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(54) **ASSEMBLY OF A BALUSTRADE**

GELÄNDERKONSTRUKTION

ASSEMBLAGE D'UNE BALUSTRADE

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DescriptionFIELD OF THE INVENTION

[0001] This invention relates to balustrades and to a method of assembling balustrades.

BACKGROUND TO THE INVENTION

[0002] Balustrades are features in buildings that comprise of a number of upright posts (stanchions or "balusters") which support a coping or handrail along their upper ends and which often include a so-called "infill" between posts, such as a number of intermediate cross-bars, vertical slats or glass panels. Historically, a wide variety of materials have been used to manufacture balustrades, but the present invention is concerned with balustrades made of metal, e.g. stainless steel, with intermediate cross-bars between the posts.

[0003] Cross-bars of stainless steel balustrades are often made of solid cylindrical rods with a nominal diameter of 12 mm, which has been found to be smallest standard size of stainless steel rod that is strong enough for the purposes of a balustrade. Stainless steel is expensive and in order to provide affordable balustrades, the mass of stainless steel used in balustrades needs to be kept to a minimum.

[0004] A balustrade is disclosed in International Patent Application No. PCT/IB2009/051700. This system works well, but in balustrades that do not extend horizontally, e.g. balustrades along ramps or staircases, the vertical cross bars are not perpendicular to the bars between which they extend and the clamp mechanisms cannot be used. US 4 952 092 A is a background prior art document disclosing a method of assembling a balustrade.

[0005] The present invention seeks to provide cross-bars for balustrades of metal, especially stainless steel balustrades, that have sufficient strength, yet are more cost effective than solid, uniform cross-bars.

[0006] The present invention further seeks to provide for the attachment of horizontal bars to stanchions in balustrades in a strong, yet cost-effective manner, without requiring welding on site.

SUMMARY OF THE INVENTION

[0007] To solve the above problem, the invention relates to a method of assembling a balustrade according to claim 1 and to a balustrade according to claim 2.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] For a better understanding of the present invention, and to show how the same may be carried into effect, the invention will now be described by way of non-limiting example, with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic side elevation of part of a balustrade, included herein for the sake of a better understanding;

Figure 2 is a three dimensional view of a short cross-bar, for a balustrade such as that shown in Figure 1, included herein for the sake of a better understanding;

Figure 3 is a sectional view of a cross bar in accordance with the present invention, included herein for the sake of a better understanding;

and
Figure 4 is a sectional side view of part of a balustrade in accordance with the present invention.

15 DETAILED DESCRIPTION OF THE DRAWINGS

[0009] Referring to the drawings, a balustrade is generally indicated by reference numeral 10 and a cross-bar for such a balustrade is generally indicated by reference numeral 12.

[0010] The balustrade 10.1 shown in Figure 1 includes a number of upstanding stanchions of posts 14 that are attached to the adjacent floor and a handrail 16 that extends along the tops of the posts and that are attached to the tops of the posts by short pins 18. In the illustrated example, these components are pressed together on site, but in conventional balustrades, they can be welded together. The posts 14 and handrail 16 are hollow cylindrical pipes and all the components are made of stainless steel, for reasons of aesthetics, structure and corrosion resistance.

[0011] The cross-bars 12 are elongate structural elements that extend transversely between the posts 14 and that are attached to the posts with fittings 20 that are pressed together. As can be seen in Figure 2, each cross-bar 12.1 comprises a hollow cylindrical outer sheath of stainless steel in the form of a tube 22 that defines a cylindrical inner cavity. The tube 22 is preferably a standard stainless steel tube with a nominal diameter of 12.7 mm, which is significantly less expensive per length than 12mm solid bar.

[0012] The cavity inside the tube 22 is filled with a core 24 of a composite material in the form of glass fibre reinforced polyester, or "fibreglass". The fibreglass core 24 improves the structural strength of the cross-bar 12.1, particularly by improving the stiffness of the cross-bar, i.e. its resistance to bending. The improvement in the structural strength of the tube 22 by the addition of the fibreglass core 24 gives the cross-bar 12.1 sufficient structural strength to be used in the balustrade, despite including significantly less stainless steel than a conventional solid cross-bar. At the same time, the tube 22 is obviously as aesthetically pleasing and corrosion resistant as a solid stainless steel bar and protects the core 24 against UV radiation, so that the cross-bar 12.1 has all the attributes to replace conventional solid cross-bars, at lower cost.

[0013] The cross-bar 12.1 is made by injecting the fi-

breglass into the cavity inside the tube 22 while it is in a flowable condition and allowing it to cure inside the tube to form the core 24 and to bond to the inner walls of the tube 22.

[0014] The tube 22 can be of different material, such as other metals. The core 24 can be made of any material other than the tube 22, as long as it is cost effective and imparts sufficient structural strength to the tube. Other suitable materials for the core include other polymers, such as thermoplastic materials and other metals, such as low grade iron or steel.

[0015] Like the cross bar shown in Figure 2, the cross bar 12.2 in Figure 3 has a hollow, cylindrical outer sheath in the form of a stainless steel tube 22. In the centre of the cross bar 12, its core comprises of a rod 26 of carbon steel of the type commonly used for reinforcing concrete buildings and known colloquially as "rebar". The rebar rod 26 is inserted into the stainless steel tube 22 from either end so that it is recessed from one end, but preferably from both ends, as shown in Figure 3. A flowable composite material, e.g. a glass reinforced nylon material is injected into the cavities at each end of the tube 22, to solidify and form a composite core 24, similar to that shown in Figure 2, but extending only in the vicinities of the ends of the cross bar 12.2.

[0016] The rebar rod 26 is resilient enough to give the cross bar 12.2 the desired stiffness and strength, especially in its centre, where it is likely to encounter the highest bending loads. Further, the composite core 24 also provides stiffness and strength closer to the ends of the cross bar 12.2 and seals the rebar rod 26 from the ingress of air or water from the ends of the tube 22 and thus protects the rebar rod against corrosion. Rebar rods are significantly less expensive than stainless steel rods and the cross bar 12.2 shown in Figure 3 can be made at significantly lower cost than solid stainless steel cross bars, while having sufficient strength to serve the purposes of a cross bar 12.2 in a balustrade 10.

[0017] A balustrade 10.3, in accordance with the present invention, of which a part is shown in Figure 4 includes a stanchion or post 14, to which two horizontal tubes 28 are attached on opposing sides.

[0018] The tubes 28 are attached to the post 14 by drilling through the post to provide apertures 36 on opposing sides of the post and passing a short rod 38 through both apertures so that each of its ends protrudes from the post, on opposing sides of the post. An insert 40 which defines a blind recess 44 is inserted into the end of each tube 28 with a press fit or in any other suitable manner that will prevent the insert from sliding further into the tube. Each tube 28 is fitted to the post 14 by receiving the protruding end of the rod 38 into the blind recess 44 at the end of the tube, so that the tubes extend on opposing sides of the post 14, with the rod held captive between the blind apertures 44 and with the rod and tubes all in general alignment with a common longitudinal axis extending transverse to the post.

Claims

1. A method of assembling a balustrade (10), said method including:

5 providing an upright stanchion (14);
 providing protuberances (44) on opposing sides of the stanchion;
 providing longitudinal recesses (42) extending inwards from the end of each of two tubes (28); and
 10 receiving the protuberances inside the recess of each tube, such that the tubes extend in general alignment on opposing sides of the stanchion;
 wherein each tube (28) has an insert (40) at its end and the protuberances are formed by passing a rod (38) through apertures (36) on opposing sides of the stanchion(14);
 15 **characterised in that** each recess (42) is a blind recess extending into the insert and further
 20 **characterised in that** the stanchion (14) is a hollow cylindrical pipe and the apertures (36) are provided by drilling through the stanchion.

2. A balustrade (10) comprising:

an upright stanchion (14);
 protuberances (44) on opposing sides of the stanchion;
 longitudinal recesses (42) extending inwards from the end of each of two tubes (28); and
 the protuberances being received inside the recess of each tube, such that the tubes extend in general alignment on opposing sides of the stanchion;
 wherein each tube (28) has an insert (40) at its end and the protuberances are formed by passing a rod (38) through apertures (36) on opposing sides of the stanchion(14);
 30 **characterised in that** each recess (42) is a blind recess extending into the insert and further
 35 **characterised in that** the stanchion (14) is a hollow cylindrical pipe and the apertures (36) are drilled through the stanchion.

Patentansprüche

1. Verfahren zum Zusammenbauen eines Geländers (10), wobei das Verfahren enthält:

Vorsehen einer aufrechten Strebe (14);
 Vorsehen von Vorsprüngen (44) an gegenüberliegenden Seiten der Strebe;
 Vorsehen länglicher Aussparungen (42), die sich vom Ende jeder von zwei Röhren (28) nach innen erstrecken; und

Aufnehmen der Vorsprünge im Inneren der Aussparung jeder Röhre, so dass sich die Röhren in einer allgemeinen Ausrichtung an gegenüberliegenden Seite der Strebe erstrecken; wobei jede Röhre (28) einen Einsatz (40) an ihrem Ende aufweist und die Vorsprünge gebildet werden, indem eine Stange (38) durch Öffnungen (36) an gegenüberliegenden Seiten der Strebe (14) geführt wird; **dadurch gekennzeichnet, dass** jede Aussparung (42) eine blinde Aussparung ist, die sich in den Einsatz erstreckt, und ferner **dadurch gekennzeichnet, dass** die Strebe (14) ein hohles zylindrisches Rohr ist und die Öffnungen (36) durch Bohren durch die Strebe vorgesehen sind.

2. Geländer (10), umfassend:

eine aufrechte Strebe (14);
 Vorsprünge (44) an gegenüberliegenden Seiten der Strebe;
 längliche Aussparungen (42), die sich vom Ende jeder von zwei Röhren (28) nach innen erstrecken; und
 wobei die Vorsprünge im Inneren der Aussparung jeder Röhre so aufgenommen sind, dass sich die Röhren in einer allgemeinen Ausrichtung an gegenüberliegenden Seite der Strebe erstrecken;
 wobei jede Röhre (28) einen Einsatz (40) an ihrem Ende aufweist und die Vorsprünge gebildet werden, indem eine Stange (38) durch Öffnungen (36) an gegenüberliegenden Seiten der Strebe (14) geführt wird;
dadurch gekennzeichnet, dass jede Aussparung (42) eine blinde Aussparung ist, die sich in den Einsatz erstreckt, und ferner **dadurch gekennzeichnet, dass** die Strebe (14) ein hohles zylindrisches Rohr ist und die Öffnungen (36) durch die Strebe gebohrt sind.

Revendications

1. Une méthode pour assembler une balustrade (10), ladite méthode incluant de :

fournir une colonne verticale (14);
 fournir des saillies (44) sur des côtés opposés de la colonne;
 fournir des évidements longitudinaux (42) s'étendant vers l'intérieur depuis l'extrémité de chacun de deux tubes (28); et
 recevoir les saillies à l'intérieur de l'évidement de chaque tube, de telle sorte que les tubes s'étendent globalement dans un alignement sur des côtés s'opposant de la colonne;

dans laquelle chaque tube (28) a un insert (40) à ses extrémités et les saillies sont formées en passant une tige (38) à travers des ouvertures (36) sur des côtés s'opposant de la colonne (14); **caractérisée en ce que** chaque évidement (42) est un évidement borgne s'étendant dans l'insert et **caractérisée en outre en ce que** la colonne (14) est un tuyau cylindrique creux et les ouvertures (36) sont fournies en perçant à travers la colonne.

2. Une balustrade (10) comprenant:

une colonne verticale (14);
 des saillies (44) sur des côtés s'opposant de la colonne;
 des évidements longitudinaux (42) s'étendant vers l'intérieur depuis l'extrémité de chacun de deux tubes (28); et
 les saillies étant reçues à l'intérieur de l'évidement de chaque tube, de telle sorte que les tubes s'étendent globalement dans un alignement sur des côtés s'opposant de la colonne;
 dans laquelle chaque tube (28) a un insert (40) à ses extrémités et les saillies sont formées en passant une tige (38) à travers des ouvertures (36) sur des côtés s'opposant de la colonne (14); **caractérisée en ce que** chaque évidement (42) est un évidement borgne s'étendant dans l'insert et **caractérisée en outre en ce que** la colonne (14) est un tuyau cylindrique creux et les ouvertures (36) sont fournies en perçant à travers la colonne.

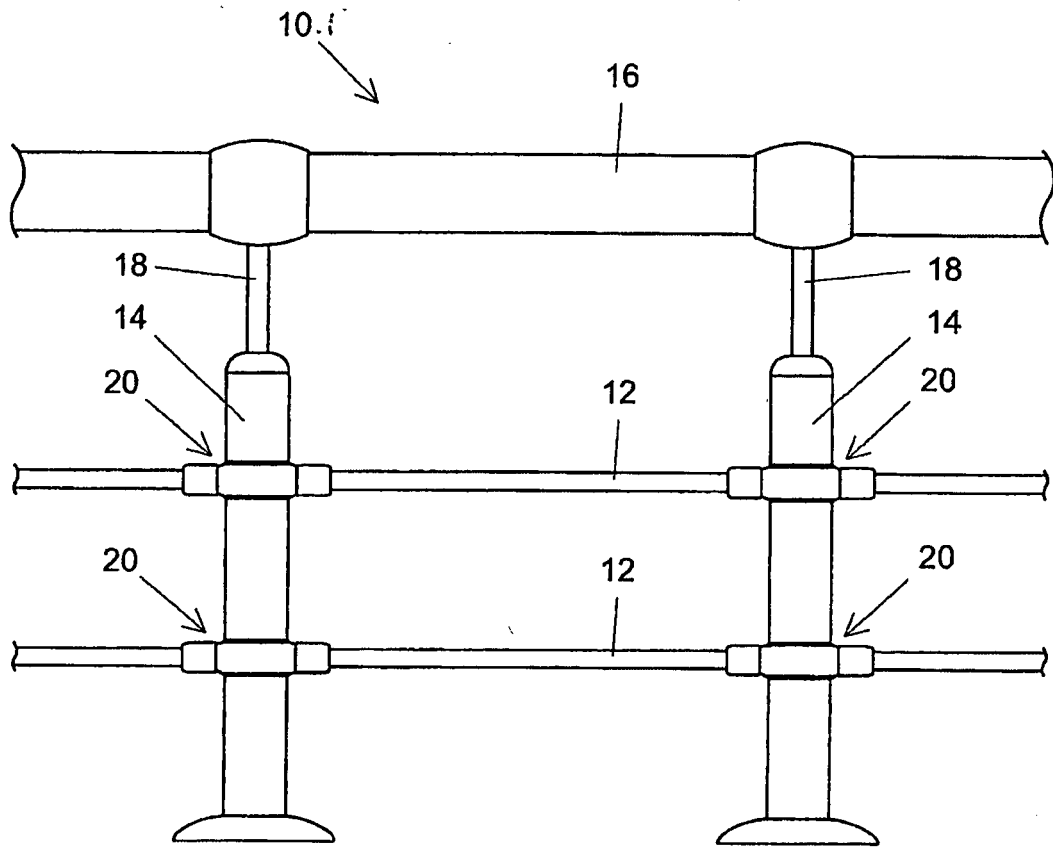


Figure 1

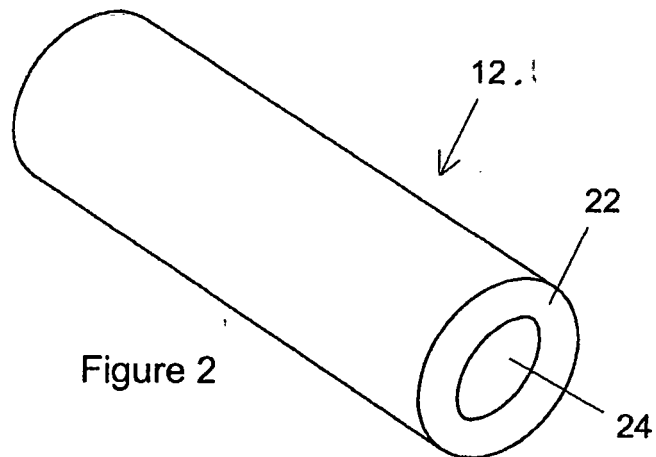


Figure 2

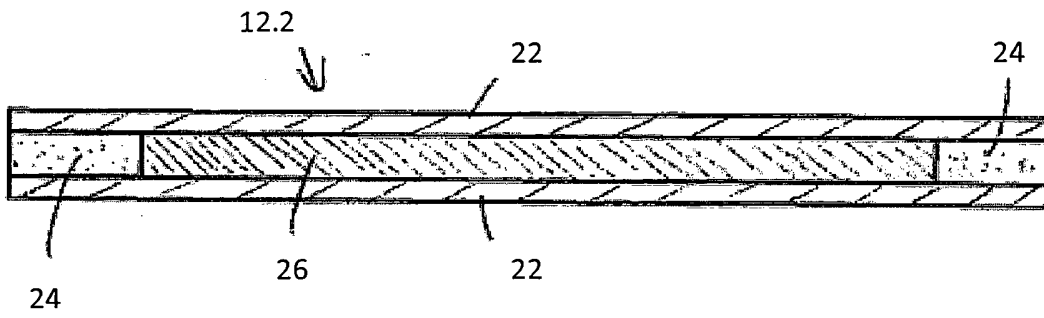


Figure 3

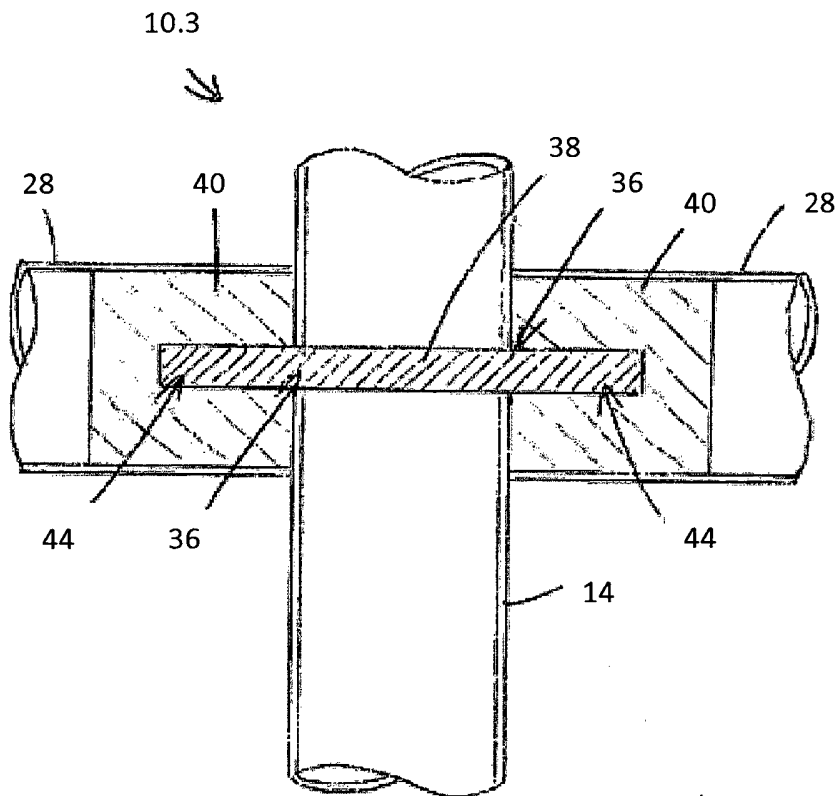


Figure 4

REFERENCES CITED IN THE DESCRIPTION

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