

Abstract

The present invention relates to a method for producing a safety net, to a safety net, and to the use of such a safety net for protection from avalanches, falling rock or timber, mudslides, earth flows, or for slope protection. In the inventive method, firstly at least a first net element and at least a second net element are individually produced, self-contained, from respectively at least one rope, and are arranged parallel to each other and at a distance apart in a longitudinal direction of the safety net to be formed. Then the two net elements are connected to each other with the aid of at least one connecting rope, wherein the connecting rope is guided between the first and the second net element such that a self-contained connecting net element is obtained.

(Fig. 1)

Patent claims

1. A method for producing a safety net (100, 200, 300), in particular for protection from avalanches, falling rock or timber, mudslides, earth flows, or for slope stabilization, in which method
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- firstly at least a first net element (101, 201, 301) and at least a second net element (102, 202, 302) are individually produced, self-contained, from respectively at least one rope (104, 204, 304), and the ropes (104, 204, 304, 104', 204', 304') of the first net element (101, 201, 301) and of the second net element (102, 202, 302) are here guided such that each of the net elements thus produced has a plurality of rope junctions (105, 105', 205, 205', 305, 305'), where respectively at least two rope portions (104a, 204a, 304a and 104b, 204b, 304b) intersect, and
 - the first net element (101, 201, 301) and the second net element (102, 202, 302) are arranged parallel to each other and at a distance apart in a longitudinal direction (L) of the safety net (100, 200, 300) to be formed, so that a first net edge portion (106, 206, 306) of the first net element (101, 201, 301) is facing a second net edge portion (106', 206', 306') of the second net element (102, 202, 302),
- wherein the first net element (101, 201, 301) has a plurality of first rope edge portions (107, 107, 107) arranged in the first net edge portion (106, 206, 306), which run between respectively two rope junctions (105, 205, 305) and are facing the second net edge portion (106', 206', 306'), and the second net element (102, 202, 302) has a plurality of second rope

edge portions (107', 207', 307'), arranged in the second net edge portion (106', 206', 306'), which run between respectively two rope junctions (105, 105', 205, 205', 305, 305') and
5 are facing the first net edge portion (106, 206, 306),

and then

- with the aid of at least one connecting rope (108, 208, 308), at least a part of the first
10 rope edge portions (107, 207, 307) of the first net element (101, 201, 301) is connected to at least a part of the second rope edge portions (107', 207', 307'), facing the first rope edge portions (107, 207, 307), of the second net
15 element (102, 202, 302), wherein

- the at least one connecting rope (108, 208, 308) is guided between the first net element (101, 201, 301) and the second net element (102, 202, 302) such that a self-contained connecting net
20 element (103, 203, 303) having a plurality of connecting rope junctions (109, 209, 309), where respectively at least two connecting rope portions (108a, 208a, 306a and 108b, 208b, 308b) intersect, is obtained. ✓

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2. The method as claimed in claim 1, wherein at least the first net element (101, 201, 301) and the second net element (102, 202, 302) are produced respectively from just a single rope (104, 104',
30 204, 204', 304, 304').

3. The method as claimed in claim 1 or 2, wherein just a single connecting rope (108, 208, 308) is guided between the first net element (101, 201, 301) and the second net element (102, 202, 302).
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4. The method as claimed in one of claims 1 to 3, wherein the connection of the respective rope edge

portions (107, 107', 207, 207', 307, 307') of the first net element (101, 201, 301) and of the second net element (102, 202, 302) to the connecting rope (108, 208, 308) is realized by looping, welding, with the aid of guide means and/or with the aid of clamping means.

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5. The method as claimed in one of claims 1 to 4, wherein the first net edge portions (106, 206, 306) of the first net element (101, 201, 301) and/or the second net edge portions (106', 206', 306') of the second net element (102, 202, 302) are movable relative to the connecting rope (108, 208, 308) of the connecting net element (103, 203, 303).

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6. The method as claimed in one of claims 1 to 5, wherein the ends of the ropes (104, 204, 304) of the first net element (101, 201, 301) and/or the ends of the ropes (104', 204', 304') of the second net element (102, 202, 302) and/or the ends of the connecting rope (108, 208, 308) of the connecting net element (103, 203, 303) are respectively oppositely directed and are self-contained by means of a permanent connection (112, 212), preferably by means of clamps.

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7. The method as claimed in one of claims 1 to 6, wherein intersecting rope portions (104a, 104a', 204a, 204a', 304a, 304a' and 104b, 104b', 204b, 204b', 304b, 304b') of the ropes (104, 104', 204, 204', 304, 304'), at at least a part of the rope junctions (105, 105', 205, 205', 305, 305'), and/or intersecting rope portions (108a, 108b, 208a, 208b, 308a, 308b) of the connecting ropes (108, 208, 308), at at least a part of the connecting rope junctions (109, 209, 309), are connected by welding and/or potting and/or by

means of ferrules and/or by means of clamps, in particular by means of stirrup clamps and/or cross clamps (113, 114, 213, 214, 313, 314).

- 5 8. The method as claimed in one of claims 1 to 7, wherein, for the production of the net elements (101, 201, 301, 102, 202, 302) and/or of the connecting net element (103, 203, 303), wire ropes of steel, preferably of galvanized steel, are used.
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9. The method as claimed in one of claims 1 to 8, wherein the first net element (101, 201, 301) and the second net element (102, 202, 302) are produced in identical construction in terms of their size and shape.
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10. The method as claimed in claim 9, wherein the first net element (101, 201, 301), the second net element (102, 202, 302) and the connecting net element (103, 203, 303) are produced in identical construction in terms of their size and shape.
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11. The method as claimed in one of claims 1 to 9, wherein the ropes (104, 104') of the first net element (101) and of the second net element (102) are guided such that each of the net elements thus produced has in the longitudinal direction (L) of the safety net (100) a plurality of rows (R) of rope junctions (105, 105') and in a transverse direction (Q) running at right angles to the longitudinal direction (L) of the safety net (100) a plurality of columns (S) of rope junctions (105, 105'), and
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- 35 the at least one connecting rope (108) is guided between the first net element (101) and the second net element (102) such that a self-contained connecting net element (103) having just a single

column (S) of connecting rope junctions (109), which column is arranged in the transverse direction (Q) of the safety net (100), is obtained.

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12. The method as claimed in one of claims 1 to 10, wherein the ropes (204, 204') of the first net element (201) and of the second net element (202) are guided such that each of the net elements thus produced has just a single column (S) of rope junctions (205, 205'), which column is arranged in a transverse direction (Q) arranged at right angles to the longitudinal direction (L) of the safety net (200), and

15 the at least one connecting rope (208) is guided between the first net element (201) and the second net element (202) such that a self-contained connecting net element (203) having just a single column (S) of connecting rope junctions (209), which column is arranged in the transverse direction (Q) of the safety net (200), is obtained.

13. The method as claimed in one of claims 1 to 10, wherein the ropes (304, 304') of the first net element (301) and of the second net element (302) are guided such that each of the net elements thus produced has in the longitudinal direction (L) of the safety net (300) a plurality of rows (R) of rope junctions (305, 305') and in a transverse direction (Q) arranged at right angles to the longitudinal direction (L) of the safety net (300) a plurality of columns (S) of rope junctions (305, 305'), and

35 the at least one connecting rope (308) is guided between the first net element (301) and the second net element (302) such that a self-contained

connecting net element (303) having a plurality of rows (R), arranged in the longitudinal direction (L) of the safety net (300), and a plurality of columns (S), arranged in the transverse direction (Q) of the safety net, of connecting rope junctions (309) is obtained.

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14. A safety net (100, 200, 300), in particular for protection from avalanches, falling rock or timber, mudslides, earth flows, or for slope stabilization, consisting of
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- 15 a) at least a first net element (101, 201, 301), which is individually produced, self-contained, from at least one rope (104, 204, 304) and has a plurality of rope junctions (105, 205, 305), where respectively at least two rope portions (104a, 204a, 304a and 104b, 204b, 304b) intersect, and
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- 20 b) at least a second net element (102, 202, 302), which is individually produced, self-contained, from at least one rope (104', 204', 304') and has a plurality of rope junctions (105', 205', 305'), where respectively at least two rope portions (104a', 204a', 304a' and 104b', 204b', 304b') intersect, and is arranged with respect to the first net element (101, 201, 301) in parallel and at a distance apart in a longitudinal direction (L) of the safety net (100, 200, 300), so that a first net edge portion (106, 206, 306) of the first net element (101, 201, 301) is facing a second net edge portion (106', 206', 306') of the second net element (102, 202, 302),
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- wherein the first net element (101, 201, 301) has a plurality of first rope edge portions (107, 207, 307) arranged in the first net

edge portion (106, 206, 306), which run between respectively two rope junctions (105, 205, 305) and are facing the second net edge portion (106', 206', 306'), and

5 wherein the second net element (102, 202, 302) has a plurality of second rope edge portions (107', 207', 307') arranged in the second net edge portion (106', 206', 306'), which run between respectively two rope
10 junctions (105', 205', 305') and are facing the first net edge portion (106, 206, 306),

and

c) at least one connecting net element (103, 203, 303), which is produced, self-enclosed,
15 from at least one connecting rope (108, 208, 308) and has a plurality of connecting rope junctions (109, 209, 309), where respectively at least two connecting rope portions (108a, 208a, 308a and 108b, 208b, 308b) intersect,

20 ← wherein, with the aid of the at least one connecting rope (108, 208, 308), at least a part of the first rope edge portions (107, 207, 307) of the first net element (101, 201, 301) is connected to at least a part of the
25 second rope edge portions (107', 207', 307') of the second net element (102, 202, 302) which are facing the first rope edge portions (107, 207, 307) of the first net element (101, 201, 301).

30 15. The use of a safety net (100, 200, 300) as claimed in claim 14 for protection from avalanches, falling rock or timber, mudslides, earth flows, or for slope stabilization.

35 Dated this 19 day of March 2013.


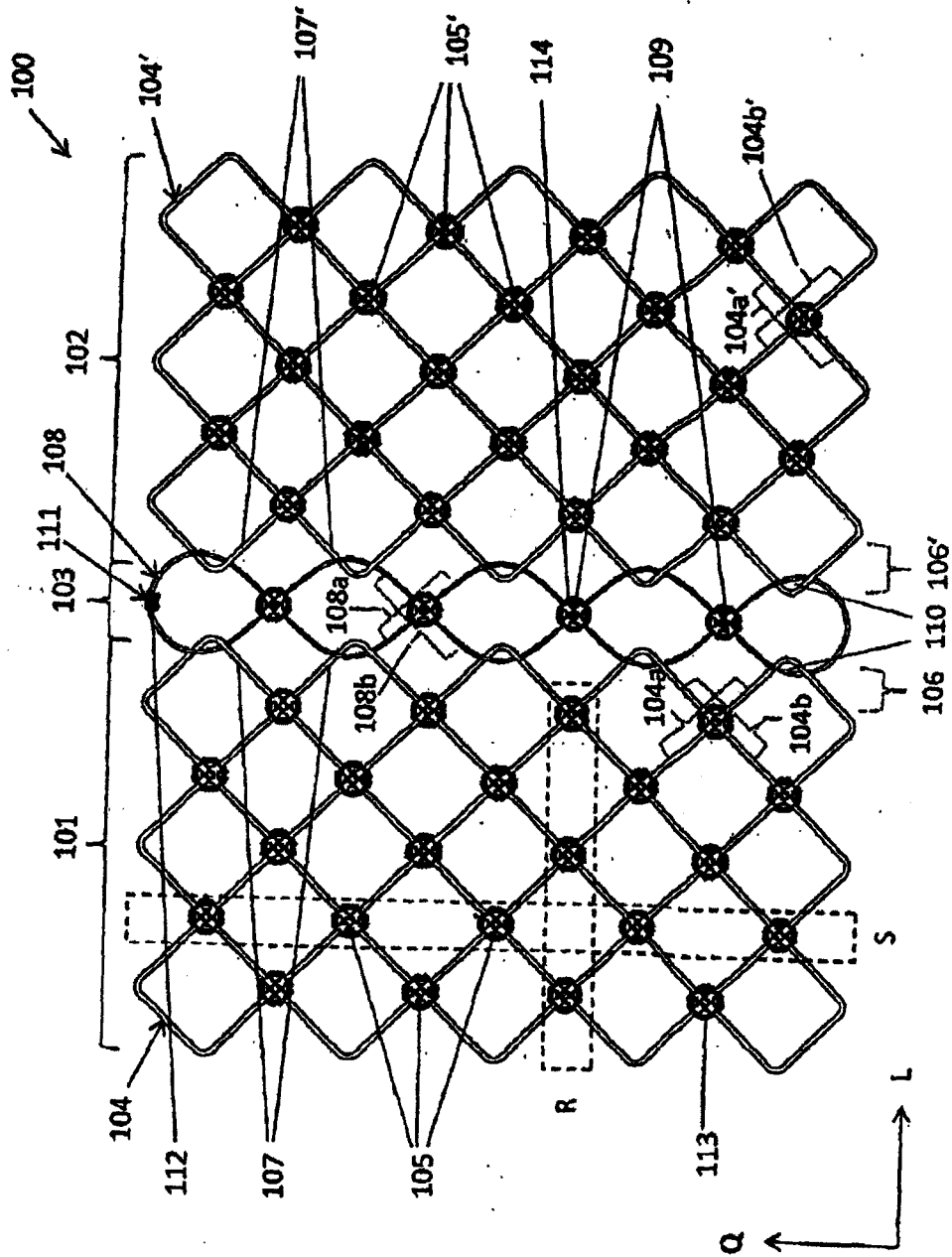

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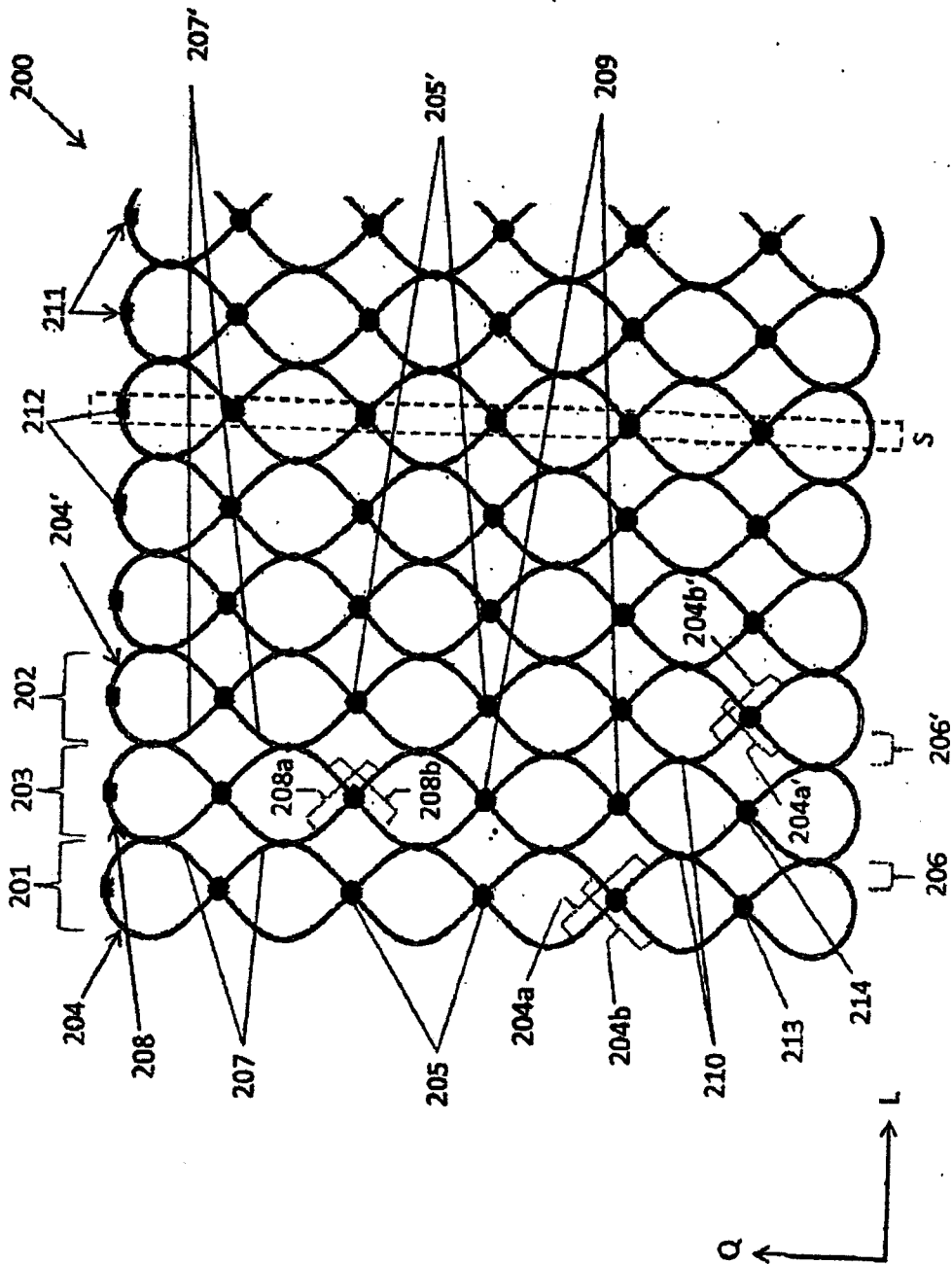
Figure 1



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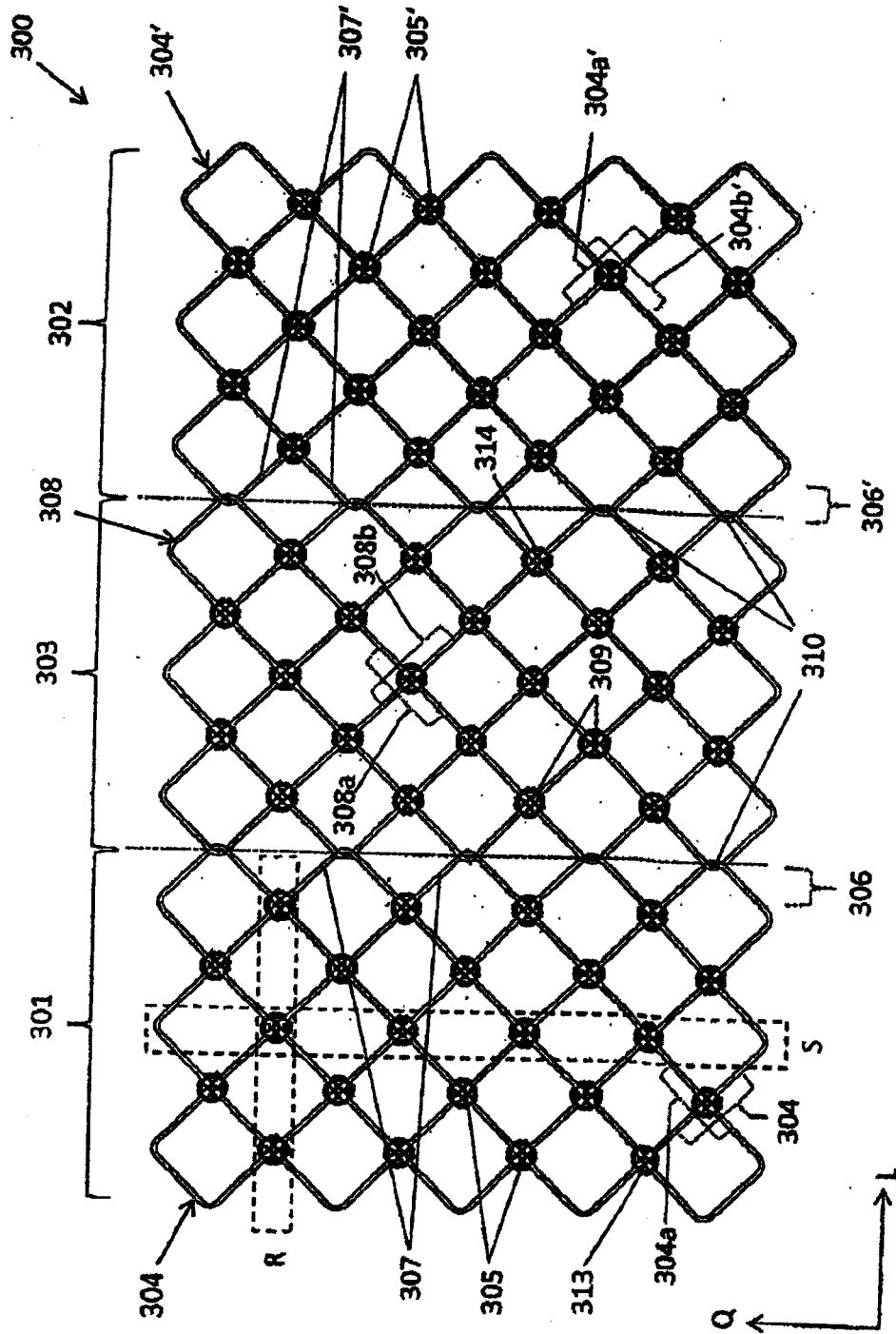
Figure 2



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Figure 3



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Safety net

The present invention relates to a method for producing a safety net, to a safety net, and to the use of such a safety net for protection from avalanches, falling rock
5 or timber, mudslides, earth flows, or for slope stabilization. ✓

Safety nets of the abovementioned type are installed for this purpose on a slope, for example, in order that
10 falling rocks, wood, snow avalanches or similar are securely captured. ✓

Such safety nets are known, for example, from EP-B-0 979 329. In these safety nets, a coherent mesh netting
15 is woven out of individual wire strands, wire ropes or wire bundles. These wire nets are produced such that they are ready for installation and are then rolled up for storage and transport. A relatively large amount of space is therefore required for this. A further
20 drawback consists of the fact that the prefabricated nets in the rolled-up state are under tension, so that they uncurl explosively when the net roll is opened. If such a net roll accidentally becomes undone and opens during transport, particularly by helicopter, this
25 presents a serious hazard. Yet even at the site of installation itself, the opening of the net roll, for the above-stated reason, poses high risk of injury for the installers. ✓

30 For transport and installation reasons, considerable importance is attached to the weight of such safety nets, particularly in mountain regions, since they must often be installed at poorly accessible locations in pathless terrain and must often be installed by the use
35 of helicopter. Particularly where thick wire ropes are used to produce a wire rope safety net having high

load-bearing capacity, transport is made more difficult due to the bulkiness of a completely prefabricated net.

5 One object of the present invention is therefore to provide a method for producing a flexible, hard-wearing and weatherproof safety net of the type mentioned in the introduction, which allows simple, rapid and unproblematic production, storage, transportability and installation of the safety net.

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This object is achieved by the inventive method as claimed in claim 1 for producing a safety net and by a safety net of this kind as claimed in claim 14. Preferred embodiments are the subject of the dependent claims.

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The inventive method for producing a safety net comprises the following steps:

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- Firstly at least a first and at least a second net element are individually produced, self-contained, from respectively at least one rope. The ropes of the first and of the second net element are here guided such that each of the net elements thus produced has a plurality of rope junctions, where respectively two rope portions intersect.

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The first and the second net element are arranged parallel to each other and at a distance apart in a longitudinal direction of the safety net to be formed, so that a first net edge portion of the first net element is facing a second net edge portion of the second net element. The first net element here has a plurality of first rope edge portions arranged in the first net edge portion, which run between respectively two rope junctions and are facing the second net edge portion, and the second net element has a plurality of second rope edge portions, arranged in the second net edge

portion, which run between respectively two rope junctions and are facing the first net edge portion.

5 - Next, with the aid of at least one connecting rope, at least a part of the first rope edge portions of the first net element is connected to at least a part of the second rope edge portions, facing the first rope edge portions, of the second net element.

10 The at least one connecting rope is here ^{by} guided between the first and the second net element such that a self-contained connecting net element having a plurality of connecting rope junctions, where respectively two connecting rope portions intersect,
15 is obtained.

The inventive method enables the production of a safety net for protection from avalanches, falling rock or timber, mudslides, earth flows, or for slope
20 stabilization, in a simple manner.

Typically, such safety nets must be transported into pathless terrain and installed there under difficult installation conditions. The inventive method is in
25 particular advantageous since the individual net elements can be produced, stored and transported individually. Thus there is no need to transport a large, heavy and bulky net, but rather it is possible to transport individual net elements and to complete
30 the safety net at the site of installation, or at least in the vicinity thereof.

The inventive method is not, of course, limited to the production of a net consisting merely of two net
35 elements connected by a connecting net element, but rather, within the meaning of the invention, any number of net elements can be connected by respectively a connecting net element arranged between two net

elements. The inventive method thus allows simple adaptation of the size of the safety net according to requirement: The length of the safety net can be varied, on the one hand, via the length of the
5 individually produced net elements and/or of the connecting net element and, on the other hand, via the number of net elements which are connected to one another by connecting net elements. By virtue of the inventive method, an already prefabricated net can be
10 retrofitted with additional net elements.

At this point it should be mentioned that, according to the invention, the individual net and/or connecting net elements do not necessarily have to have the same
15 height. As the height of the net or connecting net elements is here regarded the direction transverse to the longitudinal direction of the safety net. In this respect, it is not essential for the net and/or connecting net elements, in the longitudinal direction
20 of the safety net, to have a same number of rows of junctions. It is thereby possible by virtue of the inventive method to produce a safety net which can be adapted specifically to the local conditions, including in terms of the height of the net and/or connecting net
25 elements.

A further advantage of a safety net produced according to the method of the present invention lies in the fact that damaged net elements can be replaced by new ones,
30 by an individual damaged net element being removed in its entirety and by a new replacement net element being arranged parallel to and at a distance from the existing safety net, so that the replacement net element according to the inventive method can be
35 connected to the existing safety net. Similarly, by virtue of the inventive method, pre-existing safety nets can be retrofitted with additional net elements.

Moreover, holding and fastening ropes can be threaded directly into the net without further connecting means, which in turn allows a material and weight reduction. In general, such safety nets are fastened at their
5 upper and lower edge to supporting ropes.

Particularly in the case of an articulated connection of net and connecting net elements of the inventive safety net, the net elements and, according to the
10 embodiment of the safety net, possibly also the connecting net elements, can be folded in a zigzag pattern and placed one upon the other, and it is possible to introduce supporting ropes directly into the folded net. Installation in the terrain, and
15 particularly under confined spatial conditions, is thereby made considerably easier, since the net does not have to be extended in length for the fitting of fastening ropes.

20 The inventive net production is also possible as a line production and allows both a manual production of the safety net and a partially automatic or fully automatic production.

25 According to a preferred embodiment of the invention, at least the first and second net element are produced respectively from just a single rope. The connection of the two ends of the rope, or connecting rope, is preferably realized such that the two oppositely
30 directed rope ends are connected in an overlap region, preferably by means of press-clamping, welding or potting. The fact that the two rope ends are oppositely connected means that they can also absorb large tensile forces and the net elements are particularly stable.

35 In a preferred embodiment of the invention, just a single connecting rope is guided between the first and the second net element. As stated above, at least a

part of the respective first rope edge portions of the first net element is here connected to at least a part of the second rope edge portions, lying opposite the first rope edge portions, of the second net element.

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The connection of the respective rope edge portions of the first and of the second net element to the connecting rope is realized at connection points located respectively between the respective rope junctions of the connected rope edge portions. In particular, the connection of the respective rope portions of the first and of the second net element to the connecting rope is preferably realized by looping and/or welding and/or with the aid of guide means and/or with the aid of clamping means. In contrast to clamping means, the ropes are not clamped in guide means, but merely guided. That is to say that the guide means is displaceable along the two respective connected rope portions. In this regard, it is also possible, of course, for the guide means to be configured such that it is fixed to a rope portion and is merely displaceable along the other rope portion which is to be connected. As the guide means, sleeves or rings, for example, can be used. In terms of clamping means, clamps, in particular cross clamps, stirrup clamps or ferrules, can be used in a known manner.

A connection of the respective rope edge portions of the first and of the second net element to the connecting rope by looping or by means of guide means is particularly preferred, for it enables an articulated connection of the net elements to the connecting net element in the region of the connection points. Such an articulated connection allows a zigzag-like folding together and/or rolling up of the safety net transversely to the longitudinal direction of the

safety net, which makes the storage and transport of the safety net considerably easier. <

In the welding or looping of the rope edge portions to the connecting rope, material savings can once again be made, since no additional connecting means are necessary. As already mentioned, this is particularly advantageous, since a weight reduction of the safety net, especially when used in mountain regions, is beneficial for transport and installation reasons.

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According to a particularly preferred embodiment of the invention, all first rope edge portions of the first net element are connected to all second rope edge portions of the second net element with the aid of the at least one connecting rope. ✓

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According to a further preferred embodiment of the invention, the first net edge portions of the first net element and/or the second net edge portions of the second net element are movable relative to the connecting rope of the connecting net element. This means that the respective rope edge portions are displaceable along the connecting rope between the two respective rope junctions, or at least articulately connected. ✓

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This mobility of the net edge portions relative to the connecting rope allows stresses generated, in particular, in the absorption of heavy dynamic loads in the safety net to be ideally distributed. The local force effect of the impacting loads can thereby be distributed evenly in all directions, which ensures a particularly high energy or force absorption capacity. The described mobility of the net edge portions also lends the safety net a particularly high flexibility, which means that the safety net, in the absorption of loads, can plastically deform in the direction of pull of the weight and can thus dissipate the high kinetic

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energy which is generated upon the impact of loads. Furthermore, the mobility of the net edge portions relative to the connecting rope allows greater adaptability of the net to the nature of the terrain.

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Due to the above characteristics, the connection of the rope edge portions to the connecting rope by looping is particularly preferred, since it allows, on the one hand, the mobility of the net edge portions relative to the connecting rope and, on the other hand, a reduction in weight. As mentioned further above, the net elements can thereby be folded in a zigzag pattern and placed one upon the other. Apart from the advantage of easier transportability of the safety net which has been folded in this way, supporting or fastening ropes can be introduced directly into the folded net. This yields considerable space savings, since, both in production and installation, the net does not have to be spread out in length and hence much smaller distances must be covered.

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According to a preferred embodiment of the invention, the ends of the ropes of the first and of the second net element and the ends of the connecting rope of the connecting net element are arranged respectively oppositely to each other and are self-contained by means of a permanent connection. The permanent connection is realized preferably by means of stirrup clamps or ferrules. Alternatively, the connection can also be realized in a known manner by knotting, welding, potting, or by means of ferrules.

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An enhanced stability of the safety net can be achieved by the intersecting rope portions of the ropes and/or of the connecting ropes being stabilized at the junctions. In a preferred embodiment, the intersecting rope portions of the ropes and/or connecting ropes, at the junctions, are therefore connected by means of

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clamps, ferrules, guide means and/or by welding or potting. A connection by means of stirrup clamps or cross clamps is particularly preferred in this regard. For enhanced stability of the safety net, it is sufficient if just a part of the intersecting rope portions of the ropes and/or connecting ropes is connected at the junctions. It is possible, for example, for a connection of the respective rope portions to be realized merely at every second junction. In this respect, reference is made to document CH 698 305 B1, the content of which is herewith incorporated into this application. ✓

In order to enhance stability and weatherproofness, steel wire ropes are preferably used for the production of the net elements and/or of the connecting net element. According to the field of application, use of plastics ropes is also conceivable. If wire ropes are used, regard should be given to their flexibility, and the rigidity associated therewith, as well as their corrosion resistance, so that galvanized steel ropes, in particular having a preferred thickness of 6 to 12 mm, are preferably used. Wire or steel ropes consisting of a plurality of twisted rope strands are generally used, though the use of one individual steel wire of appropriate thickness is also conceivable. Similarly, the wire ropes can be provided, for protection, with a protective casing, for example of plastic. ✓

Where a low weight of the safety net is of particular importance, ropes made of synthetic or natural fibers can also be used for the production of the net.

According to a preferred embodiment of the invention, the first and the second net element are produced in identical construction in terms of their height and shape. This means that the two net elements have in the longitudinal direction of the safety net an equal

number of rows of junctions. A parallel arrangement of the first and second net element, as well as the connection of their respective edge rope elements with the aid of the connecting rope, is thereby facilitated.

5 In the transverse direction of the safety net, the number of columns of junctions of the first net element does not in this embodiment have to be the same as that of the second net element. The two net elements can thus have a different length. This is particularly of
10 advantage if an existing safety net has to be extended by a specific length. In this case, for example, the second net element can be produced in terms of its length such that it expands the existing safety net by exactly the desired lengthening. ✓

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According to a further preferred embodiment of the invention, the first and the second net element are produced in identical construction in terms of their size and shape. The size of the net elements, or of the
20 safety net, is fixed by the respective length in the longitudinal direction of the safety net and by the respective height in a transverse direction, running at right angles to the longitudinal direction, of the safety net. Within the meaning of the present
25 invention, this means that the first and the second net element in the longitudinal direction of the safety net have the same length and in the transverse direction of the safety net have the same height. In particular, the first and the second net element should in the
30 longitudinal direction have an equal number of rows and in the transverse direction of the safety net have an equal number of columns of junctions. It is thereby ensured that the first and the second net element are mutually matched in terms of structure and their
35 respective rope edge portions can be stably connected with the aid of the connecting rope.

Preferably, the first and the second net element are also produced from the same material and by a same production method. The production process can thereby be simplified and, if need be, can also be realized semi-automatically or fully automatically.

According to a particularly preferred embodiment of the invention, apart from the first and the second net element, the connecting net element is also produced in identical construction in terms of shape. Such a safety net has a regular shape and consists of repeating, structurally identical units of net and connecting net elements.

In terms of the net elements and the connecting net element, a wide variety of sizes and shapes from rectangular to polygonal are conceivable. Also the length of the rope portions between two respective junctions, and thus the width of the "meshes" formed between junctions, can be freely chosen. Thus the safety net can be produced from fine-meshed and/or wide-meshed net elements, or connecting net elements, according to requirement.

According to a preferred embodiment of the invention, the ropes of the first and of the second net element are guided such that each of the net elements thus produced has in the longitudinal direction of the safety net a plurality of rows of rope junctions and in a transverse direction running at right angles to the longitudinal direction of the safety net a plurality of columns of rope junctions, and the at least one connecting rope is guided between the first and the second net element such that a self-contained connecting net element having just a single column of connecting rope junctions, which column is arranged in the transverse direction of the safety net, is obtained.

In this embodiment, the prefabricated net elements have a certain longitudinal extent. It is thus possible to produce a longer net within a short time. If the net is intended to be transported already prefabricated, in a preferred manner, then, particularly if the respective rope edge portions of the net elements are articulately connected to the connecting rope (for example by looping), it is also possible to fold together the prefabricated net transversely to the longitudinal direction of the net in a zigzag pattern, like a type of "concertina", for transport. In this way, a stack in which the individual net elements bear substantially stresslessly one upon the other or one against the other can be formed. During installation, supporting ropes are introduced directly into the folded net, which makes installation in the terrain, and particularly under confined spatial conditions, considerably easier, since the net does not have to be extended in length for the fitting of fastening ropes.

Where the net is completed only after transport to the site of installation, the above embodiment allows, on the one hand, easy transportation of the individual net elements and, on the other hand, rapid on-site production, since the connecting net element can be comfortably produced on-site only once the net elements are connected, and thus a longer net can be rapidly produced with the aid of the prefabricated wider net elements.

According to a further preferred embodiment of the invention, the ropes of the first and of the second net element are guided such that each of the net elements thus produced has just a single column of rope junctions, which column is arranged in a transverse direction of the safety net running at right angles to the longitudinal direction of the safety net, and the

connecting net elements, moreover, the length of the net can be exactly adapted at the site of installation.

5 According to a further preferred embodiment of the invention, the ropes of the first and of the second net element are guided such that each of the net elements thus produced has in the longitudinal direction of the safety net a plurality of rows of rope junctions and in a transverse direction running at right angles to the longitudinal direction of the safety net a plurality of columns of rope junctions, and the at least one connecting rope is guided between the first and the second net element such that a self-contained connecting net element having a plurality of rows, 10 arranged in the longitudinal direction of the safety net, and a plurality of columns, arranged in the transverse direction of the safety net, of connecting rope junctions is obtained.

20 In this above embodiment, both the net elements and the connecting net element have a certain length. Whether completion is made at the factory or, possibly, at the site of installation, it is thus possible to produce a longer net within a very short time.

25 In this embodiment too, in particular an articulated connection of the respective rope edge portions of the net elements to the connecting rope (for example by looping of the connecting rope with the respective rope edge portions of the net elements) is particularly preferred, since this enables the individual net and connecting net elements to be folded together in a zigzag pattern and stacked for transport.

35 Where the safety net is completed only at the site of installation, in the above embodiment both the net elements and the connecting net elements are preferably transported already prefabricated to the site of

installation. The connection of the respective rope edge portions of the net elements to the connecting rope is in this case preferably realized by welding, with the aid of guide means and/or with the aid of clamping means.

In a further aspect, the present invention also relates to a safety net which is produced by the method of the present invention as claimed in one of claims 1 to 13.

In a further aspect, the present invention relates to a safety net, in particular for protection from avalanches, falling rock or timber, consisting of

- a) at least a first net element,
- b) at least a second net element and
- c) at least one connecting net element.

The safety net according to the present invention is characterized by the features described below:

The first net element is individually produced, self-contained, from at least one rope and has a plurality of rope junctions, where respectively two rope portions intersect.

The second net element is also individually produced, self-contained, from at least one rope and similarly has a plurality of rope junctions, where respectively two rope portions intersect. The second net element is arranged with respect to the first net element in parallel and at a distance apart in a longitudinal direction of the safety net, so that a first net edge portion of the first net element is facing a second net edge portion of the second net element.

Furthermore, the first net element has a plurality of first rope edge portions arranged in the first net edge

portion, which run between respectively two rope junctions and are facing the second net edge portion.

5 In addition, the second net element has a plurality of second rope edge portions, arranged in the second net edge portion, which run between respectively two rope junctions and are facing the first net edge portion.

10 The connecting element is produced, self-contained, from at least one connecting rope and has a plurality of connecting rope junctions, where respectively two connecting rope portions intersect.

15 The net elements, or the net elements and the connecting rope, preferably form respectively a substantially planar net structure.

20 With the aid of the at least one connecting rope, at least a part of the first rope edge portions of the first net element is connected to at least a part of the second rope edge portions of the second net element which are facing the first rope edge portions of the first net element.

25 With the aid of the at least one connecting rope, all first rope edge portions of the first net element are preferably connected to all second rope edge portions of the second net element.

30 The inventive safety net is particularly advantageous, since it consists of individual net elements which can be produced, stored and transported individually. The safety net can therefore be completed at the production site or at the site of installation, according to
35 requirement.

Furthermore, the size of the safety net can be adapted according to requirement: The height and length of the

safety net can be varied, on the one hand, via the height and length of the individually produced net elements and/or of the connecting net element and, on the other hand, also via the number of net elements which are connected to one another by connecting net elements. In the produced state, the net can also be retrofitted with additional net elements, or damaged net elements can be replaced.

10 Moreover, holding and fastening ropes can be threaded directly into the net without further connecting means, which in turn enables a material and weight reduction.

15 Embodiments of the safety net which are obtained by the above-described preferred embodiments of the inventive method can also be regarded as preferred embodiments for the safety net of the present invention.

20 In a further aspect, the present invention also relates to the use of an inventive safety net for protection from avalanches, falling rock or timber, mudslides, earth flows, or for slope stabilization.

25 The use of an inventive safety net is in particular advantageous since its component parts can be produced, stored and transported easily, rapidly and without problems, and the safety net is installable even in pathless terrains. The structure of the inventive safety net allows, moreover, that heavily worn net elements can be replaced without having to dismantle the entire net for this purpose.

35 The inventive safety net is suitable as a safety net for protection from avalanches, falling rock or timber, mudslides, earth flows, or for slope stabilization, since, due to its flexibility, the enormous forces of falling large loads are dynamically absorbed. Moreover, the material used for the safety net can be adapted to

the specific environmental influences, so that the safety net is particularly weatherproof and corrosion-resistant.

7 The present invention is described in the following
5 examples, which are not, however, intended to be restrictive.

In purely schematic representation:

10 fig. 1: shows a first embodiment of an inventive safety net consisting of a first and a second net element and a connecting net element, in which embodiment the first and the second net element are produced in identical construction in terms of their size and shape;

15 fig. 2: shows a second embodiment of an inventive safety net, in which embodiment the first and the second net element and the connecting net element are produced in identical construction in terms of their size and shape; and
20

25 fig. 3: shows a third embodiment of an inventive safety net, in which embodiment the first and the second net element and the connecting net element are produced in identical construction in terms of their size and shape.

30 In all embodiments of the inventive safety net represented in figures 1 to 3, the following features are actualized:

The inventive safety net 100, 200, 300 is formed of a
35 first net element 101, 201, 301, a second net element 102, 202, 302 and a connecting net element 103, 203, 303.

The first net element 101, 201, 301 is produced individually from a single rope 104, 204, 304 and has a plurality of rope junctions 105, 205, 305, where respectively two rope portions 104a, 204a, 304a and 5 104b, 204b, 304b intersect. Analogously, the second net element 102, 202, 302 is individually produced, self-contained, from a single rope 104', 204', 304' and has a plurality of rope junctions 105', 205', 305', where respectively two rope portions 104a', 204a', 304a' and 10 104b', 204b', 304b' intersect.

The second net element 102, 202, 302 is arranged with respect to the first net element 101, 201, 301 in parallel and at a distance apart in a longitudinal direction L of the safety net 100, so that a first net 15 edge portion 106, 206, 306 of the first net element 101, 201, 301 is facing a second net edge portion 106', 206', 306' of the second net element 102, 202, 302.

Moreover, the first net element 101, 201, 301 has a plurality of first rope edge portions 107, 207, 307 20 arranged in the first net edge portion 106, 206, 306, which run between respectively two rope junctions 105, 205, 305 and are facing the second net edge portion 106', 206', 306'.

The second net element 102, 202, 302 has analogously a 25 plurality of second rope edge portions 107', 207', 307', arranged in the second net edge portion 106', 206', 306', which run between respectively two rope junctions 105', 205', 305' and are facing the first net edge portion 106, 206, 306.

30 The first rope edge portions 107, 207, 307 accordingly run between respectively two rope junctions 105, 205, 305 of the first net element 101, 201, 301 and are arranged in the first net edge portion 106, 206, 306. Analogously thereto, the second rope edge portions 35 107', 207', 307' thus run between respectively two rope junctions 105', 205', 305' of the second net element

102, 202, 302 and are arranged in the second net edge portion 106', 206', 306'.

5 The connecting net element 103, 203, 303 is produced, self-contained, from a single connecting rope 108, 208, 308 and has a plurality of connecting rope junctions 109, 209, 309, where two connecting rope portions 108a, 208a, 308a and 108b, 208b, 308b intersect.

10 The first rope edge portions 107, 207, 307 are facing the second rope edge portions 107', 207', 307' and are connected to one another with the aid of the connecting rope 108, 208, 308.

15 The connection of the first rope edge portions 107, 207, 307 of the first net element 101, 201, 301 and of the second rope edge portions 107', 207', 307' of the second net element 102, 202, 302 to the connecting rope 108, 208, 308 is realized at connection points 110, 210, 310, which are located respectively between the respective rope junctions 105, 105', 205, 205', 305, 305' of the connected rope edge portions 107, 107', 207, 207', 307, 307'.

25 In the shown embodiments, respectively all first rope edge portions 107, 207, 307 are connected with the aid of the connecting rope 108, 208, 308 to the respective second rope edge portions 107', 207', 307' lying opposite the first rope edge portions 107, 207, 307. All first rope edge portions 107, 207, 307 of the first net element 101, 201, 301 and all second rope edge portions 107', 207', 307' of the second net element 102, 202, 302 are here connected to the connecting rope 108, 208, 308 at the connection points 110, 210, 310 by looping.

35 Alternatively, the first rope edge portions of the first net element and the second rope edge portions of the second net element can be connected to the connecting rope by welding, with the aid of guide means

and/or with the aid of pressing or clamping means (not shown).

5 The ropes 104, 104', 204, 204', 304, 304' of the first net element 101, 201, 301 and/or of the second net element 102, 202, 302 and/or the connecting rope 108, 208, 308 of the connecting net element 103, 203, 303 are preferably produced from stainless steel wire.

10 Intersecting rope portions 104a, 204a, 304a and 104b, 204b, 304b of the ropes 104, 104', 204, 204', 304, 304' are connected at the junctions 105, 105', 205, 205', 305, 305' by means of cross clamps 113, 213, 313. Similarly, intersecting connecting rope portions 108a, 208a, 308a and 108b, 208b, 308b of the connecting rope
15 108, 208, 308 are connected at connecting rope junctions 109, 209, 309 by means of cross clamps 114, 214, 314.

20 In the first embodiment shown in figure 1, the first net element 101 and the second net element 102 are produced in identical construction in terms of their size and shape. The shown shape of the first net element 101 and of the second net element 102 is known to the person skilled in the art as a diagonal grid or
25 Curry grid. Moreover, they have respectively in the longitudinal direction L of the safety net 100 nine rows R, and in a transverse direction Q of the safety net 100 running perpendicular to the longitudinal direction L, respectively five columns S of rope
30 junctions 105, 105'.

By contrast, the connecting net element 103 is produced such that it has just a single column S of connecting rope junctions 109, which column is arranged in the
35 transverse direction Q of the safety net 100.

The two ends of the connecting rope 108 are arranged such that they oppositely overlap each other and are

permanently connected in their overlap region 111 by means of a ferrule 112. Analogously, the ends of the ropes of the net elements can be permanently connected to each other (not shown).

5

In the second embodiment of the safety net 200, shown in figure 2, both the first net element 201 and second net element 202 and the connecting net element 203 are produced in identical construction in terms of their size and shape and are preferably produced respectively from a single rope.

The first net element 201 and the second net element 202 respectively have just one column S of rope junctions 205, 205', which column is arranged in the transverse direction Q of the safety net 200. Analogously, the connecting net element 203 also has just a single column S of connecting rope junctions 209, which column is arranged in the transverse direction Q of the safety net 200.

The respective ends of the ropes (204, 204') and the respective ends of the connecting rope 108 are arranged such that they oppositely overlap each other and are permanently connected in their overlap region 211 by means of a ferrule 212.

In the third embodiment, shown in figure 3, both the first net element 301 and second net element 302 and the third connecting net element 303 are once again produced in identical construction in terms of their size and shape and are preferably produced respectively from a single rope. The shown shape of the first net element 301, of the second net element 302, and of the connecting net element 303 is known to the person skilled in the art as a diagonal grid or Curry grid. The first net element 301 and the second net element 302 have respectively in the longitudinal direction L

nine rows R, and in the transverse direction Q of the safety net 300, five columns S of rope junctions 305, 305'. Analogously, the connecting net element 303 also has in the longitudinal direction L nine rows R, and in
5 the transverse direction Q of the safety net 300, five columns S of connecting rope junctions 309.

The respective ends of the ropes 304, 304' and the respective ends of the connecting rope 308 are
10 respectively permanently connected.

Alternatively, the first net element and/or the second net element and/or the connecting net element can also respectively be produced individually from a plurality
15 of ropes, or connecting ropes (not shown).

In addition, it would also be possible for just a part, for example half, of the intersecting rope portions of the ropes at junctions and/or intersecting connecting
20 rope portions of the connecting rope at connecting rope junctions to be connected by means of clamps, in particular cross clamps, and/or ferrules and/or by welding (not shown).

25 According to one embodiment (not shown), the first and/or the second net element and/or the connecting net element can have a different height. This means that the net elements and/or the connecting net element can have in the longitudinal direction of the safety net a
30 different number of rows of junctions. A particularly good adaptation of the safety net to the local conditions is thereby enabled.

According to an alternative embodiment (not shown), the
35 first and the second net element can be produced in identical construction in terms of their height and shape, yet can have a different length. This means that the two net elements, in the longitudinal direction of

the safety net, have an equal number of rows of junctions. In the transverse direction of the safety net, the number of columns of junctions of the first net element does not have to be the same as that of the
5 second net element.