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(54) Fencing section with flat rod panels fixed to fencing post

(57) A fencing section (30) comprises at least one flat rod panel (32, 34), a fencing post (36) with the panel (32, 34) fixed to the fencing post (36). The rod panel (32, 34) has vertically extending rods (40, 43, 44) and horizontally extending rods (38). The vertically extending rods (40) are welded to the horizontally extending rods (38). The vertically extending rods (40) facing the fencing post (36). The fencing post (36) has an open side having an openness (42) which is open over at least the height of the vertically extending rods (40). The open side face the rod panel (32, 34). The open side has two flange portions (41) which limit the openness (42). The rod panel (32, 34) is fixed to the fencing post (36) so that at least one vertically extending rod (43, 44) is housed in the openness (42).

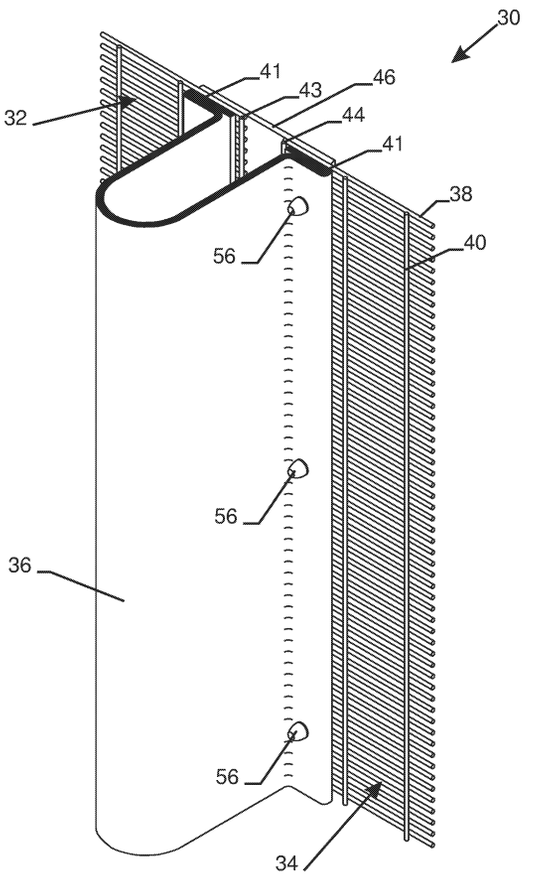

Fig. 2

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Description

Field of the invention.

[0001] The present invention relates to a fencing section having at least one flat rod panel, a fencing post and fastening means such as bolts and nuts for fixing the rod panel to the fencing post.

Background of the invention.

[0002] In the prior art various embodiments of fencing sections with flat rod panels and fencing posts are known. As will be explained hereafter, these embodiments suffer from three major drawbacks. First of all it is extremely difficult to fix the rod panels tightly to the fencing post and still keep the panels flat in a single plane. Secondly, the fencing sections are very vulnerable from a security point of view. It suffices to break a fencing section at or in the neighborhood of the single and isolated spots where bolts are used, to penetrate through the fencing. Thirdly, installation of the fencing section must be done in a very accurate way since high tolerances are not allowed.

Summary of the invention.

[0003] It is an object of the present invention to avoid the drawbacks of the prior art.
It is another object of the present invention to enable fixing of rod panels to fencing posts in a straight and planar way.
It is also an object of the present invention to increase the security offered by fencing sections.
It is still an object of the present invention to facilitate the installation of fencing sections.

[0004] According to the present invention there is provided a fencing section having at least one flat rod panel, a fencing post. The rod panel or rod panels are fixed to the fencing post. The rod panel has vertically extending rods and horizontally extending rods. The vertically extending rods are welded to the horizontally extending rods. The vertically extending rods face the fencing post, i.e. the horizontally extending rods are more remote from the fencing post than the vertically extending rods. The fencing post is characterized by an open side with an openness that is open over at least the height of the vertically extending rods. This open side faces the rod panel or the rod panels. The open side has two flange portions, which limit the openness. The rod panel is fixed to the fencing post so that at least one vertically extending rod is housed in the openness.
As a consequence, and as will be explained hereafter, when fixing the rod panel tightly to the fencing post, the rod panel will no longer pivot around the vertically extending rods and will remain planar or in the same plane as the other rod panels.

[0005] Preferably the horizontally extending rods contact the flange portions, which further increases the stability of the construction and prevents the rod panels from pivoting.

[0006] Preferably the openness allows horizontal adjustment of the rod panel in the fencing post, which will facilitate installation of the fencing section. As will be explained hereinafter in more detail, installation will no longer be bound by tolerances of less than plus minus 5 mm. Tolerances or adjustments of the order of 5 cm, i.e. ten times higher than before, are now allowed.

[0007] According to a preferable embodiment, the fencing section comprises two rod panels. Each of these two rod panels has two edge rods extending vertically at each side thereof and limiting the rod panel. The edge rod of one of these panels and an adjacent edge rod of the other of these panels are both housed in the openness. When a frontal attack is launched in the middle of one of the rod panels, the edge rod of the attacked rod panel will provide an anchorage and line contact with the relevant flange portion over its whole height, which provides a much higher resistance than the isolated fixtures of bolts and nuts in the prior art embodiment.

[0008] The fencing section according to the invention preferably comprises a cover plate and fastening means. The cover plate overlaps with the flange portions of the fencing post. Fastening means fix the rod panel between the flange portions and the cover plate. The cover plate increases the stability of the construction. Preferably the horizontally extending rods contact the cover plate, which further increases the stability and strength of the construction.

[0009] In a preferable embodiment, the flange portions comprise vertically extending slots instead of circular holes for housing e.g. bolts as fastening means. These vertically extending slots allow vertical adjustment of the rod panel to the fencing post. These vertically extending slots help to facilitate the installation.
The cover plate may also comprise vertically extending slots for housing bolts instead of circular holes. This allows vertical adjustment of the cover plate to the rod panel and the fencing post.

[0010] Instead of a single cover plate per fencing post, there may be provided more than one cover plate. This more than one cover plate per fencing post may overlap partially with each other, which further increases the stability of the fencing section.

[0011] The fencing post may be made from several pieces of metal plate, which are welded to each other. Preferably, however, the fencing post is made out of a single piece of metal plate, which has been formed to the desired profile. This forming can be done in a continuous operation, after which the continuous profile is cut to the desired lengths (heights) of the fencing post.

[0012] The means for fastening the rod panel to the fencing post may be any known means such as bolts and nuts, screws, rivets, ...

Brief description of the drawings.

[0013] The invention will now be described into more detail with reference to the accompanying drawings wherein

- FIGURE 1 illustrates the way in which a prior art fencing section is installed ;
- FIGURE 2 gives a perspective view of a fencing section according to the invention ;
- FIGURE 3 gives a perspective view of a fencing post according to the invention ;
- Figures 4 give the various individual components of a fencing section according to the invention :
    - o FIGURE 4a is a frontal view of a fencing post,
    - o FIGURE 4b is a cross-section of the fencing post,
    - o FIGURE 4c is a frontal view of a cover plate,
    - o FIGURE 4d is a perspective view of fastening means,
    - o FIGURE 4e is a perspective view of a cap ;
- FIGURE 5 is a cross-section of a preferable embodiment of the invention ;
- FIGURE 6 is a cross-section of an alternative embodiment of the invention ;
- FIGURE 7 is a cross-section of another alternative embodiment of the invention.

Description of the prior art embodiment.

[0014] FIGURE 1 illustrates the installation of a fencing section 10 according to the prior art. The fencing section 10 comprises two flat rod panels 12 and 14. Each rod panel 12, 14 comprises horizontally extending rods 16 and vertically extending rods 18. The vertically extending rods 18 are welded to the horizontally extending rods 16. The fencing section further comprises a hollow but closed fencing post 20 with a square cross-section. Circular cross-sections are also available. The rod panels 12 and 14 are fixed to fencing post 20 in an overlapping configuration by means of a clamp bar 22. Holes 26 are made in fencing post 20 and slots 28 are made in the clamp bar 22. Bolts 29 are used through the holes 26 and through the slots 28 to fix the rod panels 12 and 14 between the clamp bar 22 and the fencing post 20.
A first drawback of this prior art fencing section 10 is as follows. If one tries to fix the rod panels 12 and 14 very tightly to the fencing post 20, a great force is applied to the horizontally extending rods 16 in the middle between two vertically extending rods 18. Since the vertically extending rods 18 keep the horizontally extending rods 16 at a distance from the fencing post 20 or at a distance from another rod panel, which distance is equal to the diameter of the vertically extending rods, the horizontally extending rods 16 start to bend and pivot with respect to the vertically extending rods 18. The result is damage on the rod panels 12 and 14. The rod panels 12 and 14 no longer lie in one single plane. In order to mitigate this drawback, a resilient material such as rubber can be placed between the horizontally extending rods 16 and the fencing post 20. The addition of such a resilient material, however, complicates the structure and is time-consuming.
A second drawback of the prior art fencing section 10 is as follows. The forces and impacts caused by a frontal attack, e.g. by a car hitting the middle of a rod panel 12, must be received mainly at the isolated spots of the bolts 29. Due to the lever effect of the horizontally extending rods 16, the fixation of the rod panels 12 and 14 to the fencing post 20 risks to be broken quite quickly.
In other prior art fencing sections, attempts have been made to overcome the above-mentioned two drawbacks. This has been done by the use of the above-mentioned resilient material and by the use of two bolts on the same horizontal line. However, these other prior art fencing sections suffer from following drawback. Experience by professional installation teams of these other prior art fencing sections has shown that the maximum tolerances in a horizontal direction amount to $\pm$ 8.0 mm, which is very small having regard to the size of the rod panels and to the rigidity of both the fencing posts and the rod panels.

Description of a preferable embodiment of the invention.

[0015] FIGURE 2, FIGURE 3, FIGUREs 4a, 4b, 4c, 4d, 4e and FIGURE 5 all illustrate a preferable embodiment of the invention.
FIGURE 2 gives a perspective view of an invention fencing section 30.
FIGURE 3 gives a perspective view of a fencing post 36 without the rod panels.
FIGUREs 4 give the various parts individually. FIGURE 4a is a frontal view of the fencing post 36. FIGURE 4b is a cross-section of the fencing post 36. FIGURE 4c is a frontal view of the covering plate 46.
FIGURE 4d is a perspective view of fastening means. FIGURE 4e is a perspective view of a post cap.
FIGURE 5 is a cross-section of an invention fencing section 30.
[0016] Referring to both FIGURE 2 and FIGURE 5, a fencing section 30 according to the invention comprises two flat rod panels 32 and 34 and a fencing post 36.
[0017] Although other rod panels are not excluded, the invention is particularly useful for rod panels 32, 34 of the type SECURIFOR®, a trademark owned by N.V. Bekaert S.A. These rod panels 32, 34 are a heavy high security panel with rod diameter of 4.0 mm for both the horizontally extending rods 38 and the vertically extending rods 40. The horizontally extending rods and the vertically extending rods form rectangular meshes of the size 12.7 mm (height) x 76.2 mm (width), measured from the geometrical center axes of the wire rods. The height

of these meshes is deliberately kept that small in order to prevent human fingers or human feet from penetrating there through or from finding support. The standard width of the whole rod panel 32, 34 is 2515 mm and the height of the panel can be up to 6270 mm. Tensile strength of the wire rods 38, 40 ranges from 540 MPa to 615 MPa. The horizontally extending rods 38 are welded to the vertically extending rods 40. The weldshear strength is about 75% of the tensile strength of the rod 38, 40. The weight of a rod panel 32, 34 is about 9.10 kg/m^2. The wire rods 38, 40 are galvanized by means of a hot dip operation in zinc or a zinc aluminum alloy. The rod panels 32, 34 are coated by means of a polymer coating such as nylon or polyester.

Other dimensions, other wire rod diameters, other sizes of meshes and sizes of panels are possible. As a matter of example, the wire rod diameters may vary between 3.0 mm to 7.0 mm.

[0018] The fencing post 36 is a hollow post with an open side. Flanging portions 41 at the open side limit an openness 42 in the fencing post 36. A vertical edge rod 43 of a rod panel 34 and a vertical edge rod 44 of an adjacent rod panel 32 are housed in the openness 42. Due to this housing of the vertical edge rods 43 and 44 in the openness 42, the horizontally extending rods 38 now may contact the flange portions 41 of the fencing post over the width of the flange portions 41, which increases substantially the stability and rigidity of the construction.

The openness 42 between the flange portions 41 allows some horizontal shifting or displacement of the rod panels 32 and 34. As a matter of example, the width of the openness 42 is 50.0 mm. Taken into account a wire rod diameter of 5.0 mm, such openness increases the tolerances on the positioning of the fencing posts 36 to about 45.0 mm.

An external force exercised upon one of the rod panels 32 or 34, may lead the edge rods 43 and 44 to contact the edges of the flange portions 41. A line contact is established over the whole height of the rod panels 32 and 34. This line contact reinforces the fixation of the rod panels 32 and 34 to the fencing post 36 as the bolds no longer alone have to absorb any external forces.

The fencing post 36 is preferably made out of a single steel plate with, for example, a thickness of about 5.0 mm. Other suitable dimensions of thickness may vary from 3.0 to 6.0 mm. The final profile of the fencing post 36, with its flange portions 41, can be made by cold forming by means of a single continuous operation. There is no need for additional welding operations. After this operation the profile is cut to its required length corresponding to the height of the fencing post 36. The fencing post 36 can have a greatest cross-sectional dimension T ranging from e.g. 110 mm to 150 mm and more. A cover plate 46 is used to help to fix the rod panels 32 and 34 to the flanging portions of fencing post 36.

[0019] Referring to FIGURE 3, in an advantageous embodiment of the fencing section 30, more than one cover plate 46', 46" can be used.

[0020] These cover plates 46', 46" preferably overlap. This overlapping gives a supplementary rigidity and security to the fencing section.

[0021] FIGURE 4a gives a frontal view of fencing post 36. Vertically extending slots 50 are made in the flanging sections 41 of fencing post 36. Such vertically extending slots 50 allow some vertical adjustment of the rod panels 32 and 34 to the fencing post 36. Such vertically extending slots 50 are difficult to make in prior art closed round or square fencing posts. In contrast herewith and according to an aspect of the invention, the presence of the flanging sections 41 facilitate making such vertically extending slots 50.

FIGURE 4b gives a cross-section of a fencing post 36. FIGURE 4c is a frontal view of a cover plate 46. Such a cover plate 46 may be made from a steel plate of e.g. 5.0 mm thick. As with the flanging sections 41, vertically extending slots 52 are preferably provided in the covering plate 46. These slots 52 allow for some vertical adjustment of the cover plate 46 with respect to the rod panels 32 and 34 and the fencing post 36.

FIGURE 4d gives a perspective view of fastening means. These fastening means can be bolts 54, nuts 56 and washers 58. Other fastening means may be screws. The bolts 54 can be limited in length since they do not need to traverse the whole cross-section of the fencing post.

FIGURE 4e gives a perspective view of a fencing post cap 60 fitting with the particular cross-section of fencing post 36.

Description of alternative embodiments of the invention.

[0022] FIGURE 6 gives a cross-section of a first alternative embodiment of a fencing section according to the invention. Fencing post 62 has an open rectangular cross-section. Flange sections 64 at the open side of fencing post 62 allow fixation of the rod panels 32 and 34 to the fencing post.

[0023] FIGURE 7 is a cross-section of a second alternative embodiment of a fencing section according to the invention. The fencing post is now made out of several parts : an open U-profile 66 and two flange sections 68. The flange sections 68 are connected to profile 66 by means of welds 70.

Claims

1. A fencing section comprising at least one flat rod panel, a fencing post, said rod panel being fixed to said fencing post,
   said rod panel having vertically extending rods and horizontally extending rods, said vertically extending rods being welded to said horizontally extending rods, said vertically extending rods facing said fenc-

ing post,
said fencing post having an open side having an openness which is open over at least the height of the vertically extending rods, said open side facing said rod panel, said open side having two flange portions which limit said openness,
said rod panel being fixed to said fencing post so that at least one vertically extending rod is housed in said openness.

2. A fencing section according to claim 1 wherein said horizontally extending rods contact said flange portions.

3. A fencing section according to claim 1 or claim 2 wherein said openness allows horizontal adjustment of said rod panel in said fencing post.

4. A fencing section according to any one of the preceding claims, wherein said fencing section comprises two rod panels, each of said rod panels having two edge rods extending vertically at each side thereof, an edge rod of one of said panels and an adjacent edge rod of another of said panels both being housed in said openness.

5. A fencing section according to any one of the preceding claims wherein said fencing section further comprises a cover plate and fastening means, said cover plate overlapping with said flange portions, said fastening means fixing said rod panel between said flange portions and said cover plate.

6. A fencing section according to claim 5 wherein said horizontally extending rods contact said cover plate.

7. A fencing section according to any one of the preceding claims wherein said flange portions comprise vertically extending slots for allowing vertical adjustment of said rod panel to said fencing post.

8. A fencing section according to any one of claims 5 to 7 wherein said cover plate comprises vertically extending slots for allowing vertical adjustment of said cover plate to said rod panel and said fencing post.

9. A fencing section according to any one of the claims 5 to 8, wherein said fencing section comprises more than one cover plate.

10. A fencing section according to claim 9 wherein said more than one cover plate overlap partially with each other.

11. A fencing section according to any one of the preceding claims wherein said fencing post is made out of a single piece of metal plate.

12. A fencing section according to any one of the preceding claims wherein said fastening means comprise bolts and nuts.

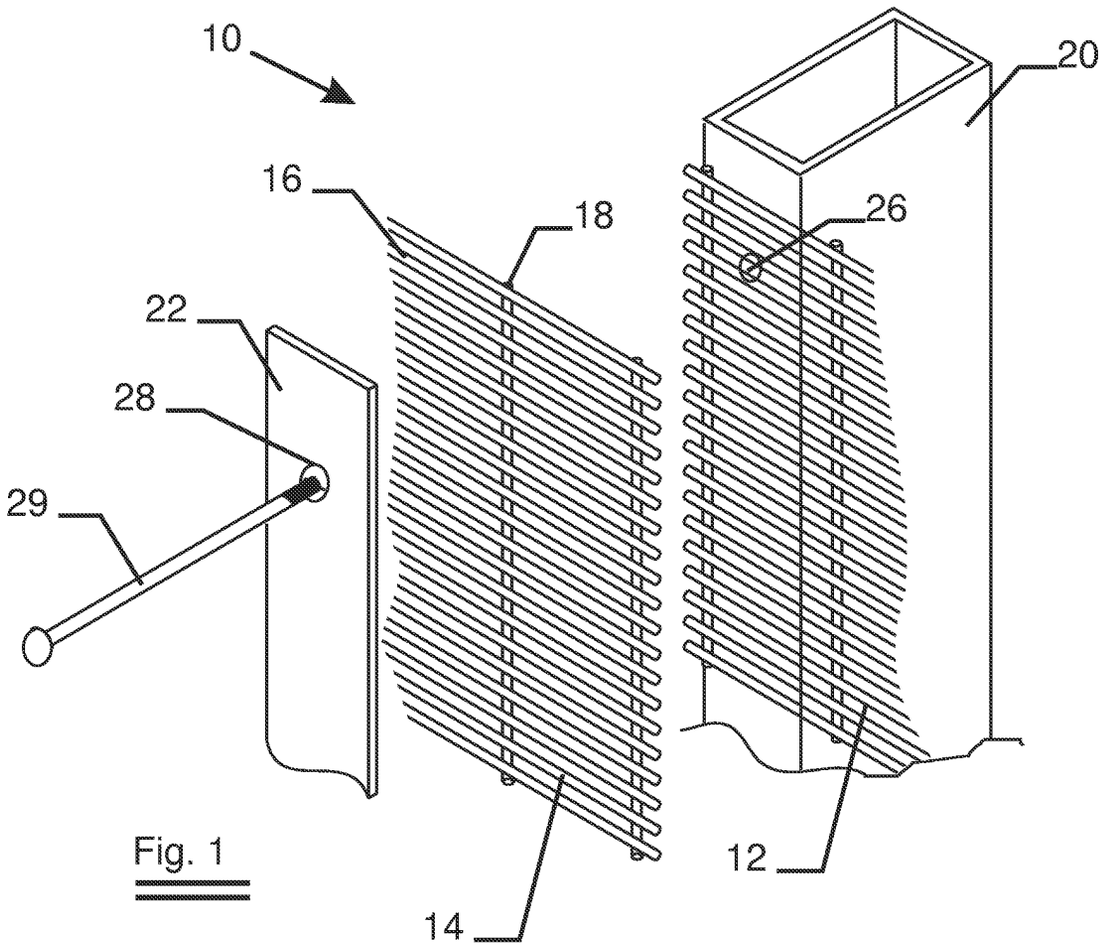

Fig. 1

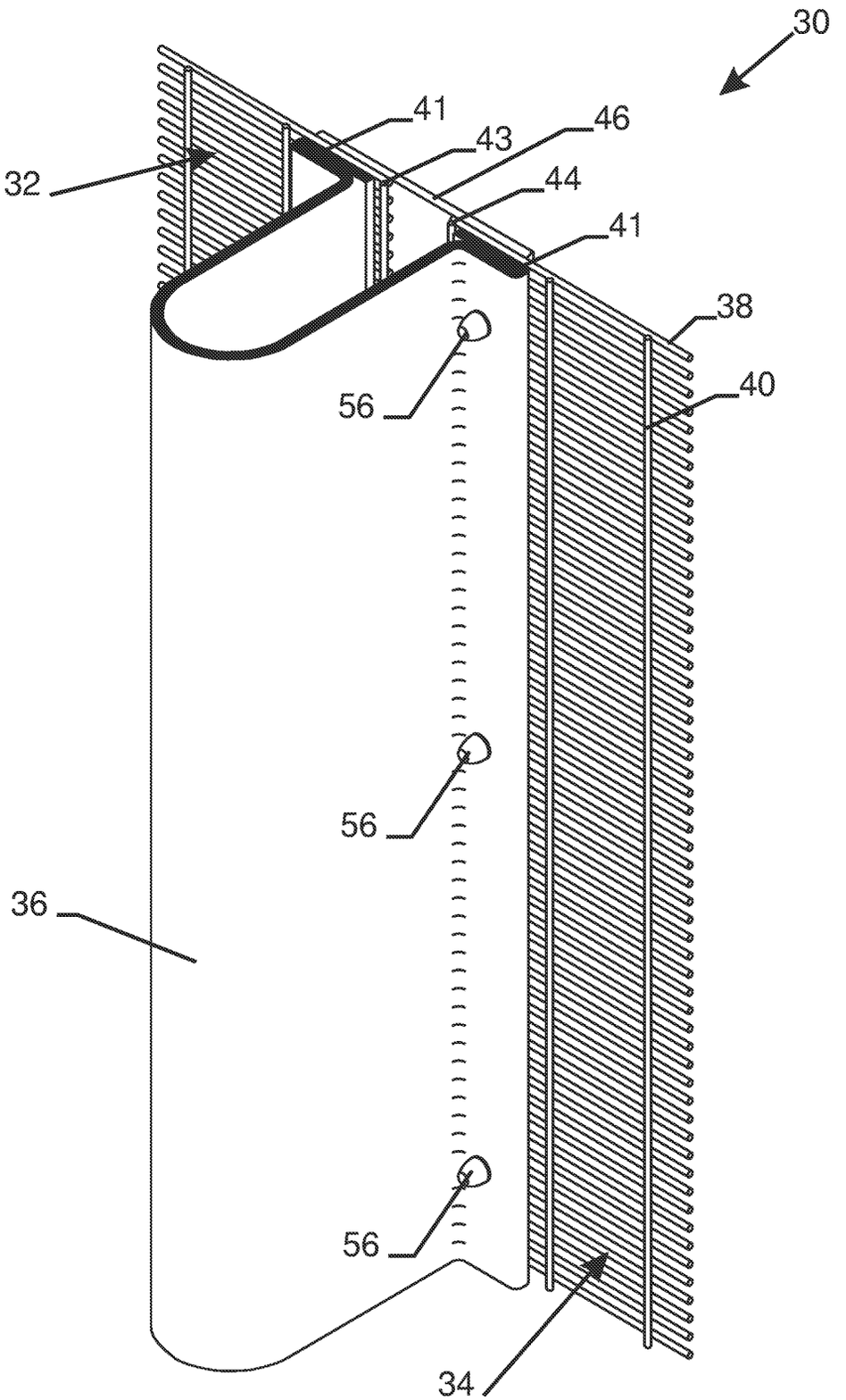

Fig. 2

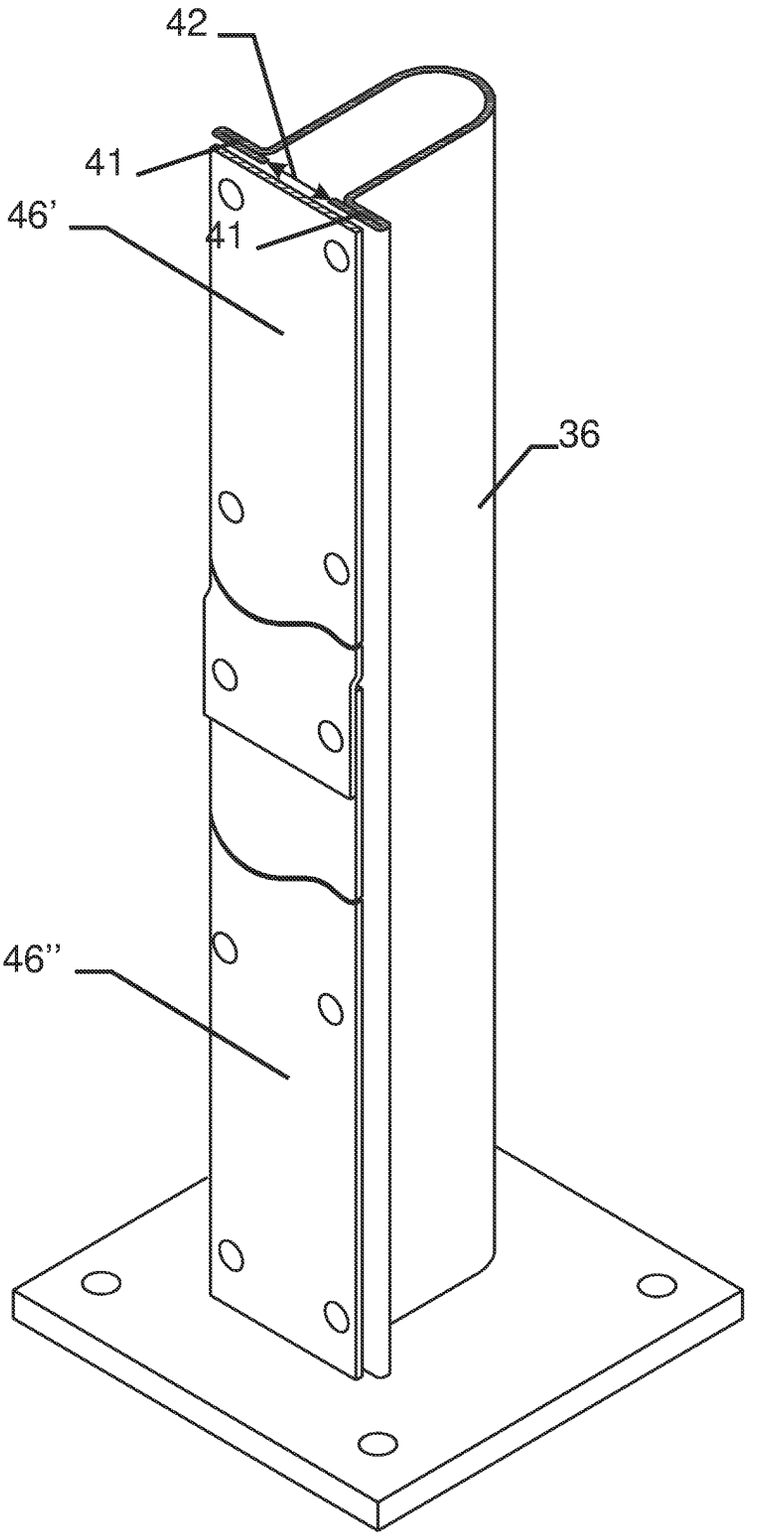

Fig. 3

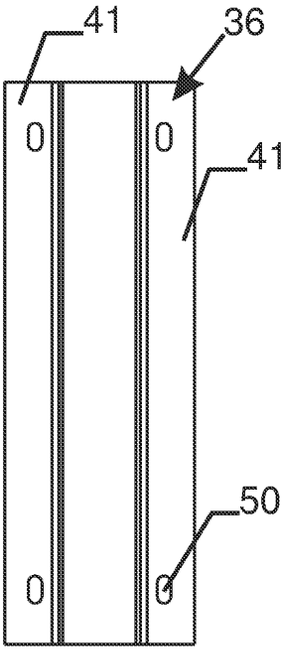

Fig. 4a

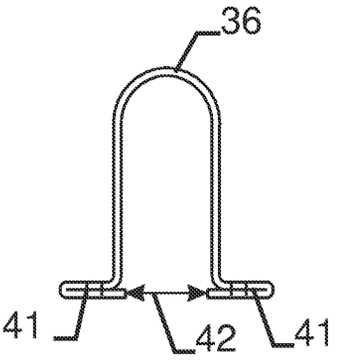

Fig. 4b

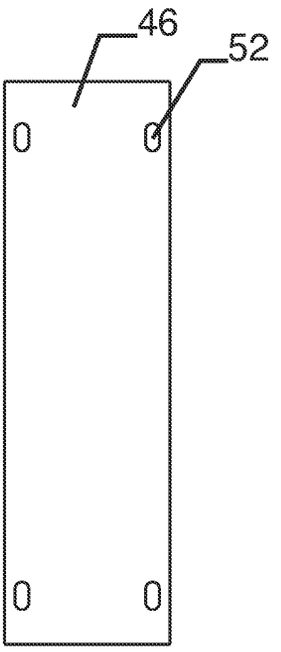

Fig. 4c

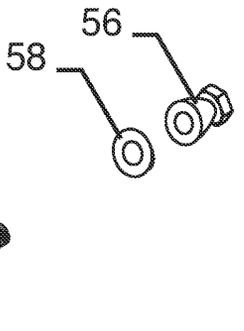

Fig. 4d

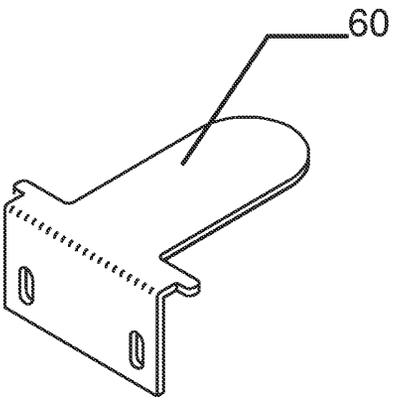

Fig. 4e

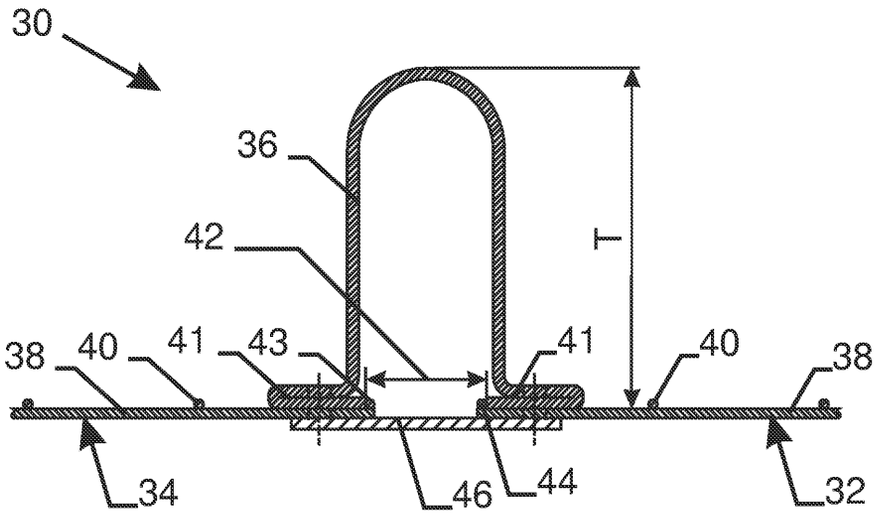

Fig. 5

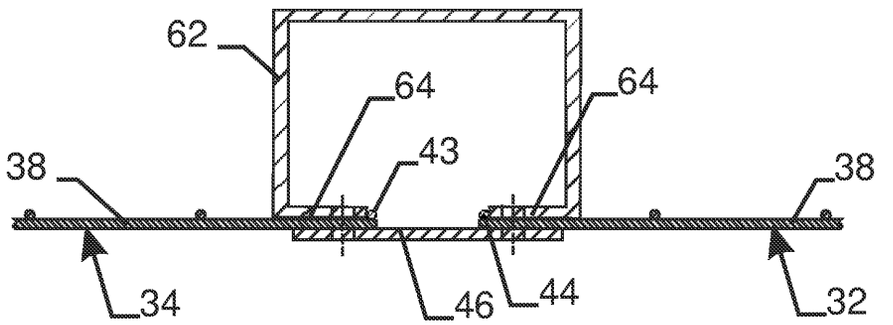

Fig. 6

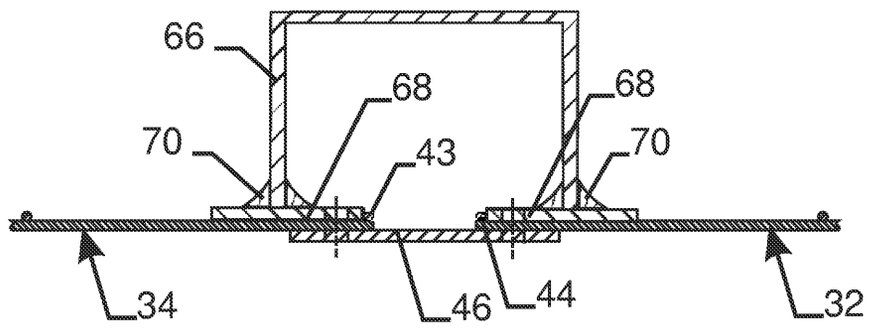

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 04 10 0561

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	21 July 2004	Stefanescu, R

CATEGORY OF CITED DOCUMENTS

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