A railing for stepped staircases or other fixed structures comprises at least one handrail and supporting poles for the handrail which are integral with the fixed structure, and also comprises a fabric mesh (1) and at least one rigid frame (2), designed to support the mesh (1), having adjustable connecting means (3). The adjustable connecting means (3) comprise at least one upper connecting element (31), designed to connect the frame (2) to the handrail (4) and a supporting pole (5), and at least one lower connecting element (32), designed to connect the frame (2) to a supporting pole (5).
Description

Railing for fixed structures

Technical Field

This invention relates to a railing for fixed structures: it may be used above all for all types of stepped staircases, for example spiral or ramp-shaped, but also in other contexts, for example for balustrades or parapets.

Background Art

In the sector of furnishing for interiors and exteriors, the public is continuously presented with technical solutions which on one hand must meet the requirements of manufacturers and sellers and, on the other hand must be innovative products in terms of both function and industrial design.

Even for products in which functional requirements seem to force consolidated patterns to be followed, experimentation with new materials and new structures allows limits and problems which are widely known and passively tolerated to be overcome.

Most railings, for example, are made of rigid materials, usually wood or metal, so as to give solidity to the entire structural assembly. However, during production, transportation and installation such materials require conditions which do not often adapt well to the increasingly felt need for construction flexibility and efficient warehouse management.

Amongst the few prior art solutions which differ from the previous ones, it is worth mentioning some railings made using rigid metal meshes and fabric meshes.

Railings made of rigid metal meshes do not bring advantages in terms of transportation, only in the use of a reduced quantity of material: the nature of these products is such that they must be transported ready for installation, with
considerable dimensions and prevent any possibility of size adjustment, which would be necessary, for example, for staircases with steps having a variable riser.

Even railings comprising fabric meshes do not allow the adjustments typically needed for prefabricated staircases common all over the world. Moreover, although transportation is easier, since flexibility allows reduced dimensions, direct fixing of the meshes to the handrail and steps creates tensioning difficulties, therefore, problems achieving high safety standards, and the performance of any repairs to damaged parts.

Disclosure of the Invention

This invention therefore has for an aim to eliminate the above-mentioned disadvantages. The invention, described in the appended claims, achieves the aim thanks to a railing comprising a fabric mesh and a supporting frame which is independent of the fixed structure of the staircase, or of the balustrade, or of the parapet.

The main advantage of this invention is basically the fact that the use of the mesh allows huge advantages in terms of the dimensions necessary both for transportation and for the warehouse.

Moreover, the presence of a supporting structure which is not part of the fixed components of the staircases, balustrades or parapets allows both very easy adjustment, and the achievement of high levels of safety, comparable with those of a fully rigid structure.

Finally, the invention may be installed on staircases having various structures, for example spiral or ramp-shaped, even retrofitted on them.

Brief Description of the Drawings

Further advantages and features of the invention are more apparent in the detailed description which follows, with reference to the accompanying drawings, which illustrate a preferred, non-limiting example embodiment of the invention, in which:
Figure 1 is a perspective assembly view of the invention in an operating condition;

Figure 2 is a view of an alternative embodiment of the invention;

Figure 3 is a perspective view of a first detail of the invention;

Figure 4 is a side view of the detail of Figure 3;

Figure 5 is a view of the detail according to the cross-section V - V of Figure 4;

Figure 6 is a perspective view of a second detail of the invention;

Figure 7 is a top plan view of the detail of Figure 6, with some parts cut away to better illustrate others;

Figure 8 is a view of the detail according to the cross-section VIII - VIII of Figure 7;

Figure 9 is a side view of an embodiment of a third detail of the invention;

Figure 10 is a perspective view of the detail of Figure 9;

Figure 11 is an enlarged view of a first portion of the detail of Figures 9 and 10;

Figure 12 is an enlarged view relative to a second embodiment of the detail of Figures 9 and 10;

Figures 13 and 14 are respectively a perspective view and a cross-section of a first embodiment of a second portion of the detail;

Figures 15 and 16 are respectively a perspective view and a cross-section of a second embodiment of a second portion of the detail.

**Detailed Description of the Preferred Embodiments of the Invention**

In accordance with the accompanying drawings, the invention relates to a railing for fixed structures. It is shown connected to a spiral staircase, but could be adapted to other types of stepped staircases, or even to balustrades or parapets. It comprises at least one handrail (4) and supporting poles (5) for the handrail (4) which are integral with the steps (51) of the staircase (50), or, in general, with the fixed part of the structure to which the railing (10) is connected. The railing (10)
also comprises a fabric mesh (1) and at least one rigid frame (2) equipped with adjustable connecting means (3) designed to support the mesh (1) once it has been installed.

A single frame (2) may be used for the entire length of the staircase (50) or other fixed structure, or the railing (10) may comprise a plurality of rigid frames (2), each designed to support a portion of mesh (1) and having autonomous adjustable connecting means (3), so that the railing (10) is split into separate sectors.

The adjustable connecting means (3) comprise at least one upper connecting element (31), designed to connect the frame (2) to the handrail (4) and a supporting pole (5), and at least one lower connecting element (32), designed to connect the frame (2) to a supporting pole (5).

The upper connecting element (31) comprises a projection (313) whose angle can be adjusted, designed to connect the frame (2) to the handrail (4), and an engagement end (312), designed to rigidly connect the frame (2) to the supporting pole (5). Moreover, especially in the case of staircases (50) which are not linear, as illustrated in the accompanying drawings, it is appropriate that the upper connecting element (31) also comprises a clamp (311) whose angle can be adjusted, designed to optimise frame (2) stability. The presence of the clamp (311), which may be rotated according to the angle of the stretch of staircase (50) alongside which the railing (10) stands, allows the contact surfaces of the upper connecting element (31) and the upper part of the frame (2) to be made to adhere as much as possible.

The lower connecting element (32) comprises means (322) for coupling to the pole which can be adjusted vertically, allowing the mesh (1) to be tightened. Similarly to what is described above, especially for spiral staircases (50), it is a good idea if the lower connecting element (32) also comprises a clamp (321) whose angle can be adjusted, designed to optimise frame (2) stability in its lower part too. In such a case, there are also means (323) for locking the clamp (321) in operating conditions.
The means (322) for coupling to the pole comprise a ring (221) which can move vertically and means (222) for locking the ring (221) in operating conditions.

The frame (2) comprises at least one end profile (6), designed to fix the mesh (1) and to tighten it in a horizontal direction, and at least one transversal element (7), following the extension of the staircase (50), or a different fixed structure to which the railing (10) is connected.

The frame (2) also comprises joint elements (8; 9), designed to connect an end profile (6) and a transversal element (7). They may have various forms: in Figure 12 they are shown as half-balls (8a, 8b) which can be connected to each other, respectively connected to an end profile (6) and to a transversal element (7); in Figures 9 to 11 they are shown as cap portions (9a, 9b) which can be connected to each other, neatly connected to an end profile (6) and to a transversal element (7).

The end profile (6) comprises two matching half-shells (6a, 6b) which can be connected to each other on opposite sides of the mesh (1). During assembly, before joining the half-shells (6a, 6b), the mesh (1) is tightened in the horizontal direction and cut to size according to the extension of the staircase (50), or of the fixed structure to which the railing (10) is connected. The end profile (6) may also comprise a jacket (6c), designed to stably hold the two half-shells (6a, 6b) in position.

The invention described above may be modified and adapted in several ways without thereby departing from the scope of the inventive concept.

Moreover, all details of the invention may be substituted by technically equivalent elements.

Obviously, in practice modifications and/or improvements are possible which are covered by the following claims.
Claims

1. A railing for fixed structures, comprising at least one handrail and supporting poles for the handrail which are integral with the fixed structure, characterised in that it comprises a fabric mesh (1) and at least one rigid frame (2), designed to support the mesh (1), having adjustable connecting means (3).

2. The railing according to claim 1, characterised in that it comprises a plurality of rigid frames (2), each designed to support a portion of mesh (1) and having autonomous adjustable connecting means (3), so that the railing (10) is split into separate sectors.

3. The railing according to claim 1 or 2, characterised in that the adjustable connecting means (3) comprise at least one upper connecting element (31), designed to connect the frame (2) to the handrail (4) and a supporting pole (5), and at least one lower connecting element (32), designed to connect the frame (2) to a supporting pole (5).

4. The railing according to claim 3, characterised in that the upper connecting element (31) comprises a projection (313) whose angle can be adjusted, designed to connect the frame (2) to the handrail (4) and an engagement end (312), designed to rigidly connect the frame (2) to the supporting pole (5).

5. The railing according to claim 3, characterised in that the upper connecting element (31) comprises a clamp (311) whose angle can be adjusted, being designed to optimise frame (2) stability.

6. The railing according to claim 5, characterised in that the upper connecting element (31) comprises means (314) for locking the clamp (311) in operating conditions.
7. The railing according to claim 3, characterised in that the lower connecting element (32) comprises means (322) for coupling to the pole which can be adjusted vertically, allowing the mesh (1) to be tightened.

8. The railing according to claim 3, characterised in that the lower connecting element (32) comprises a clamp (321) whose angle can be adjusted, being designed to optimise frame (2) stability.

9. The railing according to claim 8, characterised in that the lower connecting element (32) comprises means (323) for locking the clamp (321) in operating conditions.

10. The railing according to claim 7, characterised in that the means (322) for coupling to the pole comprise an adjustable ring (221) and means (222) for locking the ring (221) in operating conditions.

11. The railing according to claim 1 or 2, characterised in that the frame (2) comprises at least one end profile (6), designed to fix the mesh (1) and to tighten it in a horizontal direction, and at least one transversal element (7), following the extension of the fixed structure.

12. The railing according to claim 11, characterised in that the frame (2) comprises joint elements (8; 9), designed to connect an end profile (6) and a transversal element (7).

13. The railing according to claim 12, characterised in that the joint elements (8) comprise half-balls (8a, 8b) which can be connected to each other, respectively connected to an end profile (6) and to a transversal element (7).
14. The railing according to claim 12, characterised in that the joint elements (9) comprise cap portions (9a, 9b) which can be connected to each other, neatly connected to an end profile (6) and to a transversal element (7).

15. The railing according to claim 11, characterised in that the end profile (6) comprises two matching half-shells (6a, 6b) which can be connected to each other on opposite sides of the mesh (1).

16. The railing according to claim 15, characterised in that the end profile (6) comprises a jacket (6c) designed to hold the two half-shells (6a, 6b) in position.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. E04F11/18 E04F11/032

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)

E04F

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

Electronic database consulted during the international search (name of database and, where practical, search terms used)

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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* Special categories of cited documents
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Date of the actual completion of the international search: 7 June 2010

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Name and mailing address of the ISA/

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Authorized officer

Bouyssy, Vincent
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