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(54) **Raked fence panel**

(57) A system (10) for connecting a plurality of pales (11) to a rail (12) in a fence panel, the system comprising: a plurality of pales (11), each having a notch (19) the notch is lined, in use, in a straight line; a rail (12) having a longitudinal cavity (14) and, along its length, at least one opening (15) into the cavity through which, in use, the pales can be inserted; and a coupling member (24) for insertion, in use, axially into the cavity to engage with each notch (19) to couple the pales (11) to the rail (12); wherein the notches (19) are shaped so as to permit relative rotational movement between the rail (11) and the pales (12). Thus the present invention provides a fence panel which can be used on a sloping surface, which is sturdy in construction and which maintains the appropriate level of security.

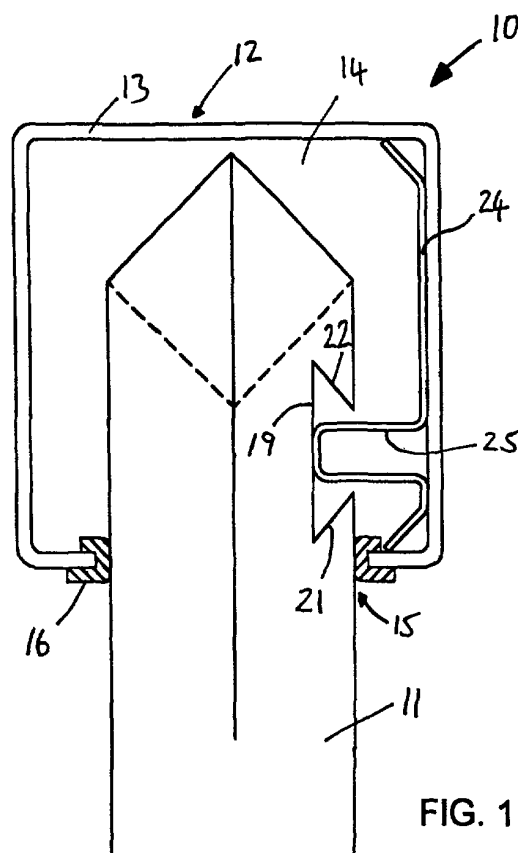


FIG. 1

Description

[0001] This invention relates to fence panels and, in particular, to a system which permits the fence panel to be raked.

[0002] Typically, fence panels consist of a number of substantially vertical pales and one or more substantially horizontal rails connected to each of the pales in such a way that the resulting fence panel is rigid in its construction. This permits the panel to have an enhanced strength and ensures that it is relatively simple and easy to move such a panel from place to place. This also ensures that, when erected, a fence formed from a number of these panels can provide a secure barrier.

[0003] However, in the case where it is desired to erect a fence on ground which is not substantially horizontal, a number of problems are encountered. If the fence panel is placed directly on to the ground, the pales can no longer remain vertical and it affects the aesthetic appearance of the fence. Furthermore, the security features of the fence are also affected because, as the slope of the ground changes, adjacent fence panels cannot abut together closely resulting in gaps which are not only unsightly but which also reduce the security afforded by the fence.

[0004] It is known to survey and then landscape part of the ground on which the fence is to be erected in order to provide one or more substantially horizontal steps on which the fence panels can be erected in such a way as to maintain the pales in a substantially vertical attitude. However, in this arrangement, the upper surface of the resulting fence is stepped and this detracts from the appearance of such a fence when compared to a typical horizontal fence which has a continuous upper surface.

[0005] It is known, from EP-A-0282269, to provide a fence panel having plurality of overlapping pales which are connected to one or more rails by a single pin connector which allows rotational movement between the pales and the rails. Unfortunately, the single pin connection of this type offence panel is not very secure and can be relatively easily dismantled. This is of concern, in particular, when the fence is intended to prevent access to a property as security is obviously compromised.

[0006] Accordingly, it is an aim of the present invention to provide a fence panel which can be used on a sloping surface, which is sturdy in construction and which overcomes the above problems.

[0007] According to the present invention, there is provided a system for connecting a plurality of pales to a rail in a fence panel, the system comprising:

a plurality of pales, each having a notch, the notches lying, in use, in a straight line;
a rail having a longitudinal cavity and, along its length, at least one opening into the cavity through which, in use, the pales can be inserted; and
a coupling member for insertion, in use, axially into the cavity to engage with each notch to couple the

pales to the rail;

wherein the notches are shaped so as to permit relative rotational movement between the rail and the pales.

[0008] Thus, the present invention provides a fence panel which can be raked at a variety of angles and which provides secure and durable fastening between the pales and the rail.

[0009] Preferably, one or more of the notches are shaped so as to limit the rotation between the pales and the rail.

[0010] Preferably, the rail is provided with a plurality of openings, one for each of the pales.

[0011] The notches and/or the openings may be shaped so as to limit the rotation between the rail and the pales to a maximum of 45°.

[0012] The rail may also be provided with one or more apertures in the opposite side of the rail to the openings, through which the pales can extend, in use.

[0013] Preferably, at least one notch has at least one pair of cooperating surfaces for abutment, at the maximum rotation, with the coupling member. Preferably, the surfaces extend at 45° to the longitudinal axis of the pale.

[0014] Embodiments of the present invention will now be described with reference to the accompanying drawings, in which:

Figures 1 to 3 are side, front and underneath plan views respectively of one embodiment of the present invention; and

Figures 4 and 5 are side and front views respectively of a second embodiment of the present invention.

[0015] With reference to Figures 1 to 3, a system 10 for connecting a plurality of pales 11 (only one is shown) to an upper rail 12 can be seen. It is envisaged that this system could also be used in connection with a rail which runs along the bottom of a fence panel. The rail 12, which is formed in this example in a box section from a material such as a metal or a plastics material, but may be formed in a channel section, has a wall 13 which defines a longitudinal cavity 14. A number of openings 15 are provided in one of the faces of the rail 12, each opening 15 being surrounded by a grommet 16 which holds the upper end of the pale 11 tightly within opening 15 and helps to prevent rattling and potential damage to the pales and the rail.

[0016] The pale 11 is located within the opening 15 such that a notch 19, formed from a dove-tailed groove formed across a corner of two adjacent faces of the pale 11 and towards, in this embodiment, the upper end of the pale, is at least partially within the cavity 14. The notch 19 is provided with cooperating pairs of opposed diagonal surfaces 20, 21 and 22, 23 and, in this example, the surfaces are at approximately 45° to the longitudinal axis of the pale 11.

[0017] In use, an elongate coupling member 24 is inserted axially along the cavity 14 into engagement with one or more pales 11. The coupling member 24 can be formed from any suitable material but is preferably formed from a metal which may be treated to prevent corrosion. The coupling member 24 is provided with a protruding portion 25 which, as the coupling member is inserted and because the notch is formed in a corner of two faces of the pale, slides into the notches in successive pales 11. As can be clearly seen from the dotted line arrangement in Figure 2, when the pale 11 is rotated relative to the rail 12, one pair of the cooperating surfaces, in this case surfaces 22 and 23 abut with the projecting portion 25 so as to limit the relative rotation of the pale 11 and the rail 12.

[0018] The openings 15 are shaped to permit the pales 11 to rotate until opposite corners 17 of the pale come into contact with the longitudinal extents 18 of the opening 15 and therefore limit the rotation of the pales. Obviously, the angle at which the cooperating surfaces are formed as well as the shape of the opening 15 can be varied such that the allowed rotation is substantially the same and such that the maximum relative rotation of the pale with the rail is suitable for the environment and ground conditions in which the fence panel is to be erected.

[0019] A second embodiment of the invention can be seen in Figures 4 and 5 in which an intermediate rail 32 is formed as a C-sectioned, or possibly rectangular section, rail and is provided with a continuous opening 33 along one side and which, on the opposite side, has a plurality of openings 35 similar to the openings 15 of the first embodiment, each of which is also surrounded by a grommet 36. In this second embodiment, each pale 31 extends through one of the openings 35 and through the continuous opening 33 in the rail such that the notch 39 (similar to that of the first embodiment) is located within the cavity 34 within the rail 32. A coupling member 40 is inserted into the cavity 34 and is provided with a protruding portion 41 which protrudes into the notch 39.

[0020] As the opening 33 may be continuous, limitation of the maximum relative rotation of the rail 32 and the pale 31 can be provided by the opening 35 in a similar fashion to that described with respect to the first embodiment and/or by one of the pairs of cooperating surfaces 51, 52 and 53, 54 of notch 39.

[0021] Whilst the pale 11, 31 is shown in the Figures to be substantially rectangular, it is envisaged that other shapes such as hexagonal or even circular pales may also be used.

a plurality of pales (11), each having a notch (19), the notches lying, in use, in a straight line; a rail (12) having a longitudinal cavity (14) and, along its length, at least one opening (15) into the cavity through which, in use, the pales can be inserted; and

a coupling member (24) for insertion, in use, axially into the cavity to engage with each notch (19) to couple the pales (11) to the rail (12);

wherein the notches (19) are shaped so as to permit relative rotational movement between the rail (11) and the pales (12).

2. A system (10) according to claim 1, wherein one or more of the notches (19) are shaped so as to limit the rotation between the pales (11) and the rail (12).
3. A system (10) according to either claim 1 or claim 2, wherein the rail (12) is provided with a plurality of openings (15), one for each of the pales (11).
4. A system (10) according to claim 3, wherein one or more of the openings (15) are shaped so as to limit the rotation between the pales (11) and the rail (12).
5. A system (10) according to either claim 3 or claim 4, wherein the rotation between the rail (11) and the pales (12) is a maximum of 45°.
6. A system (10) according to any one of preceding claims, wherein the rail (12) has one or more apertures (33) in the opposite side of the rail to the openings (15).
7. A system (10) according to any one of claims 2 to 6, wherein the one or more notches (19) has at least one pair of cooperating surfaces (51, 52) for abutment, at the maximum rotation, with the coupling member (24).
8. A system (10) according to claim 7, wherein the surfaces (51, 52) extend at 45° to the longitudinal axis of the pale (11).

Claims

1. A system (10) for connecting a plurality of pales (11) to a rail (12) in a fence panel, the system comprising:

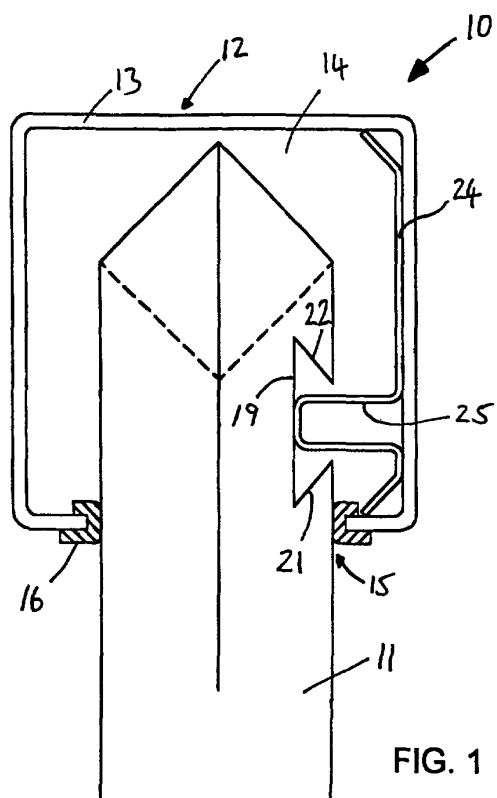


FIG. 1

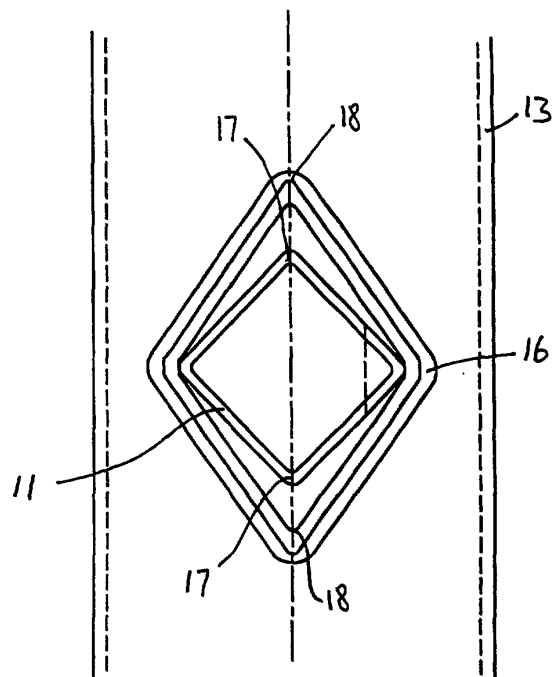


FIG. 3

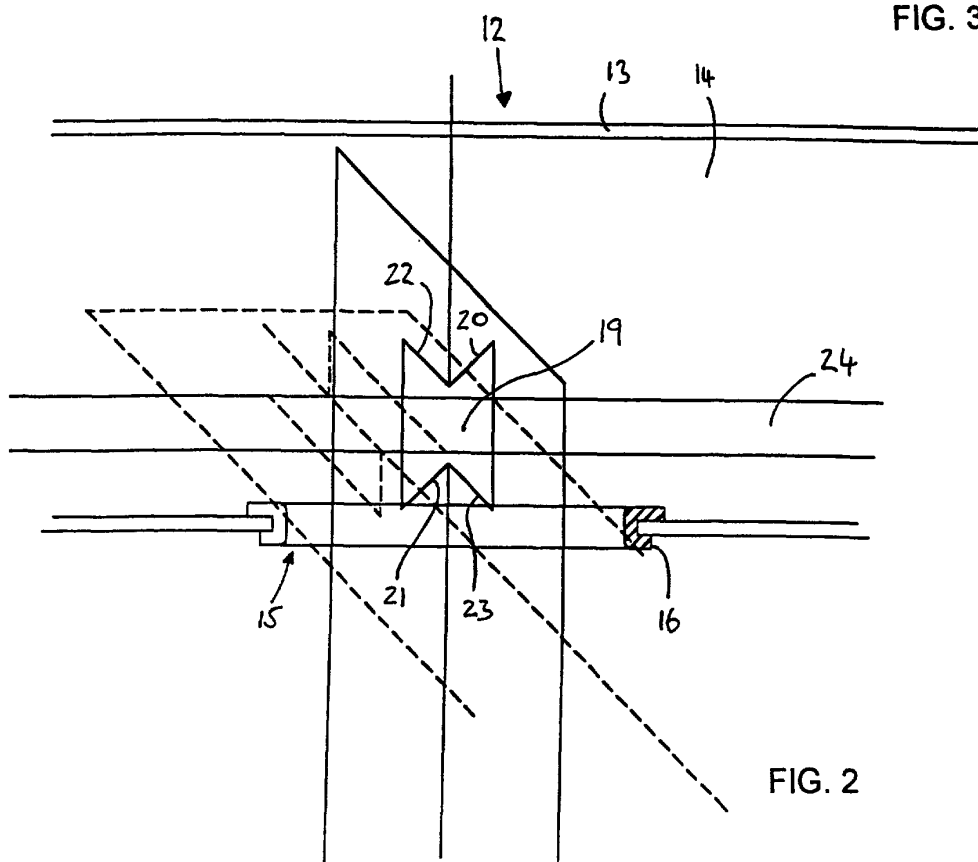
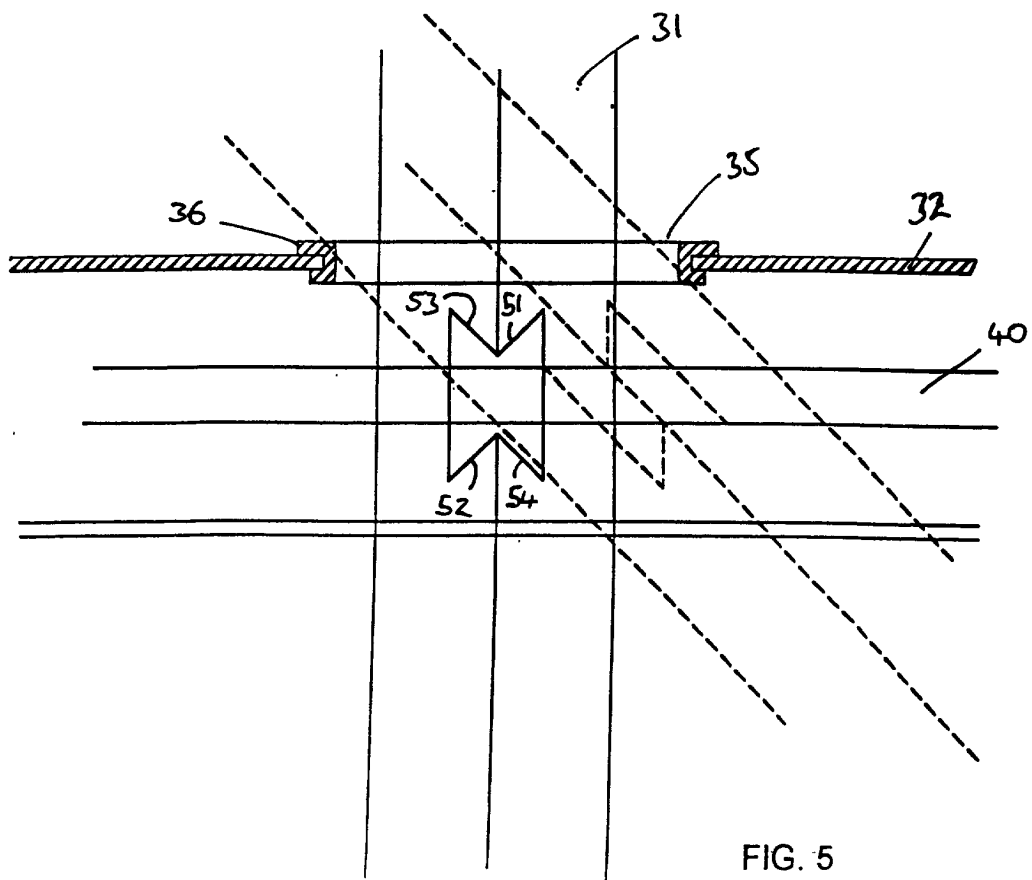
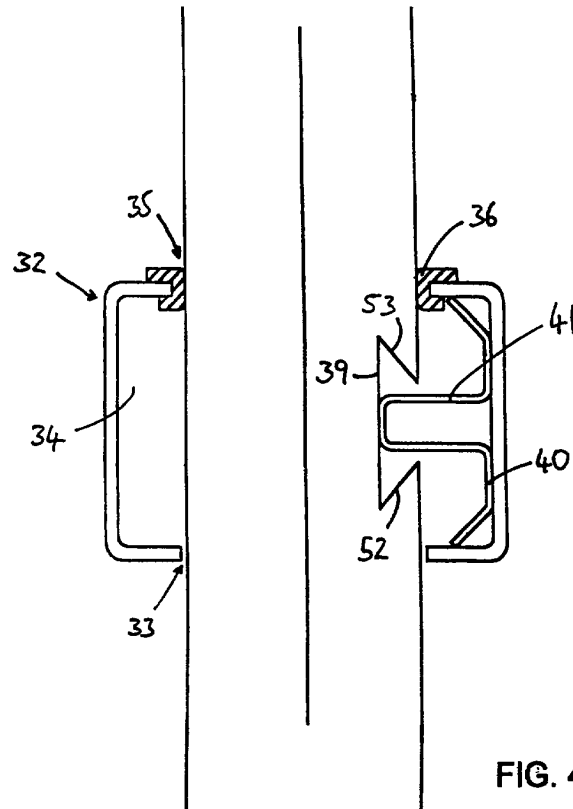


FIG. 2





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 30 1569

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 2 218 953 A (GUSTAFSON) 22 October 1940 (1940-10-22) * the whole document *	1-4,6	E04H17/14
A	US 5 660 378 A (SCHALL FREDERICK R) 26 August 1997 (1997-08-26) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E04H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 June 2001	Examiner Vrugt, S
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 30 1569

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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29-06-2001

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US 2218953 A	22-10-1940	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82