Wire netting for containment and reinforcement structures, which netting comprises one or more strengthening bars extending in a preferential longitudinal direction. The strengthening bar comprises a series of notches distributed over at least a portion of its peripheral curved surface in the preferential longitudinal direction, so that it remains securely accommodated inside the meshes of the netting when the netting is subjected to repeated and varying tensile forces.
WIRE NETTING FOR CONTAINMENT AND REINFORCEMENT STRUCTURES

[0001] The present invention relates to the field of wire netting for containment and reinforcement structures, and in particular to netting for strengthening a road surface.

[0002] It is known to strengthen wire netting used for structures for containing and reinforcing earth, by inserting metal bars between the meshes of the netting. As described in patent application EP 1012406, belonging to the same applicant, the main function of such bars is to increase the resistance of the netting to the tensile forces to which it is subjected and which are caused by the thrust exerted by the earth contained therein.

[0003] The only disadvantage encountered with the above type of netting resides in the poor grip which the bars exert on the meshes, so that, in use, the bars may gradually come out of their seats owing to the stresses applied to the netting.

[0004] It is also known to strengthen a road surface produced, for example, from bitumen, asphalt or similar materials, by means of a submerged structure constituted by wire netting, the main function of which is to absorb and therefore reduce the tensile forces to which the upper layer of the road surface is subjected owing to heavy traffic. In order to improve that performance, a plurality of strengthening bars are inserted between the meshes of the netting.

[0005] One type of strengthening member used in the above-mentioned applications is known from patent application WO 98/35100, filed in the name of N. V. Bekkant S. A., which illustrates a reinforcement with strengthening netting comprising strengthening members which extend in the transverse direction of the netting. The strengthening members are constituted by shaped steel strips wound helically and having a substantially rectangular cross-section.

[0006] The main disadvantages of those types of member are the high cost and the complexity of the manufacturing process for producing a shaped strip with the desired helical configuration.

[0007] The object of the present invention is to solve the problems associated with the strengthening bars of known type by providing a reinforcing netting comprising a strengthening bar which remains securely accommodated inside the meshes of the netting when the netting is subjected to repeated and varying tensile forces.

[0008] A further object of the present invention is to provide a netting comprising a strengthening bar which is economical to manufacture, easy to produce and exhibits high resistance even after prolonged use.

[0009] In order to achieve the objects indicated above, the invention relates to wire netting for containment and reinforcement structures, which netting comprises at least one strengthening bar extending in a preferential longitudinal direction, characterised in that the at least one strengthening bar comprises a series of notches distributed over at least a portion of its peripheral curved surface in the preferential longitudinal direction.

[0010] In one embodiment of the present invention, the notches distributed over the peripheral curved surface of the strengthening bar are interrupted by flattened portions which define at least three paths which extend in a rectilinear manner and which are arranged diametrically non-opposite relative to the longitudinal axis of the strengthening bar.

[0011] In another embodiment, the notches distributed over the peripheral curved surface of the strengthening bar are interrupted by flattened portions defining at least two paths extending in a helix on the peripheral curved surface.

[0012] One of the main advantages of the present invention is constituted by the ability to produce paths which extend, for example, although this does not constitute a limitation, in a helix over almost the entire length of the strengthening bar, in such a manner as to facilitate the engagement of the bars with the meshes of the netting.

[0013] A further advantage of the present invention consists in the ability to accommodate the strengthening bars not only in the intertwined portions of the netting during manufacture but also between one mesh and another after the manufacture of the netting, without thereby reducing the capacity of the strengthening bars to resist transverse stresses.

[0014] Further features and advantages will emerge more clearly from the following detailed description of some embodiments of the invention, with reference to the appended drawings which are given purely by way of non-limiting example and in which:

[0015] FIG. 1 is a front view of strengthened wire netting for an earth-reinforcing structure;

[0016] FIG. 2 is a front view of an embodiment of a strengthening bar; and

[0017] FIG. 3 is a sectioned view according to the line III-III in FIG. 2.

[0018] Referring now to FIG. 1, a structure for containing and/or reinforcing earth, for example, although this does not constitute a limitation, of the type used to produce a submerged strengthening structure for a road surface, comprises wire netting 2, for example, but not necessarily, having double-twist or triple-twist hexagonal meshes 4. Strengthening bars 6 are connected to the meshes of the wire netting 2 and are arranged at predetermined distances from one another in order to increase the resistance of the entire containment structure to tensile forces. In FIG. 1, the strengthening bars 6 are inserted into intertwined portions 12 of the double-twist meshes 4 during the manufacture of the wire netting 2, but it is also possible to provide different connections between the bars 6 and the wire netting 2 with the proviso that the objects and advantages of the present invention are achieved in the same way. For example, the strengthening bars 6 may be inserted between one mesh 4 and another of the wire netting 2 after the latter has been manufactured.

[0019] Each strengthening bar 6, illustrated in FIG. 2, is generally produced from steel and comprises a central core 8 which is, for example, but not necessarily, substantially cylindrical and on whose peripheral portion are formed, for example, by means of compression discs, a plurality of corrugations, peaks or notches 10 arranged transversely relative to the longitudinal direction of the bar 6. A person skilled in the art can of course identify forms of bar with different cross-sections, for example polygonal, elliptical or star-shaped cross-sections, as well as corrugations that are
formed integrally, or with any other suitable means without thereby departing from the objects of the present invention.  

[0020] In a preferred embodiment, as illustrated in FIG. 3, each notch 10 is interrupted over its periphery in three regions in such a manner as to define three flattened portions 11 which, in cross-section, are arranged relative to one another, with respect to the longitudinal axis of the bar 6, at angles other than 180°. The succession of flattened portions 11 along the bar 6 defines three paths 14 which are distributed over the peripheral portion and which have an extent smaller than or equal to the length of the bar 6.  

[0021] The notches 10 extend transversely relative to the longitudinal axis of the bar 6, and the flattened portions 11 vary their arrangement relative to one another in cross-section along the length of the longitudinal axis, so that the paths 14 extend longitudinally in a substantially curvilinear manner over the peripheral portion. In accordance with application requirements, or manufacturing specifications, the variation in the arrangement of the flattened portions 11 relative to the longitudinal axis of the bar 6 may be continuous and progressive in such a manner as to form paths 14 extending in a helix, or it may vary in a discrete and alternating manner so as to form generally curvilinear paths 14.  

[0022] In the example illustrated in FIG. 2, in addition, the notches 10 have a helical shape in order further to increase the resistance of the bar 6 to transverse sliding relative to the mesh and/or to the road surface. The notches 10 are distributed over the peripheral curved surface of the strengthening bar 6 with a spacing which is different, for example, although this is not to constitute a limitation, smaller than the spacing of the paths 14 defined by the flattened portions 11, in order to increase their resistance to sliding relative to the netting 2.  

[0023] Finally, still in the embodiment illustrated in FIG. 2, the notches 10 are distributed over the peripheral curved surface of the strengthening bar 6 in such a manner that the flattened portions 11 define at least one path 14 having a helical direction opposed to the direction of the remaining paths 14.  

[0024] The number of flattened portions 11 over the periphery of the notches 10 may of course be varied from two up to a number compatible with the extent of the peripheral portion and the arrangement relative to one another, with respect to the longitudinal axis of the bar 6, according to angles other than 180°. The number of flattened portions 11 and of paths 14 will consequently vary.  

[0025] In another embodiment, which is not illustrated, each notch is always interrupted over its periphery in three regions in such a manner as to define three flattened portions which, in cross-section, are arranged relative to one another, with respect to the longitudinal axis of the bar, in accordance with angles other than 180°. In that embodiment, however, the flattened portions keep constant their arrangement relative to one another in cross-section along the length of the longitudinal axis, so that the paths extend in a substantially rectilinear manner over the peripheral portion.  

[0026] Naturally, the principle of the invention remaining the same, the embodiments and the details of construction may be varied widely with respect to those described and illustrated without thereby departing from the scope of the present invention.  

1. Wire netting for containment and reinforcement structures, which netting comprises at least one strengthening bar (6) extending in a preferential longitudinal direction, characterised in that the at least one strengthening bar (6) comprises a series of notches (10) distributed over at least a portion of its peripheral curved surface in the preferential longitudinal direction.  

2. Wire netting according to claim 1, characterised in that the notches (10) distributed over the peripheral curved surface of the strengthening bar (6) are interrupted by flattened portions (11) defining at least two paths (14) extending in a helix on the peripheral curved surface.  

3. Wire netting according to claim 2, characterised in that the notches (10) distributed over the peripheral curved surface of the strengthening bar (6) have a spacing equal to or less than the spacing of the paths (14) defined by the flattened portions (11).  

4. Wire netting according to claim 3, characterised in that the notches (10) are distributed over the peripheral curved surface of the strengthening bar (6) in such a manner that the flattened portions (11) define at least one path (14) having a helical direction opposing the direction of the remaining paths (14).  

5. Wire netting according to claim 1, characterised in that the notches (10) distributed over the peripheral curved surface of the strengthening bar (6) are interrupted by flattened portions (11) defining at least three paths extending in a rectilinear manner on the peripheral curved surface.  

6. Wire netting according to claim 5, characterised in that the at least three paths extending in a rectilinear manner are arranged diametrically non-opposite relative to the longitudinal axis of the strengthening bar (6).  

7. Wire netting according to claim 1, characterised in that the notches (10) distributed over the peripheral curved surface of the strengthening bar (6) are interrupted by flattened portions (11) defining at least two paths (14) extending in a curvilinear manner on the peripheral curved surface.  

8. Wire netting according to claim 1, characterised in that the strengthening bar (6) comprises a central core (8) having a substantially cylindrical cross-section.  

9. Wire netting according to any one of the preceding claims, characterised in that it comprises double-twist or triple-twist meshes (4), each bar (6) being accommodated inside the meshes (4).  

10. Wire netting according to claim 9, characterised in that each bar (6) is inserted into intertwined portions (12) of the meshes (4).  

11. Use of a strengthening bar for strengthening wire netting, characterised in that the wire netting (2) is defined by any one of claims 1 to 10.  

12. Use of a strengthening bar according to claim 11, characterised in that, during the manufacture of the netting (2), the bar (6) is accommodated in the intertwined portions (12) of the meshes (14).  

13. Use of a strengthening bar according to claim 11, characterised in that, after the manufacture of the netting (2), the bar (6) is accommodated between the meshes (14).