Abstract: The invention relates to a masonry reinforcement structure comprising assemblies of grouped filament. The assemblies of grouped filaments are oriented substantially parallel in the length direction of the masonry reinforcement structure. The invention also relates to a method of manufacturing such masonry reinforcement structure and to a rolling comprising such a masonry reinforcement structure. The invention further relates to masonry reinforced with such masonry reinforcement structure and to a method to apply such masonry reinforcement structure.
A masonry reinforcement structure comprising parallel assemblies of grouped metal filaments in a parallel position

Description

Technical Field

[0001] The invention relates to a masonry reinforcement structure comprising parallel assemblies of grouped filaments. The invention also relates to a roll comprising such a masonry reinforcement structure. The invention further relates to masonry reinforced with such masonry reinforcement structure and to a method to apply such masonry reinforcement structure.

Background Art

[0002] Masonry has a high compressive strength but a limited tensile strength. This leads to limitations in the design of masonry (such as limited height, limited width, limited length of masonry) and may lead to cracking when tensile and/or shear stresses develop in the masonry. Bed joint reinforcement, for example prefabricated bed joint reinforcement of steel meshwork, is a proven technology for allowing masonry to carry higher loads (e.g. wind loads) by providing additional strength and flexibility, and for controlling cracks in masonry that is subject to tensile forces.

[0003] Bed joint reinforcement of steel meshwork for structural use (according to definitions of EN 845:3) generally comprise welded wire meshwork, such as two parallel longitudinal wires connected by a continuous zig-zag wire (truss type) or connected by straight cross wires (ladder type).

[0004] Prefabricated bed joint reinforcement structures typically have a length of about 3 m, for example 2.70 m or 3.05 m. This relatively long length makes the transportation, storing and handling of the structures complex.

[0005] To secure continuous reinforcement and to avoid weak points in reinforced masonry, overlapping of neighbouring prefabricated bed joint reinforcement elements is necessary and common practice. Overlapping leads to higher material consumption as double amount of material is required in the overlap zones.
Furthermore, as overlaps between neighbouring bed joint reinforcement structures may not be located at areas of high stress or at areas where the dimensions of a section change (for example a step in a wall height or thickness), the work of the installer of bed joint reinforcement elements is complicated.

Disclosure of Invention

[0006] It is an object of the present invention to provide an improved masonry reinforcement structure avoiding the drawbacks of the prior art. It is another object of the present invention to provide a masonry reinforcement structure that can easily be rolled up and rolled out. It is a further object of the present invention to provide a masonry reinforcement structure that when rolled out lies and remains in a flat position making additional precautions or steps to obtain a flat position of the masonry reinforcement structure superfluous. It is a further object of the present invention to provide a masonry reinforcement structure that can be provided in rolls of long length. It is a further object of the present invention to provide a masonry reinforcement structure that makes the use and handling of the masonry reinforcement structure easy, for example the use and handling on a construction site. It is a further object of the present invention to provide a masonry reinforcement structure that allows to minimize the number of overlaps between neighbouring structures. It is still a further object of the present invention to provide a masonry reinforcement structure having a minimal thickness allowing easy positioning in the joints (for example glue joints or mortar joints).

[0007] According to a first aspect of the present invention a masonry reinforcement structure comprising at least two assemblies of grouped metal filaments is provided. The masonry reinforcement structure has a length direction. The assemblies of grouped metal filaments are oriented parallel or substantially parallel in the length direction of the masonry...
reinforcement structure. The assemblies of grouped metal filaments are held in said parallel or substantially parallel position by means of at least one yarn.

[0008] The masonry reinforcement structure according to the present invention comprises preferably a bed joint reinforcement structure. A bed joint reinforcement structure is defined as a reinforcement structure that is prefabricated for building into a bed joint.

[0009] The masonry reinforcement structure has a length L and a width W, with L being larger than W.

[0010] With "parallel" or "substantially parallel" is meant that the main axes of the assemblies of grouped metal filaments are parallel or substantially parallel to each other. With "substantially parallel" is meant that there may be some deviation from the parallel position. However, if there is a deviation, the deviation from the parallel position is either small or accidental. With small deviation is meant a deviation less than 5 degrees and preferably less than 3 degrees or even less than 1.5 degrees.

[0011] The assemblies of grouped metal filaments of a masonry reinforcement structure according to the present invention are parallel or substantially parallel over the full length of the masonry reinforcement structure. The cords are not intertwisted or interconnected.

[0012] The at least one yarn holds the assemblies of grouped metal filaments in their parallel or substantially parallel position and ensures that the assemblies of grouped metal filament are secured in their parallel or substantially parallel position and this during the manufacturing, storing, transporting, installation and use of the structure for reinforcement of masonry.
YARN

[0013] The yarn comprises preferably a textile yarn.

For the purpose of this invention with "yarn" is meant any fiber, filament, multifilament of long length suitable for use in the production of textiles. Yarns comprise for example spun yarns, zero-twist yarns, single filaments (monofilaments) with or without a twist, narrow strip of materials with or without twist, intended for use in a textile structures.

The at least one yarn may comprise a natural material, a synthetic material or a metal or a metal alloy.

Natural material comprises for example cotton. Preferred synthetic materials comprise polyamide, polyether sulphone, polyvinyl alcohol and polypropylene. Also yarns made of glass fibers can be considered.

Preferred metal or metal alloys comprise steel such as low carbon steel, high carbon steel or stainless steel.

[0014] Preferably, the yarn used in the structure for the masonry reinforcement structure is suitable for use in a textile operation such as sewing, stitching, knitting, embroidery and weaving.

In order to be suitable in a textile operation and more particularly in a sewing, knitting or embroidery operation, the yarn is preferably bendable.

Preferably, the at least one yarn can be bent to a radius of curvature smaller than 5 times the equivalent diameter of the yarn. More preferably the at least one yarn can be bent to a radius of curvature lower than 4 times the diameter of the yarn, lower than 2 times the diameter of the yarn or even lower than the diameter of the yarn.

Furthermore the yarn is preferably suitable to hold and secure the assemblies of grouped metal filaments in their mutual parallel or mutual substantially parallel position.

It is clear that the yarn used preferably allows to maintain the flexibility of the structure so that the structure can be rolled up and rolled out easily.

[0015] The masonry reinforcement structure according to the present invention may comprise one yarn or a number of yarns. The number of yarns is for
example ranging between 1 and 100; for example ranging between 1 and 50, for example 10.

[001 6] A first group of structures according to the present invention comprises structures wherein the at least one yarn forms stitches. A second group of structures according to the present invention comprises woven fabrics. These two groups of structures are described below in more detail.

[001 7] For the first group of structures comprising structures wherein the at least one yarn forms stitches, the stitches hold the assemblies of grouped metal filaments in their mutual parallel or mutual substantially parallel position in the structure. The stitches are preferably formed around the assemblies of grouped metal filaments. The stitches are preferably formed by at least one operation selected from stitching, knitting or embroidering. Examples of structures of this first group comprise textile structures comprising assemblies of grouped metal filaments and at least one yarn, such as a knitted structure or a braided structure.

[001 8] Other examples of structures of this first group comprise assemblies of grouped metal filaments that are connected to a substrate by means of stitches. The assemblies of grouped metal filaments can for example be connected to a substrate by stitching, knitting or embroidering. As substrate any substrate allowing the coupling or integration of the assemblies of grouped filaments to or in the substrate can be considered. The substrate may either comprise a metal material, a non-metal material or a combination of both a metal material and a non-metal material. Examples of substrates comprise woven structures, non-woven structures, films, strips, foils, meshes, grids or foams. As non-woven substrates needlebonded, waterbonded, spunbonded, airlaid, wetlaid or extruded substrates can be considered. Preferred foils or grids are foils or grids obtained by extrusion, for example foils or grids comprising polypropylene, polyethylene, polyamide, polyester or polyurethane.
Preferred metal substrates comprise metal grids or metal meshes, for example steel grids or steel meshes. The substrate may comprise an open structure or alternatively a closed structure. A substrate having an open structure has the advantage that it is permeable for the glue or mortar when installed in the masonry. Furthermore open structures have a lower weight and higher flexibility. Substrates comprising a non-metal material comprise for example glass, carbon or polymer material. Preferred polymer materials comprise polyester, polyamide, polypropylene, polyethylene, polyvinyl alcohol, polyurethane, polyethersulphone, or any combination thereof. As metal substrates steel substrates, for example substrates made of steel wire such as meshes or grids can be considered.

[0019] Further examples of this first group comprise textile structures such as knitted or braided structures coupled to a substrate. The term ‘coupled to’ should be understood in a broad meaning and includes all possible manners whereby the assemblies of grouped filaments are coupled to a substrate. For the purpose of this invention coupling includes connecting, joining, bonding, adhering, … The assemblies of grouped filaments can be coupled, joined, bonded, adhered to the substrate by any technique known in the art. Preferred techniques comprise stitching, knitting, embroidering, gluing, welding, melting and laminating.

[0020] The second group of embodiments according to the present invention comprises woven fabrics having a warp and a weft direction. The assemblies of grouped metal filament are positioned in the warp direction and the at least one yarn is for example positioned in the weft direction. In such woven fabrics, the assemblies of grouped metal filaments are hold in their mutual parallel or mutual substantially parallel position by the at least one yarn. For a person skilled in the art it is clear that a woven fabric according to the present invention may comprise other elements such as yarns in the warp direction next to the assemblies of grouped metal filaments. The
woven fabric according to the present invention may also comprise assemblies of grouped metal filament in the weft direction.

[0021] ASSEMBLY OF GROUPED FILAMENTS
For the purpose of this invention with "an assembly of grouped metal filaments" is meant any unit or group of a number of metal filaments that are assembled or grouped in some way to form said unit or said group. The metal filaments of an assembly of grouped filaments can be assembled or grouped by any technique known in the art, for example by twisting, cabling, bunching, gluing, welding, wrapping, …
Examples of assemblies of grouped metal filaments comprise bundles of parallel or substantially parallel metal filaments, filaments that are twisted together for example by cabling or bunching such as strands, cords or ropes.

[0022] A first group of preferred assemblies of grouped metal filaments comprises cords, for example single strand cords or multistrand cords. Masonry reinforcement structures comprising cords as assemblies of grouped metal filaments have the advantage that they can easily be rolled up and rolled out. Furthermore masonry reinforcement structures comprising cords lie in a flat position when rolled out and remain in this flat position without requiring additional precautions or steps to obtain or maintain this flat position.

[0023] A second group of preferred assemblies of grouped metal filaments comprises bundles of parallel metal filaments. Masonry reinforcement structures comprising assemblies of the second group have the advantage that they can easily be rolled up and rolled out and that such masonry reinforcement structures lie in a flat position when rolled out and remain in this flat position without requiring additional precautions or steps to obtain or maintain this flat position.
Next to being flexible and allowing that the reinforcement structure lies and remains in a flat position when rolled out, assemblies comprising metal
filaments in a parallel position may have the advantage of having a limited thickness as all filaments can be positioned next to each other.

[0024] The number of filaments in an assembly ranges preferably between 2 and 100, for example between 2 and 81, between 2 and 20, for example 6, 7, 10 or 12.

[0025] METAL FILAMENTS
As metal filaments any type of elongated metal filaments can be considered. Any metal can be used to provide the metal filaments. Preferably, the metal filaments comprise steel filaments. The steel may comprise for example high carbon steel alloys, low carbon steel alloys or stainless steel alloys. The metal filaments preferably have a tensile strength higher than 1000 MPa, for example higher than 1500 MPa or higher than 2000 MPa.

[0026] The metal filaments have a diameter preferably ranging between 0.04 and 2.00 mm. More preferably, the diameter of the filaments ranges between 0.10 and 1 mm as for example between 0.2 and 0.5 mm, for example 0.25, 0.33, 0.37, 0.38 or 0.45 mm.

[0027] All metal filaments of an assembly of grouped filaments may have the same diameter. Alternatively, an assembly of grouped filaments may comprise filaments having different diameters.

[0028] An assembly of grouped filaments may comprise one type of filaments. All filaments of an assembly of filaments for example have the same diameter and the same composition. Alternatively, an assembly of grouped filaments may comprise different diameters and/or different compositions. An assembly of grouped filaments may for example comprise non-metal filaments next to metal filaments. Examples of non-metal filaments comprising carbon or carbon based filaments or yarns, polymer filaments or polymer yarns, such as filaments or yarns made of polyamide,
polyethylene, polypropylene or polyester. Also glass yarns or rovings of glass fibers can be considered.

[0029] The filaments preferably have a circular or substantially circular cross-section although filaments with other cross-sections, such as flattened filaments or filaments having a square or a substantially square cross-section or having a rectangular or a substantially rectangular cross-section can be considered as well.

[0030] The filaments can be uncoated or can be coated with a suitable coating, for example a coating giving corrosion protection. Suitable coatings comprise a metal coating such as a zinc or zinc alloy coating or a polymer coating. Examples of metal or metal alloy coatings comprise zinc or zinc alloy coatings, for example zinc brass coatings, zinc aluminium coatings or zinc aluminium magnesium coatings. A further suitable zinc alloy coating is an alloy comprising 2 to 10 % Al and 0.1 to 0.4 % of a rare earth element such as La and/or Ce. Examples of polymer coatings comprise polyethylene, polypropylene, polyester, polyvinyl chloride or epoxy.

[0031] For a person skilled in the art it is clear that a coating such as a coating giving corrosion protection can be applied on the filaments. However, it is also possible that a coating is applied on an assembly of grouped filaments.

[0032] NUMBER OF ASSEMBLIES
A masonry reinforcement structure according to the present invention comprises at least two assemblies of grouped filaments. In principle there is no limitation to the number of assemblies of grouped filaments. Preferably, the number of assemblies of grouped filaments ranges between 2 and 500, for example between 4 and 300. The number of assemblies of grouped filaments is for example 10, 20, 50, 100, 200 or 300.
Preferably, the different assemblies of a masonry reinforcement structure according to the present invention are spaced apart. The distance between neighbouring assemblies may vary within a wide range, the distance between neighbouring assemblies is for example higher than 1 mm and lower than 80 cm. The distance between neighbouring assemblies is for example ranging between 1 mm and 10 cm, for example 5 mm, 1 cm, 2 cm, 3 cm, 5 cm, 7 cm or 8 cm.

For many applications a minimum distance between neighbouring assemblies is preferred as this results in a better embedment of the assemblies in the mortar or glue.

The distance between neighbouring assemblies can be equal over the width of the structure of the masonry reinforcement structure. Alternatively, it can be preferred that the distance between neighbouring assemblies is lower in some areas of the masonry reinforcement structure, for example in areas where stresses are high.

The distance between neighbouring assemblies can for example be lower at the outer sides of the masonry reinforcement structure compared to the distance between neighbouring assemblies in the middle portion of the masonry reinforcement structure.

A masonry reinforcement structure according to the present invention may comprise one type of assemblies of grouped metal filaments. All assemblies of grouped metal filaments have for example the same number of metal filaments, the same construction and comprise the same material. Alternatively, a masonry reinforcement structure comprises a number of different types of assemblies of grouped metal filaments, for example assemblies of grouped metal filaments having a different number of filaments, having a different cord construction or made of a different material.
[0036] Thanks to the high flexibility of the masonry reinforcement structure, the masonry reinforcement structure can easily be rolled up and rolled out. Furthermore when rolled out the masonry reinforcement structure lies in a flat position and remains in a flat position without requiring additional precautions or steps to obtain a flat position. This makes the use at a construction site easy. The masonry reinforcement structure can be rolled out on a masonry structure for example on a layer of bricks or blocks. The masonry reinforcement structure can be easily cut to the required length.

As the masonry reinforcement structure can be provided at long lengths, the number of overlaps between neighbouring masonry reinforcement structures is substantially reduced compared to masonry reinforced with prefabricated bed joint reinforcement structures presently known in the art. A further advantage of a masonry reinforcement structure according to the present invention is the minimal thickness of the masonry reinforcement structure allowing easy positioning in the joints (for example glue joints or mortar joints).

[0037] The masonry reinforcement structure may have an open structure or alternatively a closed structure. A masonry reinforcement structure having an open structure has the advantage that it is permeable for the glue or mortar. Furthermore open structures have a lower weight and higher flexibility.

[0038] In preferred embodiments the masonry reinforcement structure consists of metal, for example of steel. As such masonry reinforcement structure consists of one material, this may simplify the recycling of the masonry reinforcement structure or of a masonry structure reinforced with a masonry reinforcement structure.
Examples of masonry reinforcement structures consisting of steel comprise
- steel cords coupled to a steel substrate, for example steel cords coupled to a steel mesh by means of a steel yarn;
- steel cords integrated in a woven structure, for example a woven structure consisting of steel cords and a steel yarn or a number of steel yarns;
- steel cords integrated in a knitted structure, for example a knitted structure consisting of steel cords and a steel yarn or a number of steel yarns.

[0039] According to a second aspect of the present invention a method to manufacture a masonry reinforcement structure is provided. The method comprises the steps of:
- providing at least two assemblies of grouped filaments;
- manufacturing a masonry reinforcement structure comprising said at least two assemblies of grouped metal filaments in a parallel or substantially parallel direction in the length direction of said structure, said assemblies of grouped metal filaments being held in said structure in said parallel or substantially parallel position by at least one yarn.

[0040] In a preferred method of manufacturing a masonry reinforcement structure, the structure is manufactured by stitching, knitting or embroidering. The at least one yarn forms thereby stitches to hold the assemblies of grouped metal filaments in their mutual parallel or mutual substantially parallel position.

[0041] The assemblies of grouped metal filaments and the at least one yarn may form the masonry reinforcement structure, i.e. a stitched, knitted or embroidered structure consisting of assemblies of grouped metal filaments and the at least one yarn. Alternatively, the assemblies of grouped metal filaments are coupled to or connected to a substrate by means of stitches. The assemblies of grouped metal filaments can be coupled to or connected to the substrate by means of stitching, knitting or embroidering.
It is clear that a stitched, knitted or embroidered structure can be connected to or coupled to a substrate for example by stitching, knitting, embroidering, gluing, welding, melting or laminating.

[0042] In an alternative method the masonry reinforcement structure is manufactured by weaving. Preferably, the assemblies of grouped metal filament are in the warp direction and the at least one yarn is in the weft direction.

[0043] It is clear that other elements such as yarns can be present in the warp direction next to the assemblies of grouped metal filaments. Similarly, the weft direction may comprise other elements such as assemblies of grouped metal filaments next to the at least one yarn.

[0044] According to a third aspect of the present invention a roll of a masonry reinforcement structure as described above is provided. The masonry reinforcement structure is wound or coiled to form said roll. As the masonry reinforcement structure according to the present invention is flexible, the structure can easily be rolled up and rolled out.

[0045] According to a fourth aspect of the present invention a method to install a masonry reinforcement structure as described above is provided. The method to install the masonry reinforcement structure comprises the steps of
- providing masonry comprising at least one layer of units or bricks;
- uncoiling a masonry reinforcement structure as described above and if required cutting the masonry reinforcement structure to the desired length;
- installing said masonry reinforcement structure in a joint (for example in a mortar or glue joint) on the upper surface of the last layer of units or bricks;
- providing the next layer of units or bricks on said joint.
The masonry reinforcement structure can be installed in said joint by first applying a layer of mortar or glue on the upper surface of the last layer of units or bricks and by subsequently applying the masonry reinforcement structure. Alternatively, the masonry reinforcement structure can be installed in said joint by first applying the masonry reinforcement structure on the upper surface of the last layer of units or bricks and by subsequently applying a layer of mortar or glue on the masonry reinforcement structure. In a further method a first layer of mortar or glue is applied on the upper surface of the last layer of units or bricks, the masonry reinforcement structure is applied on the masonry reinforcement structure, followed by the application of a second layer of mortar or glue on the masonry reinforcement structure.

According to a fifth aspect of the present invention masonry reinforced with at least one masonry reinforcement structure according to the present invention is provided. The masonry comprises a number of layers of units or bricks and joints between two neighbouring layers of units or bricks. At least one joint is reinforced by a masonry reinforcement structure according to the present invention. The joints may comprise mortar joints or glue joints.

**Brief Description of Figures in the Drawings**

The invention will now be described into more detail with reference to the accompanying drawings whereby

- Figure 1 is an illustration of a masonry reinforcement structure comprising a woven structure;
- Figure 2 is an illustration of a masonry reinforcement structure comprising a knitted structure;
- Figure 3 is an illustration of a masonry reinforcement structure comprising parallel assemblies of grouped filaments stitched to a substrate;
- Figure 5 is an illustration of a masonry reinforcement structure comprising a woven structure.

Mode(s) for Carrying Out the Invention

[0049] The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are non-limiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes. The dimensions and the relative dimensions do not correspond to actual reductions to practice of the invention.

[0050] The following terms are provided solely to aid in the understanding of the inventions:

- Masonry: all building systems that are constructed by stacking units of for example stone, clay, or concrete, joined by for example mortar or glue into the form of for example walls, columns, arches, beams or domes;
- Equivalent diameter of a yarn or filament: the diameter of an imaginary yarn or filament having a circular radial cross-section, which cross-section has a surface identical to the surface area of the particular yarn or filament.

[0051] Figure 1 is an illustration of a first embodiment of a masonry reinforcement structure 100 according to the present invention. The masonry reinforcement structure 100 comprises a woven structure. The woven structure comprises assemblies of grouped filaments 102 in the warp direction. The assemblies of grouped filaments 102 comprise for example steel cords. A preferred steel cord comprises between 2 and 12 filaments, for example a cord having one core filament having a diameter of 0.37 mm and 6 filaments having a diameter of 0.33 mm around this core filament (0.37 + 6x0.33).

In alternative embodiments the assemblies of grouped filaments 102 comprise bundles of parallel or substantially parallel filaments, for example bundles of 12 parallel or substantially parallel filaments.
The weft direction comprises for example a polymer yarn 104, such as a polyamide, a polyether sulphone, a polyvinyl alcohol or a polypropylene yarn.

In alternative embodiments the weft direction comprises a metal yarn, for example a steel yarn. A structure consisting of one material, for example metal (steel) has the advantage that recycling is easier.

The masonry reinforcement structure 100 is preferably an open structure permeable for the glue or mortar.

It is clear for a person skilled in the art that different weave patterns can be considered.

[0052] Figure 2 shows a second embodiment of a masonry reinforcement structure 200 according to the present invention. The masonry reinforcement structure 200 comprises a knitted structure. The knitted structure 200 comprises assemblies of grouped filaments 202 as pillar threads. The assemblies of grouped filaments 202 comprise for example steel cords comprising 3 filaments having a diameter of 0.48 mm twisted together (3x0.48 mm). Another suitable steel cord comprises a cord having one core filament having a diameter of 0.6 mm and 5 filaments having a diameter of 0.73 mm around this core filament (0.6+5x0.73 mm).

In alternative embodiments the assemblies of grouped filaments 202 comprise parallel or substantially parallel filaments, for example a bundle of 12 parallel or substantially parallel filaments.

The structure further comprises yarn 204 and yarn 206 to keep the assemblies of grouped metal filaments in their mutual parallel or mutual substantially parallel position. The yarn 204 is for example a multifilament yarn, preferably a polyamide, a polyether sulphone, a polyvinyl alcohol or a polypropylene yarn. The yarn 204 may also comprise a metal yarn, for example a steel yarn.

The yarn 206 is connecting neighbouring assemblies of grouped filaments 202. The monofilament yarn 206 is preferably a polyamide, a polyether sulphone, a polyvinyl alcohol or a polypropylene yarn. The yarn 206 may also comprise a metal yarn, for example a steel yarn.
[0053] Figure 3 is an illustration of a masonry reinforcement structure 300 comprising parallel assemblies of grouped filaments 302 stitched to a substrate 310 by means of yarn 304. The assemblies of grouped filaments 302 comprise steel cords or bundles of parallel filaments. The yarn 304 forms stitches to couple the steel cords to the substrate 310. The substrate 310 comprises for example a woven or non-woven polymer structure.

In a preferred embodiment the cords comprise steel cords that are stitched to a polymer substrate for example to a non-woven polyether sulphone substrate by means of a polyether sulphone yarn or to an extruded polypropylene grid (35 g/m2 having a 6x6 mm mesh) by means of a polypropylene yarn.

In another preferred embodiment the cords are steel cords stitched to a metal substrate, for example a steel mesh or steel grid by a metal yarn, for example a steel yarn. Such structure fully consisting of one material, more particularly metal (steel) is easier to recycle compared to structures comprising a number of different materials.

[0054] Figure 4 is an illustration of a masonry reinforcement structure 400 comprising assemblies of grouped filaments 402 integrated in a woven structure 400. The woven structure 400 comprises in the warp direction a combination of polymer yarns 403 and assemblies of grouped filaments 402. The weft direction comprises a polymer yarn 404.
Claims

1. A masonry reinforcement structure having a length direction, said masonry reinforcement structure comprising at least two assemblies of grouped metal filaments, said assemblies of grouped metal filaments being oriented parallel or substantially parallel in said length direction of said masonry reinforcement structure, said assemblies of grouped metal filaments being held in said structure in said parallel or substantially parallel position by means of at least one yarn.

2. A masonry reinforcement structure according to claim 1, wherein said at least one yarn forms stitches.

3. A masonry reinforcement structure according to claim 2, wherein said stitches are formed by stitching, knitting or embroidering.

4. A masonry reinforcement according to claim 1, wherein said structure comprises a woven fabric comprising a warp and a weft direction, said assemblies of grouped metal filaments being positioned in said warp direction.

5. A masonry reinforcement structure according to any one of claims 1 to 4, wherein said at least one yarn comprises a textile yarn.

6. A masonry reinforcement structure according to any one of the preceding claims, wherein said metal filaments comprise steel filaments.

7. A masonry reinforcement structure according to any one of the preceding claims, wherein said assemblies of grouped metal filaments comprise parallel or substantially parallel metal filaments.

8. A masonry reinforcement structure according to any one of claim 1 to 7, wherein said assemblies of grouped metal filaments comprise metal filaments that are twisted together.
9. A method to manufacture a masonry reinforcement structure as defined in any one of claims 1 to 7, said method comprising the steps of
   - providing at least two assemblies of grouped metal filaments;
   - manufacturing a structure comprising said at least two assemblies of grouped metal filaments, said assemblies of metal filaments being oriented parallel or substantially parallel in said length direction of said masonry reinforcement structure, said assemblies of grouped metal filaments being held in said structure in said parallel or substantially parallel position by means of at least one yarn.

10. A method to manufacture a masonry reinforcement structure according to claim 9, wherein said structure is manufactured by stitching, knitting or embroidering.

11. A method to manufacture a masonry reinforcement structure according to claim 9, wherein said structure is manufactured by weaving.

12. A roll of a masonry reinforcement structure as defined in any one of claims 1 to 8, said masonry reinforcement structure being wound to form said roll.

13. A method to install a masonry reinforcement structure as defined in any one of claims 1 to 8, said method comprising the steps of
   - providing masonry comprising at least one layer of units or bricks;
   - uncoiling a masonry reinforcement structure as defined in any one of claims 1 to 8;
   - installing said masonry reinforcement structure in a joint on the upper surface of the last layer of units or bricks;
   - providing the next layer of units or brick on said joint.

14. Masonry reinforced with at least one masonry reinforcement structure, said masonry comprising a number of layers of units or bricks and joints between two neighbouring layers of bricks, whereby at least one joint of said masonry is
reinforced with a masonry reinforcement structure as defined in any one of claims 1 to 8.
INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/056708

A. CLASSIFICATION OF SUBJECT MATTER

INV. E04B2/02 E04G21/18 E04G23/02 D03D13/00 D03D15/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E04B E04G D03D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<th>Category</th>
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<th>Relevant to claim No.</th>
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<td>US 874 881 A (BAKER FRANK J [US]) 24 December 1907 (1907-12-24) the whole document</td>
<td>1-3, 6-10, 12-14</td>
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<td>US 3 653 170 A (SHECKLER ADDISON C) 4 April 1972 (1972-04-04) col umn 3, l ine 14 - l ine 39; figure 6</td>
<td>1.6,7,9,12-14</td>
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<td>X</td>
<td>EP 1 690 966 AI (BEKAERT SA NV [BE]) 16 August 2006 (2006-08-16) paragraphs [0018], [0041] - [0048]; figures 7-10</td>
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Further documents are listed in the continuation of Box C.

X See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search 4 June 2014
Date of mailing of the international search report 12/06/2014

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Authorized officer
Demeester, Jan

Form PCT/ISA/210 (second sheet) (April 2006)
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