A composite armor plating, especially for installation in motor vehicles, is provided, and comprises individual plates having an outer layer, of a protective material of great hardness, and an inner layer of a fiber material of lesser hardness. Respective steel edge reinforcements of predetermined thickness that each extend along at least one outer edge of each of the plates are provided. Each edge reinforcement covers at least a side edge of the outer layer, and is fixedly connected with such plate.
COMPOSITE ARMOR PLATING, PARTICULARLY FOR INSTALLING IN MOTOR VEHICLES

[0001] The invention relates to a composite armor plating, especially for installation in motor vehicles, comprising individual plates having an outer layer, of a protective material of great hardness, and an inner layer of a fiber material of lesser hardness. Such plates are known, whereby the protective material of great hardness that forms the outer layer, can, for example, be a ceramic material, while the fiber material of lesser hardness that forms the inner layer can, for example, be a glass fiber composite.

[0002] A problematic region of such composite armor plating plates is the region of the outer edges, where the individual plates can abut one another. This region forms a weak point of the armor plating, especially against projectiles that strike this region at an angle. There then exists the danger that the plate will break off in the edge region, and the projectile, or portions of the projectile, can pass by the outer edge of the plate, or between two plates, into the interior of the vehicle. This is particularly critical if the outer edges of the plate or plates are aligned with the edge between the vehicle door and the body of the vehicle.

[0003] It is an object of the invention to embody the composite armor plating having the features described above and also in the introductory portion of claim 1 in such a way that each individual plate also ensures an adequate protection in the region of its outer edge or edges, even against projectiles that strike at an angle.

[0004] The realization of this object is inventively effected by the features of the characterizing portion of claim 1. Advantageous further developments of the inventive composite armor plating are described in the dependent claims.

[0005] The basic concept of the invention is that each plate of the composite armor plating is provided, along at least one of its outer edges, with an additional edge reinforcement that covers the outer layer at the side edge, with the edge reinforcement comprising a steel having good strength characteristics, and protecting the region of the outer edge of the plate from breaking or splitting off. It has been shown to be particularly advantageous for this edge reinforcement to have an angular profiled strip or bar, the first leg of which is guided along the side edge of the outer layer perpendicular to the surface of the plate, while the second leg extends parallel to the surface of the plate and is integrated into the plate. It is furthermore advantageous if the first leg of the angular profiled strip that is guided along the outer layer project beyond the outer surface of the outer layer by a predetermined length. The connection between the edge reinforcement and the layers of the plate can be effected by means of an adhesive.

[0006] One exemplary embodiment for a composite armor plating pursuant to the invention will be described in greater detail subsequently with the aid of the accompanying drawing.

[0007] The drawing shows a portion of a plate of a composite armor plating in the region of its outer edge. The plate has an outer layer 1, for example of a ceramic material, that is connected via an adhesive layer 4.1 with an inner layer 2, for example of a glass fiber composite. Disposed in the region of the outer edge of the plate is an edge reinforcement that is provided with an angular profiled strip or bar 3 of a steel having good strength characteristics. The angular profiled strip 3 is disposed on the outer edge in such a way that its first leg 3.1 extends perpendicular to the surface of the plate, covers the side edge of the outer layer 1, and extends a certain amount beyond the surface of the outer layer. The second leg 3.2 of the angular profiled strip 3 extends parallel to the surface of the plate and is integrated into the plate, and in particular is integrated into the inner layer 2 in such a way that a side facing the outer layer extends flush with the interface or plane of separation between the outer layer 1 and the inner layer 2. The second leg 3.2 is disposed below the outer layer 1 over a predetermined length. The connection between the second leg 3.2 of the angular profiled strip 3 and the inner layer 2 is effected via an adhesive 4, and its connection with the outer layer 1 is effected via an adhesive 4.2.

[0008] In the drawing, it is indicated that projectiles 5.1, which strike in the region of the outer edge, as well as projectiles 5.2, which come in at an angle to the surface of the plate in a direction toward the outer edge, cannot cause the plate to break or split off in the region of the outer edge, since this outer edge is protected by the edge reinforcement, i.e. the angular profiled strip 3.

1-6. (canceled)
7. A composite armor plating comprising:
   individual plates having an outer layer, of a protective material of great hardness, and an inner layer of a fiber material of lesser hardness; and
   respective steel edge reinforcements of predetermined thickness that each extend along at least one outer edge of each of said plates, wherein said edge reinforcement covers at least a side edge of said outer layer, and wherein said edge reinforcement is fixedly connected with said plate.
8. A composite armor plating according to claim 7, wherein said edge reinforcement is provided with an angular profiled strip having a first leg, which extends parallel to a surface of said plate and covers said side edge of said outer layer, and a second leg that extends below said plate surface and parallel thereto.
9. A composite armor plating according to claim 8, wherein said second leg of said angular profiled strip extends below said outer layer with a predetermined length in a region between said outer layer and said inner layer.
10. A composite armor plating according to claim 9, wherein said second leg of said angular profiled strip is integrated into said inner layer, and a side thereof that faces said outer layer extends flush with a separating plane between said outer layer and said inner layer.
11. A composite armor plating according to claim 8, wherein said first leg of said angular profiled strip projects beyond an outer surface of said outer layer by a predetermined length.
12. A composite armor plating according to claim 7, wherein a connection between said edge reinforcement and said outer layer 1 and/or said inner layer of said plate is effected by means of an adhesive.