusieurs chaînes ou cordes ou tiges passées par une ou plusieurs ouvertures (20) à l'intérieur de la barrière (2).

11. Barrière de sécurité (2) selon la revendication 9, dans laquelle le moyen d'assemblage est constitué d'une ou plusieurs chaînes ou cordes ou tiges fixées à l'extérieur de la barrière (2).

12. Barrière de sécurité (2) selon l'une quelconque des revendications précédentes, dans laquelle la largeur des éléments allongés (10) est comprise pratiquement entre 800 mm et 850 mm.

13. Barrière de sécurité (2) selon l'une quelconque des revendications 1 à 11, dans laquelle la largeur des éléments allongés (10) est comprise pratiquement entre 450 mm et 500 mm.

Fig.1

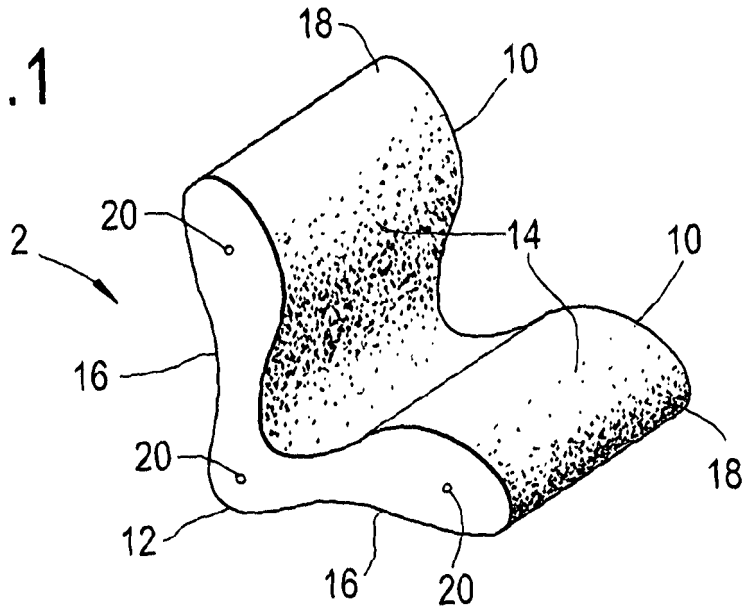


Fig.2

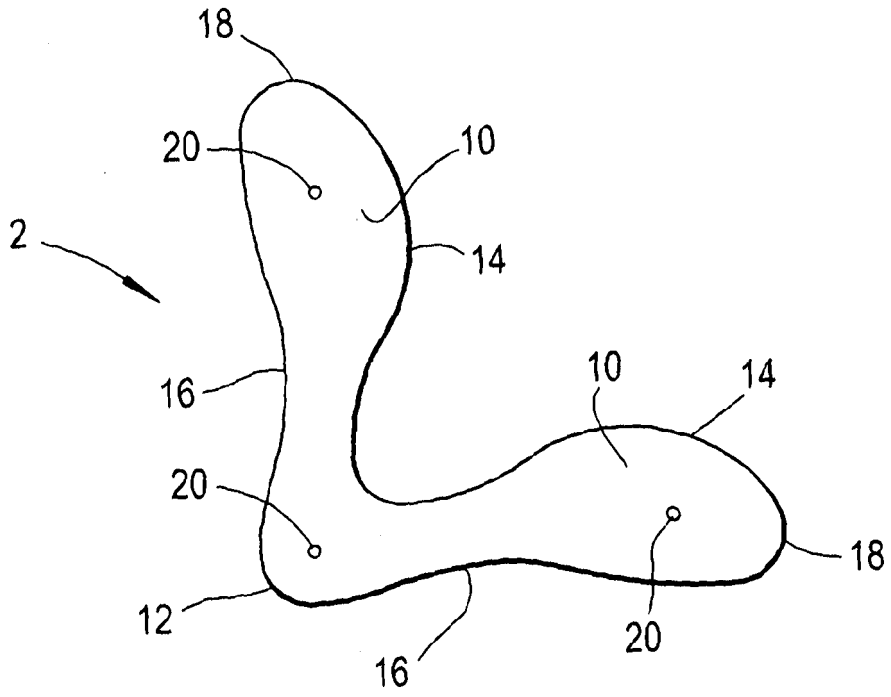


Fig.3a

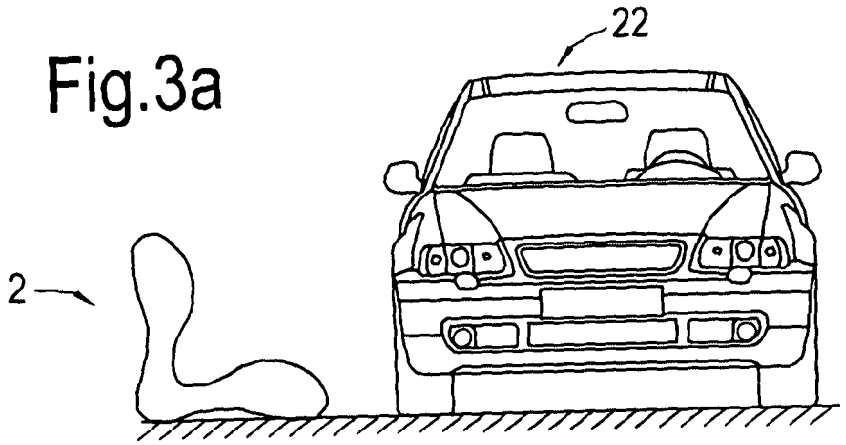


Fig.3b

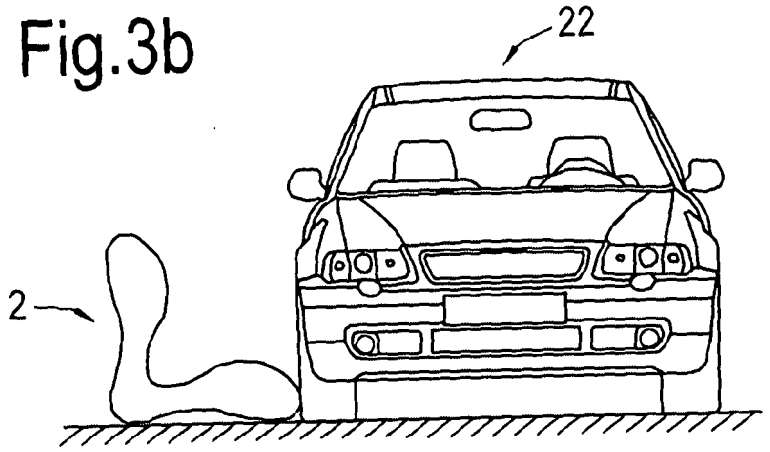


Fig.3c

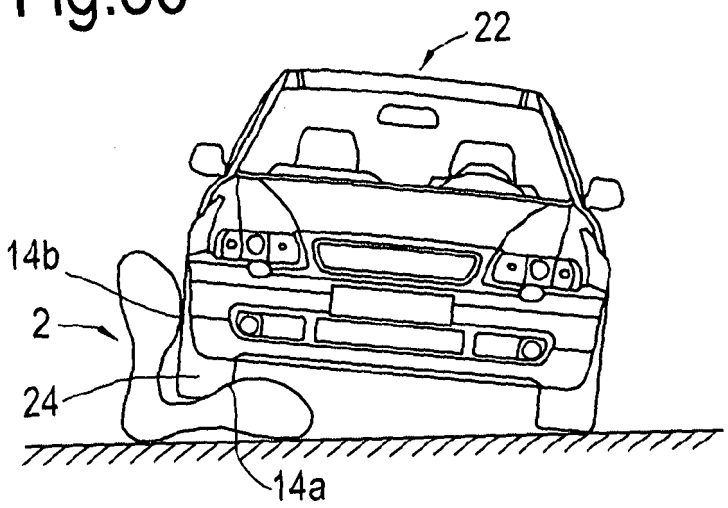


Fig.4a

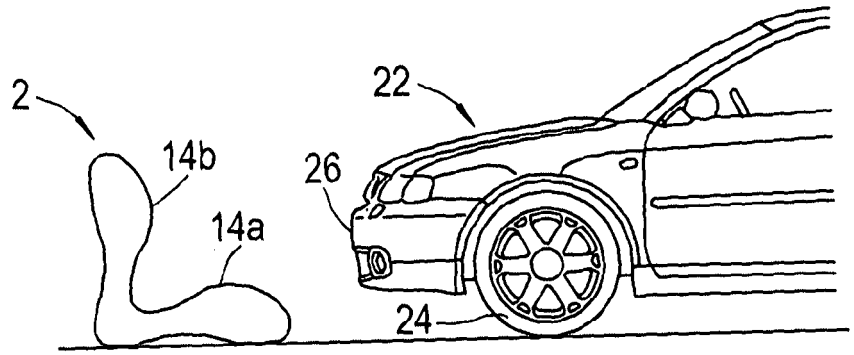


Fig.4b

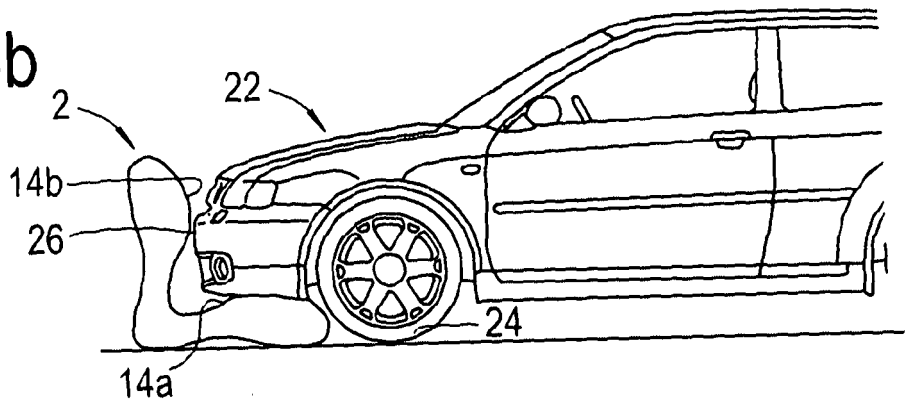


Fig.4c

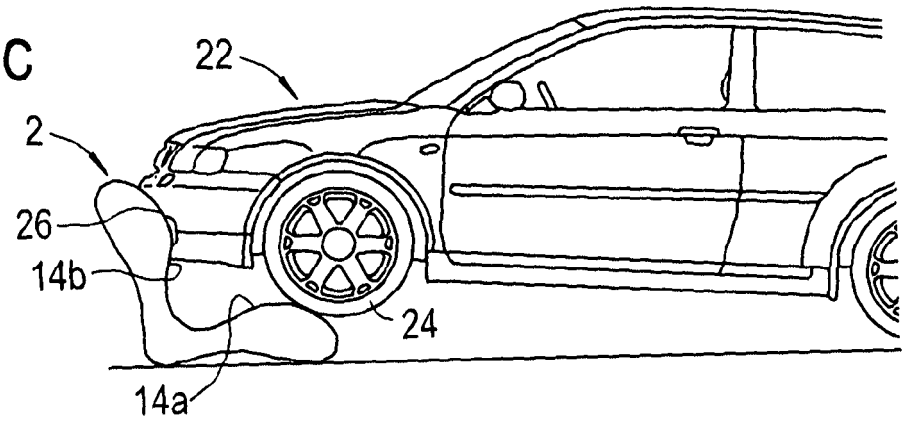
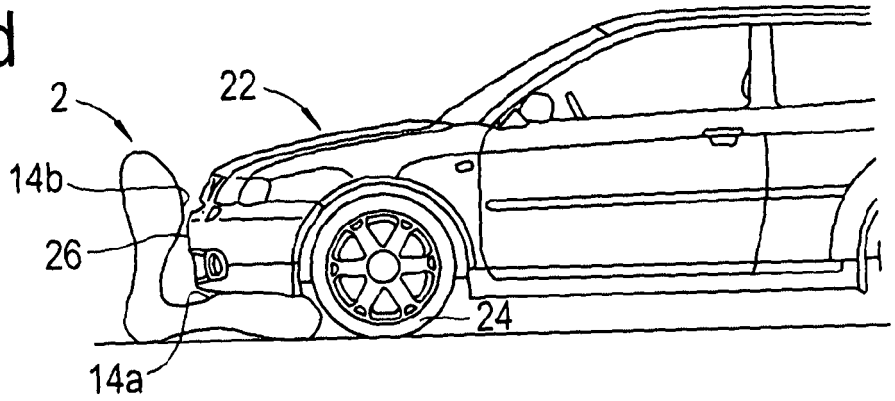


Fig.4d



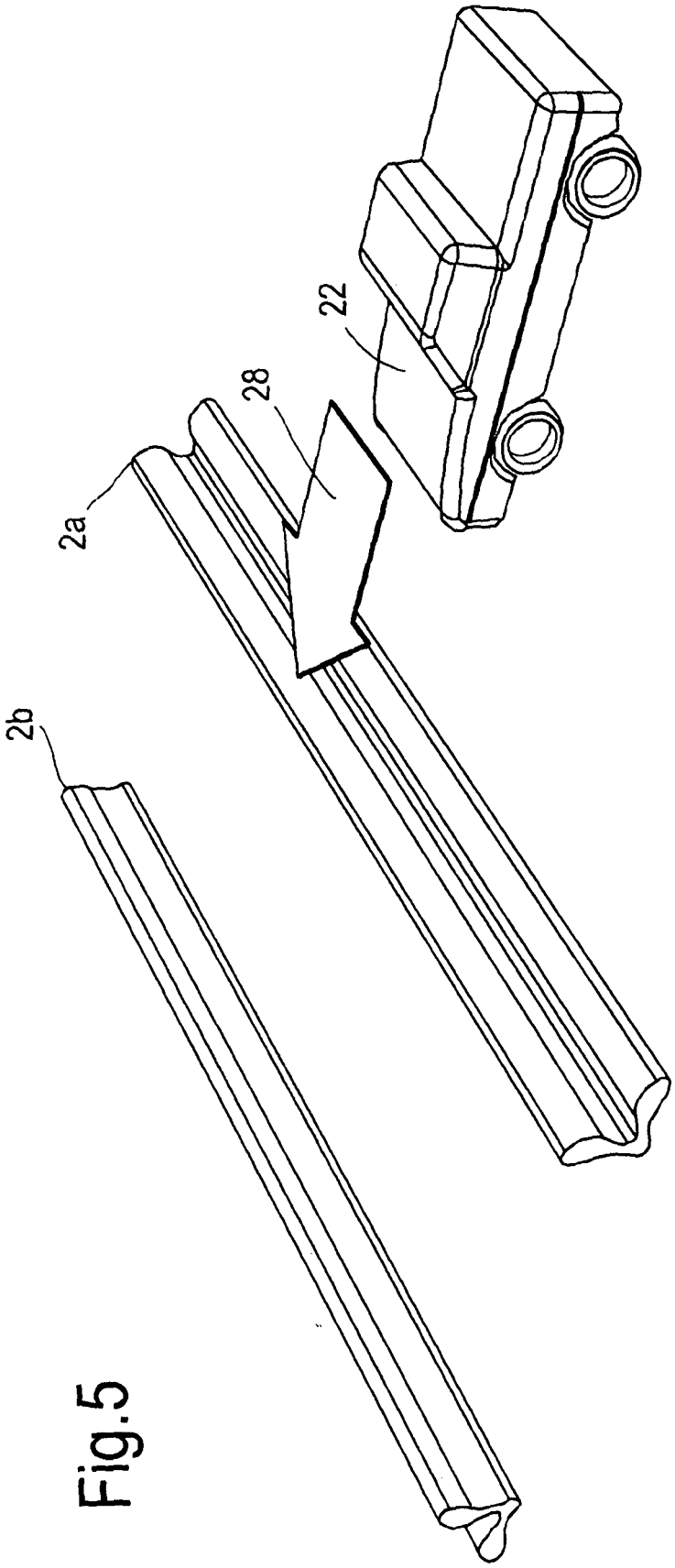


Fig.5

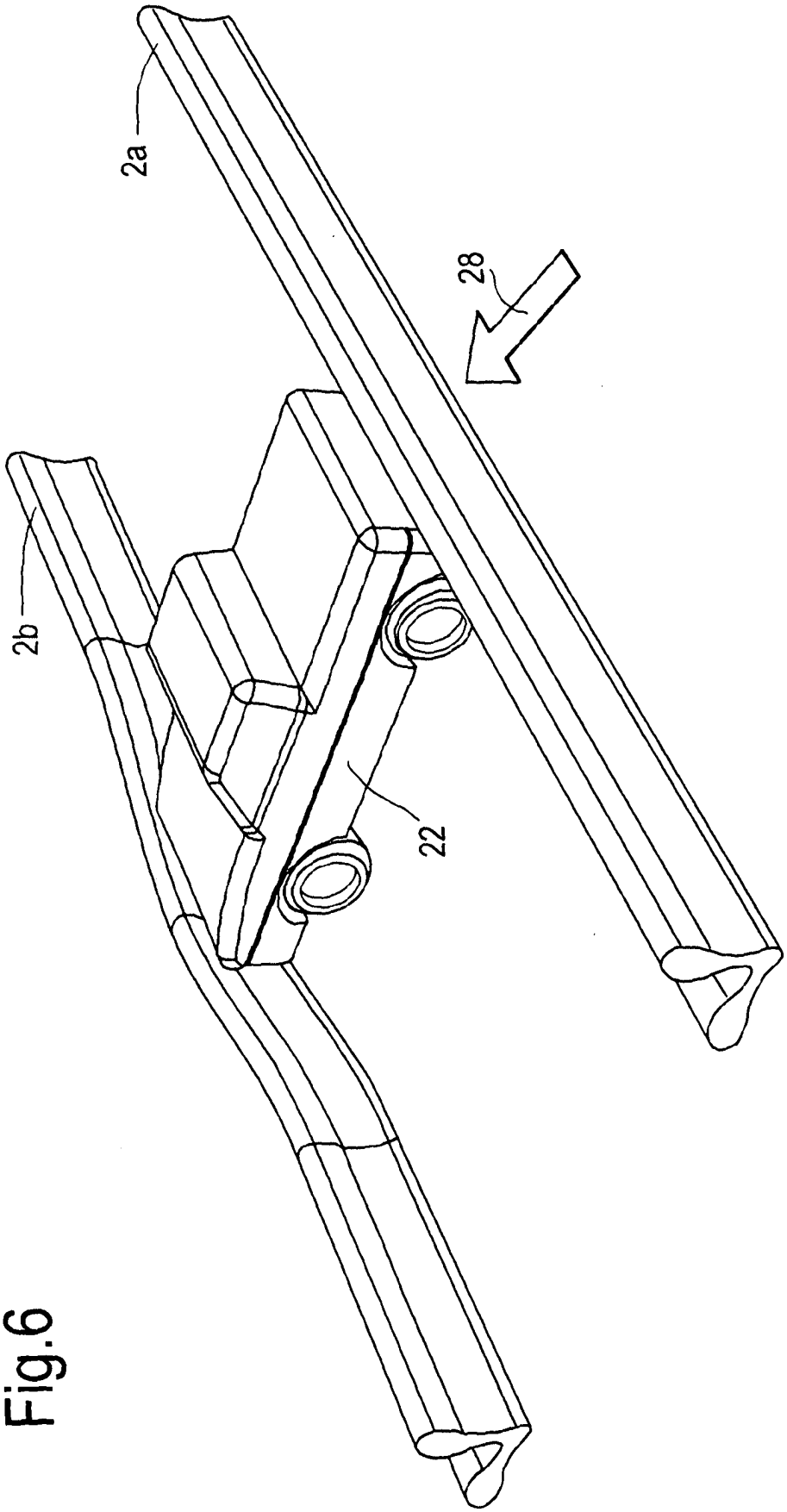


Fig.6

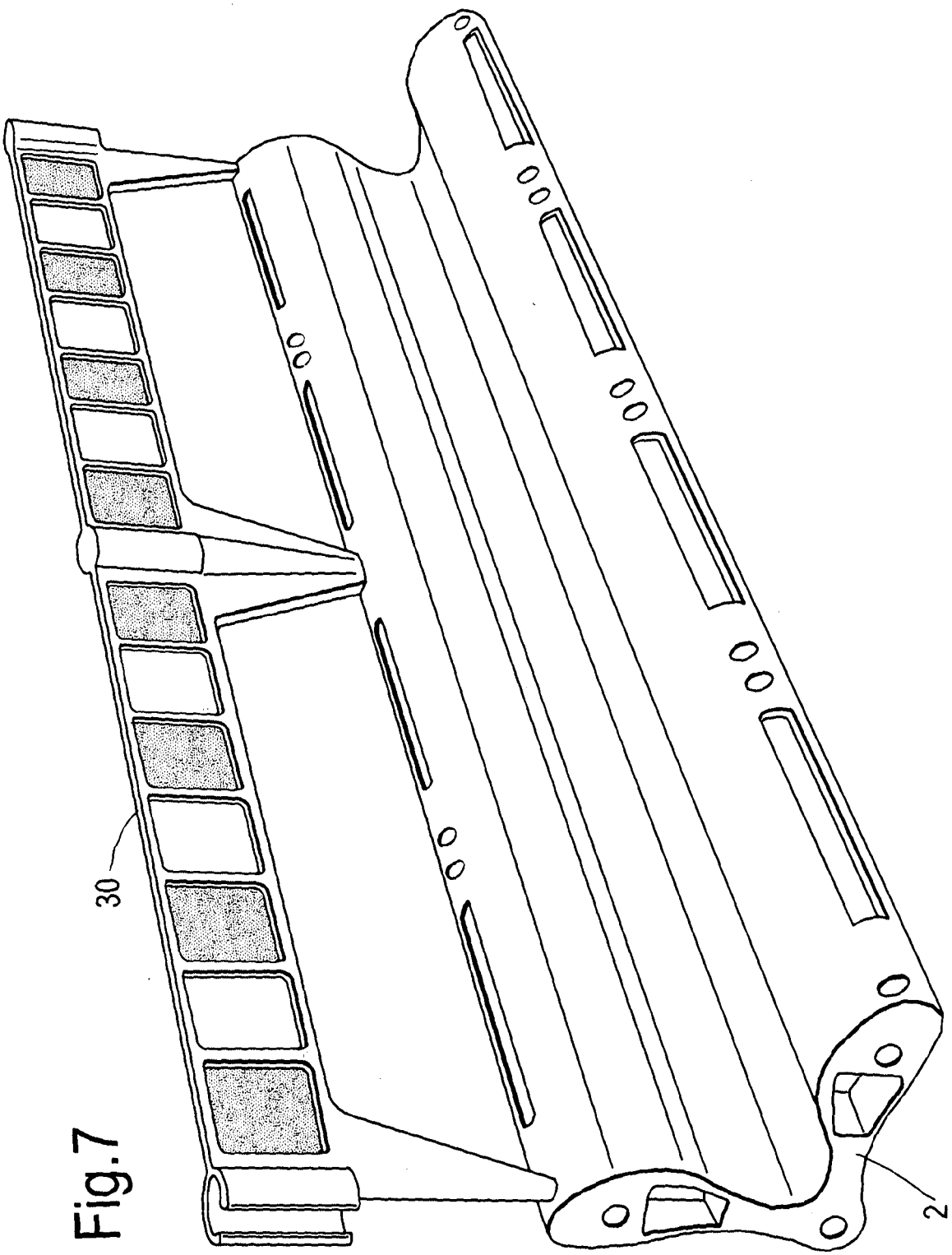


Fig.7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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