(12) UK Patent Application (19) GB (11) 2485482 (13) A

(43) Date of A Publication 16.05.2012

(21) Application No: 1119514.6

(22) Date of Filing: 11.11.2011

(30) Priority Data:
(31) 1019067 (32) 11.11.2010 (33) GB
(31) 1114139 (32) 17.08.2011 (33) GB

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(51) INT CL:
E04H 17/14 (2006.01)

(56) Documents Cited:
WO 2010/094081 A1 **US 6341764 B1**
US 5660378 A **US 20100155683 A1**
US 20060214149 A1 **US 20040046162 A1**

(58) Field of Search:
INT CL **E04H**
Other: **EPODOC & WPI**

(54) Title of the Invention: **Method of constructing a fence,and components therefor**
Abstract Title: **Method of constructing a fence and components therefor**

(57) The method comprises the steps of erecting a series of posts 14 and then connecting a top rail and a bottom rail to an adjacent pair of posts wherein the rails 10 have a number of aligned openings 16 to receive fence members 12. A fence member is located in respective openings in the top and bottom rails and the fence member is clamped in the openings. The pale or picket 12 may have an aperture 22, 122 which locates on a projection on the rail 20, 120. The projection and aperture may allow relative pivoting between the pale and the rail. The fence member may be clamped by means of a separate clamping member 62 or by a clamping flange 40 which clamps the pale in position when the rail is rotated about its longitudinal axis. A set of components for constructing a fence section is also claimed.

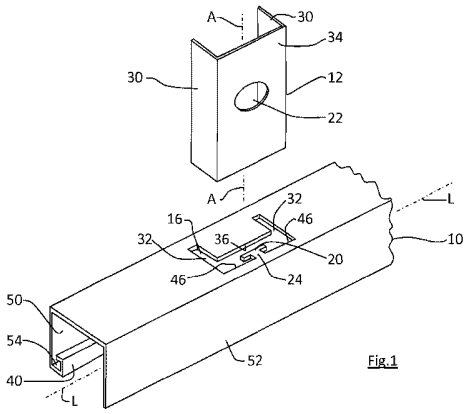

Fig.1

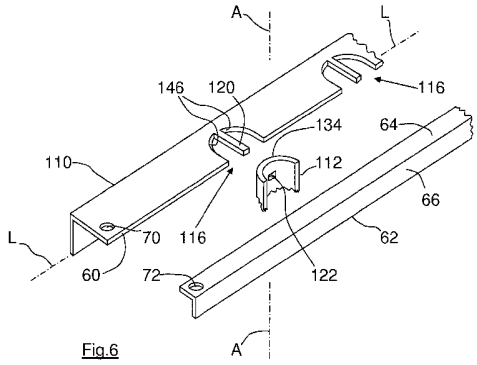

Fig.6

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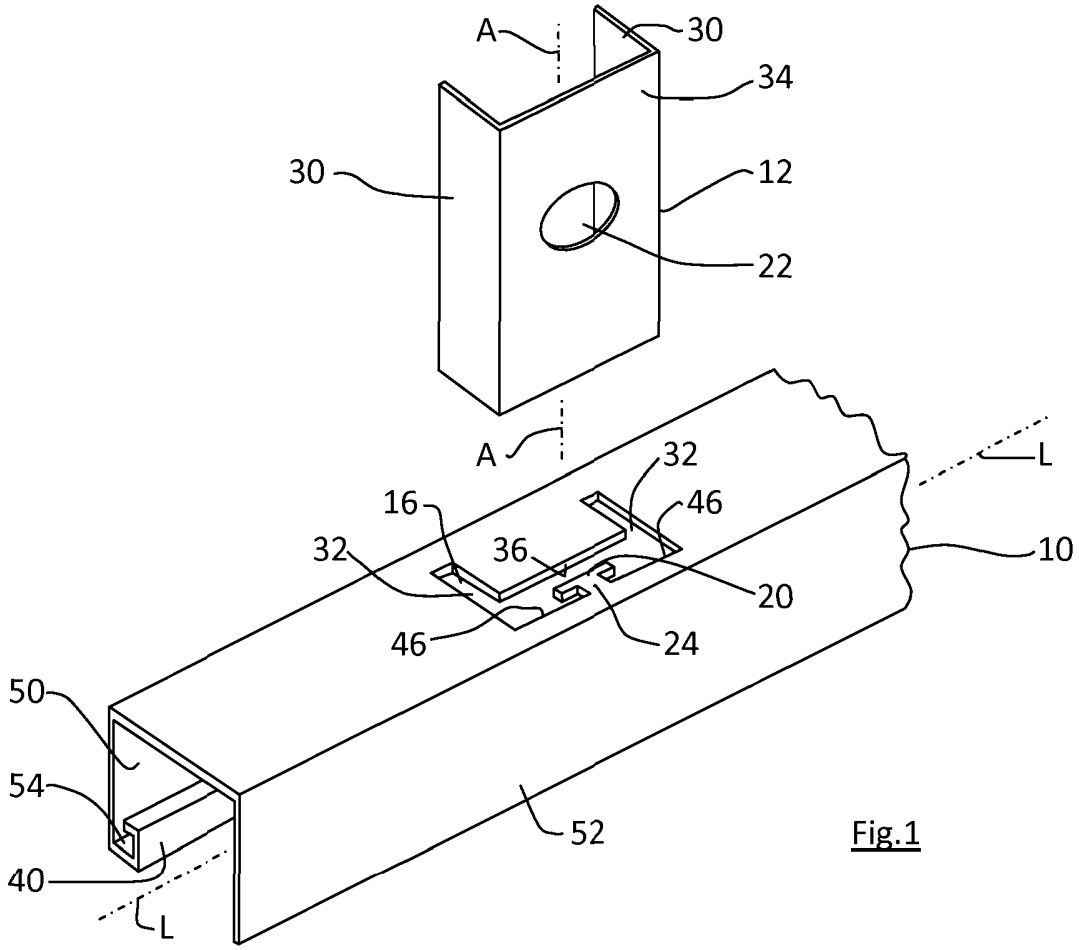

Fig.1

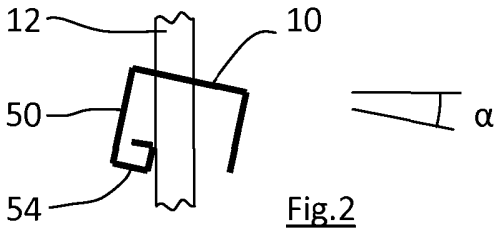

Fig.2

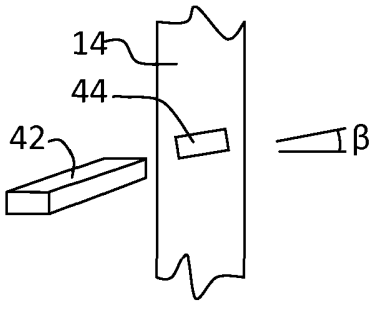

Fig.5

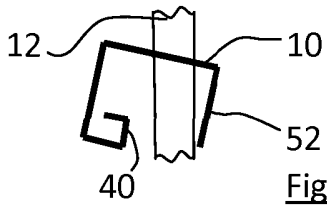

Fig.3

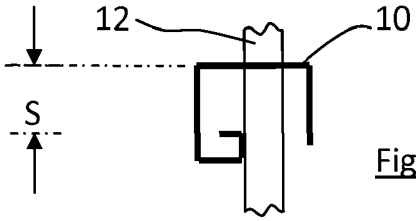

Fig.4

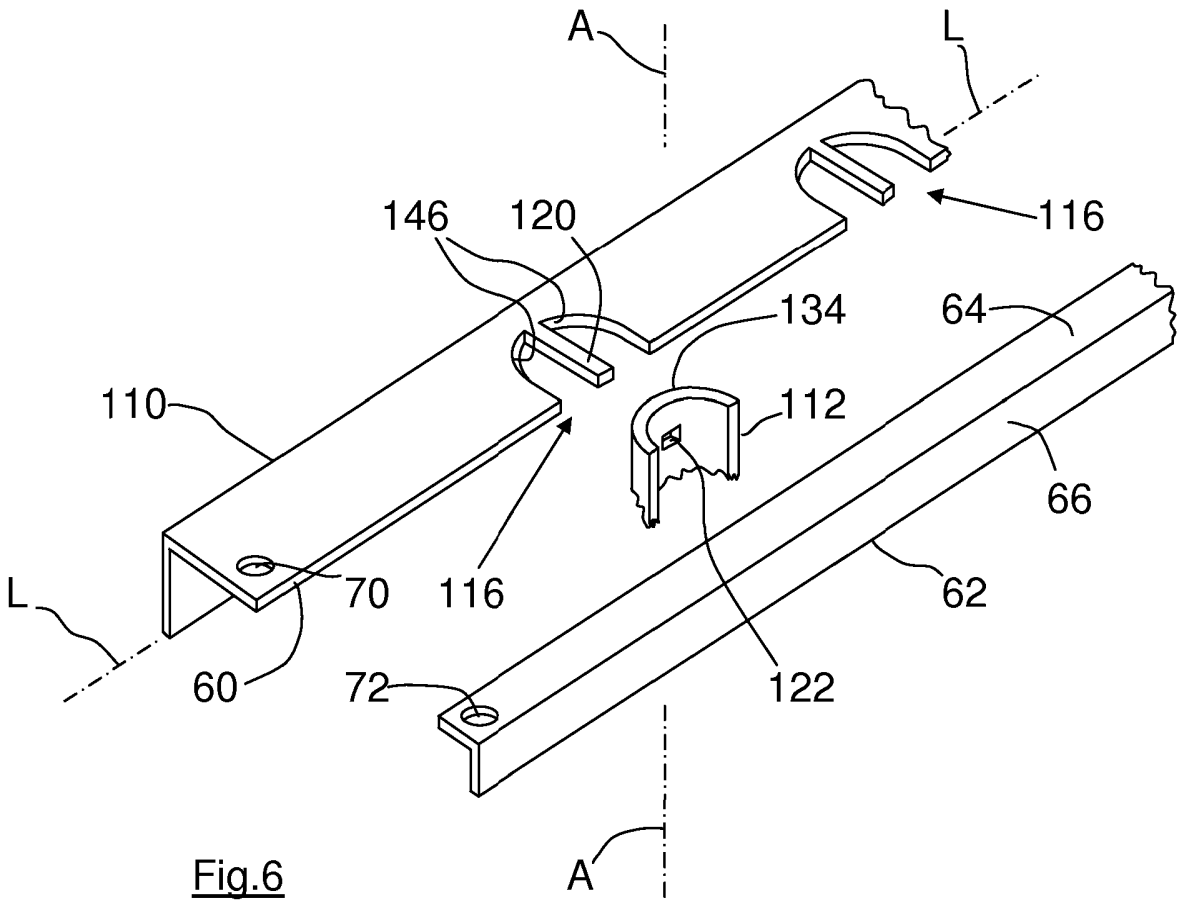

Fig.6

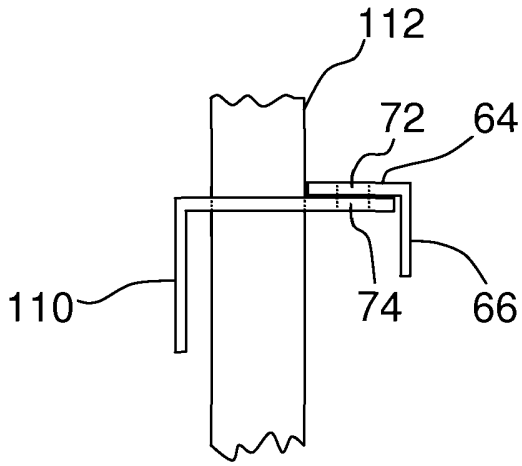

Fig.7

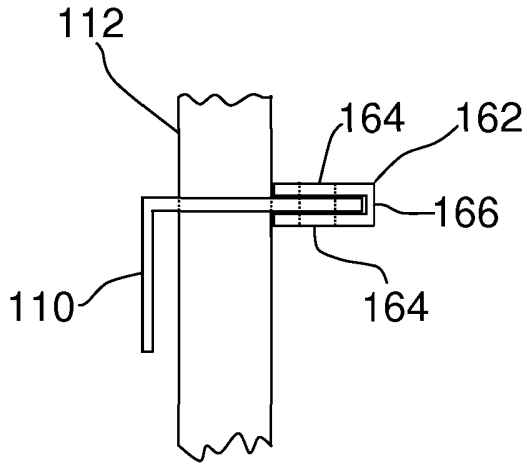

Fig.8

METHOD OF CONSTRUCTING A FENCE, AND COMPONENTS THEREFOR

FIELD OF THE INVENTION

This invention relates to a method of constructing a fence, and to a set of components therefor. The invention relates in particular to a method of constructing a multi-pale or multi-picket fence.

BACKGROUND TO THE INVENTION

Fences are made in a number of different styles, and from a number of different materials. The present invention is related to fences comprising a number of substantially vertical posts sunk into the ground at predetermined intervals, with a top rail and a bottom rail mounted between adjacent posts, and with a number of substantially vertical fence members (often called “pales” or “pickets”) secured to the rails. The portion of the fence between adjacent posts (comprising the pair of rails and the fence members) is referred to herein as a fence section. Such fences are often called “multi-pale” or “multi-picket” fences, and a particular sub-group of this type of fence is a palisade fence in which the fence members are usually flat or angled metallic beams.

The posts and fence members may be around 1.8m long and are therefore difficult to climb over; the rails are often secured adjacent to the top and bottom of the posts so as not to provide a climbing aid; the fence members are typically closely spaced, e.g. around 75mm apart, and are sufficiently rigid to prevent a person passing between adjacent fence members. Accordingly, such fences are often used to surround secure sites such as factories, warehouses and the like, and serve to prevent or at least dissuade an intruder from gaining access to the site.

It is a desirable feature of many multi-pale fences that the rails follow the contours of the ground, in order to avoid the stepping of adjacent fence sections.

Accordingly, in many fences the connections between the rails and the posts, and also the connections between the fence members and the rails, are adjustable.

The individual fence members in palisade fences in particular may be secured to the rails by bolts or rivets, and whilst these types of connection are suitable for some applications (such as providing boundary fencing for parks and the like) they are not suitable for secure sites since it is relatively easy for a intending intruder to cut or otherwise remove the bolts or rivets and thereby remove one or more fence members. To avoid this disadvantage, many sites utilise palisade fencing in which the fence members pass through openings in the rails.

An adjustable palisade fence in which the fence members pass through openings in the rails is disclosed in GB 2 256 447 of William Bain & Company. This document discloses a palisade fence in which the rails have an opening to receive the top or bottom end of the fence member, the ends of the fence member having a projection which is too large to pass through the opening.

Whilst the palisade fence of GB 2 256 447 has been commercially successful, it has a number of disadvantages. Firstly, the fence members can often be rattled in the assembled fence. Thus, it is necessary to have sufficient freedom of movement for the end of the fence member to slide through the opening in the rail, and that freedom of movement can allow the fence member to be moved relative to the rail in the assembled fence.

Secondly, the form of the fence members is restricted to those which can pass through the openings in the rails. In many applications it is desirable to have a decorative finish to the top end of the fence members, and many fence members have a "flanged triple point top" for example, in which the metal at the top of the fence member is cut and splayed out into three separate points. Such a decorative top cannot pass through the opening in the rail of GB 2 256 447 and so cannot be assembled according to that patent. For example, around 80% of the UK market for palisade fencing utilises some form of decoration at the top of the fence member which precludes its use in the method according to GB 2 256 447.

SUMMARY OF THE INVENTION

The inventor has realised that there is a need for a method of constructing a multi-pale or multi-picket fence having the security benefits of passing the fence members though openings in the rails, whilst avoiding or reducing the disadvantages of the known fences.

According to the invention there is provided a method of constructing a fence comprising the steps of:

{i} erecting a series of posts;

{ii} connecting a top rail and a bottom rail to an adjacent pair of posts, the top rail and the bottom rail having a number of aligned openings therein to receive respective fence members;

{iii} locating a fence member in an opening in the top rail and an opening in the bottom rail;

{iv} *clamping the fence member in the openings.*

Accordingly, in the present invention each of the fence members is clamped in position relative to the rails; the likelihood of the fence members being allowed to rattle is thereby reduced or more likely eliminated.

Preferably, the fence members are clamped in the openings by way of a separate clamping member secured to each of the rails. Desirably, the openings are open-sided in the form of a recess or cavity in the rail, the clamping member closing off the opening whereby the fence member is secured within the opening. An advantage of an open-sided opening in the rails is that the fence member does not need to be slid through an opening during construction of the fence.

Alternatively, the openings are formed through the rail, and the method includes the steps of:

{i} passing a fence member through an opening in the top rail and an opening in the bottom rail with the rails occupying a first orientation; and

{ii} tightening the rails upon the posts whereby to move the rails to a second orientation, the rails in the second orientation clamping the fence members in position.

With the present invention there is no requirement for the fence members to have a projection so that even in embodiments in which the fence members must pass through the openings, they can be slid though the opening of the top rail and subsequently through the opening of the bottom rail from above, so that the top end of the fence member can be decorated as required. If the fence member carries no decoration at its top end, it can be of substantially uniform cross-section along its length. The user can decide whether to slide the bottom end of the fence member downwards through the opening in the top rail and then downwards through the opening in the bottom rail, or can decide to slide the top end of the fence member upwards through the opening in the top rail and then slide the bottom end of the fence member downwards through the opening in the bottom rail.

Desirably, moving the rail between its first orientation and its second orientation comprises rotating the rail through a small angle around an axis parallel to its longitudinal axis. Such movement can be effected by initially connecting the rail loosely to the posts and subsequently tightening the bolts securing the rail to the posts. It is known to use large bolts to secure the rails of multi-pale fences to the posts, and M12 bolts are an industry standard in the UK. It will be understood that the force which can be exerted as an M12 bolt is tightened at each end of a rail can be considerable, and can translate into a significant clamping force on each of the fence members.

Preferably, the rail includes a clamping flange spaced from the opening. The provision of a clamping flange avoids the requirement for the clamping of the fence member to take place entirely at the opening, and reduces the angle through which the rail must move between its first and second orientations.

Desirably, the fence member has an aperture therethrough and the rail carries a projection adjacent to its opening, the projection being adapted to locate within the aperture. In these embodiments the fence member in the constructed fence is not retained solely by the clamping force and the fence members are therefore more securely connected to the rails. The cooperating aperture and projection have the added benefit of providing a "latched" condition for the fence member. It will be understood from the following description that the provision of a latched condition has significant benefits during construction of the fence, and in particular allows the user to latch each fence member in position relative to the rails whilst the remaining fence members are fitted, and before the fence members are clamped in position.

Preferably, the projection and aperture permit relative adjustment between the fence member and the rail whereby the assembled fence is adjustable.

As is common practice in the multi-pale fence industry, each rail is preferably connected to a post by way of a fish plate, the fish plate passing through an aperture in the post and securing the respective ends of the rails of adjacent fence sections. In the present invention the fish plate aperture can be angled relative to the horizontal, the angled aperture increasing the angular movement between the first orientation of the rail and the second orientation of the rail, and thereby increasing the clamping load which is available. In addition, and angled fish plate aperture reduces the likelihood of a fence member rattling in an assembled fence if the manufacturing tolerances reduce the clamping force upon that fence member.

There is also provided a set of components for constructing a fence section, the set of components including a top rail, a bottom rail and a number of fence members, the top rail and the bottom rail having an opening which can locate a part of a fence member, the set of components including clamping means for the fence members. Preferably the clamping means is a separate clamping member which can be secured to the rail. Alternatively, the clamping means is part of the

rail, specifically a flange spaced from the opening, the clamping flange being adapted to engage the fence member in the constructed fence.

In embodiments utilising a separate clamping member, the clamping member can be secured to the rail at a number of locations along the length of the rail and clamping member. Increasing the number of fixing locations along the length of the clamping member reduces the likelihood that the clamping member will distort along its length sufficiently to permit a fence member to rattle within its opening. Alternatively stated, one or both of a long rail and clamping member might be sufficiently flexible to permit a variable clamping load along the length of a fence section, and whilst the fence members adjacent each of the posts might be clamped sufficiently to avoid any likelihood of rattling, the fence members which are located around the middle of each fence section may be less securely clamped and might be able to rattle.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention will now be described in more detail, by way of example, with reference to the accompanying schematic drawings, in which:

Fig.1 shows a perspective view of a part of a rail and a part of a fence member of a first embodiment of the present invention;

Fig.2 shows a sectional view through the rail of Fig.1 during the first stage of construction of the fence;

Fig.3 shows a view as Fig.2 during a second stage of construction;

Fig.4 shows a view as Fig.2 during a third stage of construction;

Fig.5 shows part of a post and a fish plate for securing two rails to the post;

Fig.6 shows an exploded view of a part of a fence section of a second embodiment of the present invention;

Fig.7 shows an end view of the part of the fence section of Fig.6 in its assembled state; and

Fig.8 shows an end view of a part of an alternative embodiment of fence section in its assembled state.

DETAILED DESCRIPTION

The rail 10 and fence member 12 (only part of which are shown in Fig.1) are respective parts of an adjustable multi-pale fence. As will be understood by a person skilled in this art, the fence is constructed by locating a series of substantially vertical posts 14 (Fig.5) along the line of the fence, the posts 14 being separated by a predetermined distance corresponding to the length of the rail 10. The respective ends of two rails 10 are connected to adjacent posts 14, one rail 10 (the top rail) being connected adjacent to the top of the posts 14 and the other rail 10 (the bottom rail) being connected adjacent to the bottom of the posts.

Each rail 10 has a number of openings 16 formed therethrough, only one of which is seen in Fig.1. The separation between the openings 16 along the length of the rail 10 determines the separation between the fence members 12 in the constructed fence section.

The general form of the openings 16 in this embodiment is U-shaped, to match the U-shaped form of the fence member 12. It will be understood, however, that the present invention does not restrict the form of the fence members 12, and the fence members could alternatively be curved as in the embodiment of Fig.6, or could be of flat, angle or corrugated section (as often used in palisade fences), or

can be of box or circular section, as desired. The form of the opening will match the form of the fence member, in known fashion

Only a short length of the fence member 12 is shown in Fig.1, though it will be understood that in practice the fence member 12 will have substantial length, for example around 1.8m, and will engage the two rails 10 adjacent to the top and bottom of the fence section.

It is desirable that the fence be adjustable so as to be able to follow the contours of the ground, and so the opening 16 provides sufficient freedom of movement to the inserted fence member 12 to permit the longitudinal axis A-A of the fence member to pivot through a desired angle (for example 20º) relative to the longitudinal axis L-L of the rail, in the plane of the fence section.

The opening 16 includes a projection 20 which can locate into an aperture 22 in the fence member 12. The projection 20 in this embodiment is in the form of a "T", the narrowed leg 24 facilitating adjustment of the fence as explained below.

The fence member 12 can be inserted into the opening 16, with the sides 30 of the U-form of the fence member 12 lying within the respective parts 32 of the opening 16, and with the base 34 of the U-form of the fence member 12 engaging (or passing close to) the edge 36 of the opening 16. Accordingly, the fence member 12 can be slid through the opening 16 without engaging the projection 20.

Importantly, however, the fence member 12 cannot pass the clamping flange 40 unless the rail 10 is oriented as shown in Fig.2. Thus, in order for the (substantially vertically-oriented) fence member 12 to pass through the rail 10 (and in particular in order for the sides 30 of the fence member 12 to pass the clamping flange 40) the rail 10 must be pivoted through an angle α about an axis which is substantially parallel to its longitudinal axis L-L.

Whilst only one of the rails 10 is shown in Fig.2, it will be understood that the fence member 12 needs to be oriented substantially vertically in order to pass through both top and bottom rails 10. Both the top rail 10 and the bottom rail 10 must be similarly oriented substantially at the angle α in order for the fence member 12 to be passed through the aligned openings 16 in both rails.

It is arranged that the fence member 12 has two apertures 22 (only one of which is shown in Fig.1), separated by the distance between the top rail and the bottom rail. When the fence member 12 has been slid into its correct position relative to the rails 10 the apertures 22 are aligned with the respective projections 20. The fence member 12 may then be moved (from the position shown in Fig.2 to the position shown in Fig.3), with the projections 20 entering the respective apertures 22.

The fence member 12 is thereby retained (or latched) in position relative to the rails, and will remain in its latched condition whilst the remaining fence members 12 are inserted into their respective openings 16 in the rails 10 as a complete fence section is constructed.

It will be understood that it is not necessary to mount the rails 10 to the posts 14 at the angular orientation shown in Figs. 2 and 3, and preferably the rails 10 are initially only loosely connected to the respective posts 14 whereby to permit the rails 10 to be manually pivoted to the angle α during the construction procedure. In such embodiments the user will therefore need to hold each rail at the angle α (or substantially at the angle α) as the fence members 12 are inserted. If desired, in alternative embodiments means may be provided to temporarily secure the rails 10 at the insertion angle α.

The fish plate 42 which secures the end of a respective rail 10 to the post 14 is shown in Fig.5. In this embodiment, as in known palisade fences, the fish plate 42 is not actually secured to the post 14, but passes through an aperture 44 in the post 14. The fish plate 42 has holes (not shown) adjacent its opposed ends, each of which can receiving a bolt (also not shown) which also passes through an

aligned hole (such as the hole 70 shown in Fig.6) in the respective end of the rail 10, whereby the rails 10 to each side of the post are connected together by way of the fish plate 42, in known fashion. The bolts which secure the rails will typically have heads which can be broken off after full tightening, as are commonly used in multi-pale fencing, and a high security nut can be fitted below the fish plate 42, as is also commonly used.

In a desired method of construction, during insertion of the fence members 12, the bolts by which the rails 10 are secured to the fish plate 42 are relatively loose, so that the rail 10 can readily be pivoted to the orientation shown in Figs. 2 and 3. When all of the fence members 12 of the fence section have been fitted, the bolts are tightened, whereupon the rails 10 are forced to rotate counter-clockwise as viewed in Figs. 2 and 3, towards the orientation shown in Fig.4. During this movement, the clamping flange 40 is pressed against a part of the fence member 12, and the edge 46 of the opening 16 is pressed against another part of the fence member 12, thereby securing the fence member 12 in position relative to the rail 10.

It will be seen from Fig.5 that the aperture 44 in the post 14 is at an angle β to the horizontal. The fish plate 42 (which is a relatively tight fit within the aperture 44) is therefore held at the angle β. The bolts securing the rail 10 to the fish plates 42 will therefore not become fully tightened until the rail 10 also assumes the angle β, but it is arranged that the clamping flange 40 and the edge 46 of the rail 10 engage the fence members 12 before that angle is reached, whereby to ensure that the tightening force applied to the bolts is translated into a clamping force upon the fence members 12. This helps to ensure that the desired clamping force is applied to the fence members, and they are prevented from rattling is use, despite manufacturing tolerances.

It will be understood that the fence member 12 could be clamped to the rails 10 without the projection 20 locating within the aperture 22, and the invention could be practiced without those features. However, the construction of a fence without a cooperating projection and aperture, or some means to provide a latched

condition for the fence members relative to the rails, would be more difficult and time consuming as other means to ensure the correct location of the fence members would have to be utilised. Thus, it is rare for the fence members to engage the ground in the constructed fence, and some means to suspend the fence members in their chosen position relative to the (loose) rails would be required.

Also, it might not be desirable to rely upon the clamping force alone for retaining the fence members relative to the rail in the constructed fence, especially in fences in which the angular orientation of the fence members is aesthetically necessary. Thus, in a fence utilising fence members of circular cross-section, and having a decorative feature such as a triple point top, it may be possible for sufficient force to be exerted to twist the fence member about its longitudinal axis A-A and thereby reduce the aesthetic appeal of the fence, if the construction were to rely upon the clamping force alone.

It will also be understood that in embodiments similar to Figs. 1-4, it might be possible to avoid the requirement for a clamping flange separate from the opening, and to rely instead solely upon the clamping force applied by the opposed edges of the opening. Thus, if the material from which the rail is made is sufficiently thick, and the opening can be cut sufficiently accurately, the disclosed clamping force could be applied solely by the orientation of the opening 16 relative to the fence member 12. It is, however, desirable to make the rails from material as thin (and therefore light) as possible, and the provision of a clamping flange 40 spaced from the opening by a separation S (Fig.4) reduces the precision required, and thereby reduces the manufacturing cost of the rail 10. In addition, the side wall 50 which carries the clamping flange 40, and similarly the side wall 52, create a rail which is substantially of inverted U-shape, which serves the additional benefit of obscuring the fish plates 42 and the securing bolts in the constructed fence.

Figs. 1-4 show a preferred embodiment in which the clamping flange 40 is a surface lying in a plane which is parallel to the fence member. The clamping load

can therefore be spread across the surface of the clamping flange 40, and similarly along a length of the fence member 12, reducing the pressure applied to the fence member 12 and thereby reducing the likelihood of surface damage to the fence member and rail. It will be understood, however, that the clamping flange could instead be provided by the terminal edge of the wall 54.

If the fence member 12 has a decorative feature applied to its top, which decorative feature will not pass through the opening 16, then it is necessary to fit the fence member from above the top rail 10. If, however, the top of the fence member 12 can pass through the opening 20, then it will likely be preferable to insert the fence member 12 into the opening 20 of the top rail 10 from below.

The second embodiment of Figs. 6-7 and 8 utilise rails in which the opening 116 is open-sided. Many features of the embodiments of Figs. 6-8 are similar to the embodiment of Figs. 1-4 and a detailed description of those features is therefore not repeated.

The general form of the openings 116 is W-shaped, and the openings 116 extend to the edge 60 of the rail 110. Each opening has a projection 120 which in this embodiment also extends as far as the edge 60 (but in alternative embodiments can extend by a shorter distance (and perhaps in yet other embodiments can extend by a longer distance).

The width of the openings 116 (in the direction of the longitudinal axis L-L of the rail 110) are designed to closely match the width of the fence members 112. In the embodiment shown the fence member 112 is of curved section, and in particular is of substantially semi-circular section.

The fence member 112 will engage two rails 110, adjacent to the top and bottom of the fence section respectively. Also, whilst the top of the fence member 112 is shown in Fig.6 to be only slightly above the height of the rail 110, it will be understood that the fence member may be elongated so that it projects by any desired distance above the (top) rail 110 in the assembled fence.

The opening 116 provides sufficient freedom of movement to the inserted fence member 112 to permit the longitudinal axis A-A of the fence member 112 to pivot through a desired adjustment angle relative to the rail 110.

The projection 120 can locate into an aperture 122 in the fence member 112. The projection 120 in this embodiment is in the form of a parallel-sided tab or tongue, permitting the aperture 122 to slide relatively easily over the projection during assembly of the fence. The projection 120 is a sufficiently loose fit within the aperture 122 to provide the degree of adjustment required for the assembled fence section.

During assembly of the fence, the fence member 112 is inserted into the opening 116, with the projection 120 passing through the aperture 122, until the base 134 of the fence member 112 engages the bottom 146 of the opening 116. Only one fence member 112 is shown in Fig.6, but it will be understood that a separate fence member 112 is provided for the second opening 116 (and for all other openings of the rail 110).

It is an important benefit of this embodiment that the fence members 112 can be inserted into the openings 116 relatively easily, and without needing to be slid through the openings from above or below (which can be a time consuming part of the assembly procedure). The projection 120 on each of the rails 110 will support the fence member 112 in place as other fence members are assembled to the rails. The fact that the projection 120 extends well beyond the fence member 112 (perhaps by around 30mm in practical embodiments) helps to ensure that the fence member 112 is adequately supported during the assembly procedure, as well as providing additional security benefits as set out below.

It is arranged that in preferred embodiments, the form of the top rail and the bottom rail are substantially identical, and each of the rails has openings 116 including a projection 120. The fence member 112 therefore has two apertures 122, separated by the distance between the top rail 110 and the bottom rail 110.

When all of the fence members 112 have been located in their respective openings 116 in the top and bottom rails 110, a clamping member 62 is fitted to each rail 110. In the embodiment of Figs. 6 and 7 the clamping member 62 is an angle-section beam of substantially the same length as the rail 110. The "horizontal" leg 64 of the clamping member 62 is of a length sufficient to engage the fence member 112 (as shown in Fig.7), and the "vertical" leg 66 of the clamping member 62 provides rigidity and structural strength to the clamping member.

The rail 110 and the clamping member 62 both have a respective fixing hole 70, 72 adjacent their ends, which fixing holes 70, 72 can be aligned as shown in Fig.7 and can receive a fixing bolt (not shown). In the assembled fence the fixing holes 70, 72 are aligned with a mounting hole in the fish plate 42 which secures the ends of the respective rail 110 and clamping member 62 to the mounting post 14 in known fashion. It is arranged that when the fixing bolt is fully tightened, the clamping member 62 is pressed against the fence members 112 along its length, whereby the step of tightening the fixing bolt acts to clamp the clamping member 62 against the fence members 112 and reduce the likelihood that the fence members will rattle after assembly. It will be understood that the "vertical" leg 66 of the clamping member 62 also serves to obscure the fixing nut.

It will be understood that the clamping member 62 can be secured to the rail 110 at any number of selected positions along its length. For example, one or more intermediate fixings (such as bolts) can be used between the ends of the clamping member 62, to increase the local clamping force applied to the fence members 112 adjacent to the intermediate fixing(s). The use of additional intermediate fixings reduces the likelihood that any of the fence members will rattle in use, particularly those fence members farthest from a mounting post 14.

Fig.8 shows an alternative embodiment utilising a clamping member 162 of channel section. The clamping member 162 has two "horizontal" legs 164 connected by a "vertical" leg 166. The "vertical" leg 166 is only slightly longer

than the thickness of the rail 110 so that both of the "horizontal" legs 164 lie close to the opposed sides of the rail 110. As in the embodiment of Figs. 6 and 7, the clamping member 162 is of substantially the same length as the rail 110.

An advantage of the clamping member 162 (over the clamping member 62) is that the end of the projection 120 is fully enclosed between the "horizontal" legs 166, and an intending intruder who might seek to disassemble a part of the fence by removing a fence member will be faced with the requirement to somehow cut or deform the projection 120 sufficiently to permit removal of the fence member 112. In the embodiment of Fig.8 the intending intruder can obtain only very limited access to the projection 120. Whilst the projection 120 is more accessible in the embodiment of Figs. 6 and 7 (from beneath the clamping member 62), the intending intruder will likely only be able to deform the projection rather than break or cut it, and any deformation of the projection will likely increase the clamping force upon the fence member 112.

It will be understood that the form of the clamping member is not limited to the angle-section or channel-section shown in the drawings, and may take any suitable form having the required structural rigidity and the ability to engage and clamp the fence members 112. In one alternative embodiment for example, the clamping member can be in the form of a channel with a "vertical" leg much larger than the "vertical" leg 166 of the embodiment of Fig.8, so that the "horizontal" legs are spaced farther apart. Also, whilst it is desirable that the clamping member 62, 162 be substantially the same length as the rail 110 so that the clamping member 62, 162 can be secured to the fish plates 42 at each of the mounting posts, that is not necessary, and two (or more) clamping members can be used along each rail, the clamping members being secured by respective intermediate fixings.

As is common in multi-pale fencing, the rails 10,110 (and the clamping members 62, 162) will typically be made of metal, most suitably steel, and it is expected that the material will need to be around 2.5 mm thick in order to withstand the twisting loads applied by the fixing bolts, and to communicate the clamping load to all of the fence members of a fence section. The fence members 12 can also be of

metal such as steel, but alternatively can be made from any other suitable material, i.e. it might be desired in some applications to use wooden fence members.

The rails 10,110 and/or fence members 12,112 (and the clamping members 62, 162) can (depending upon the material from which they are made) be hot-dip galvanised or powder coated as desired.

It will be understood that the aperture 22,122 and the projections 20,120 may be visible in use. These components will ideally be sufficiently small not to be readily visible and therefore not to impair the aesthetic appeal of the constructed fence, but will be visible upon close inspection. If an intending intruder seeks to disable the fence by applying a force to the projection it is likely that the projection will bend rather than break, and in bending will be forced against the edge of the aperture, increasing rather than decreasing the retention of the fence member 12, 112. In this regard, it will be recognised that in the clamped condition the top of the aperture 22, 122 rests upon the projection 20, 120, and only a small part of the projection 20, 120 will be visible in the constructed fence.

The relatively small width of the leg 24 of the projection 20, and the relatively small width of the projection 120, provide a small surface upon which the fence member 12, 112 can pivot during adjustment, a narrower supporting surface generally providing a larger angle of adjustment.

The aperture 22 shown in Fig.1 is of oval form, but alternatively could be differently-shaped to more closely locate around the projection 20, if desired. The aperture could be formed with a top portion having a width closely matching that of the leg 24. To permit adjustment of the fence, the aperture 22 must be able to pivot in the plane of the fence relative to the leg 24 of the projection 20. Whatever the precise form of the aperture, its top edge is therefore preferably curved to facilitate adjustment.

It will be understood that an intending intruder might seek to disassemble the fence by twisting the rail of the embodiment of Figs. 1-4 (clockwise as drawn in Fig.4) towards the angle α. The material of the rail and the size of the securing bolts can be chosen to resist such an attack, and the likelihood of such an attack succeeding can be reduced by fitting an anti-sag bracket to the bottom rail. Anti-sag brackets are used in multi-pale fencing to prevent distortion of the bottom rail if the bottom rail is used to support the weight of one or more persons, the bracket being sunk into the earth between each pair of posts and engaging the bottom rail. The anti-sag bracket for the fence according to the present invention could additionally resist rotation of the bottom rail.

It is preferable that the top rail and bottom rail of each fence section are identically formed, as this reduces manufacturing complexity and cost and facilitates on-site assembly. However, it will be understood that the present invention does not require the rails to be identical, and in less desirable embodiments only one of the two rails could provide the clamping action and/or only one of the two rails could have a cooperating projection and aperture to provide the latched condition.

CLAIMS

1. A method of constructing a fence comprising the steps of:
   {i} erecting a series of posts;
   {ii} connecting a top rail and a bottom rail to an adjacent pair of posts, the top rail and the bottom rail having a number of aligned openings therein to receive respective fence members;
   {iii} locating a fence member in an opening in the top rail and an opening in the bottom rail;
   {iv} clamping the fence member in the openings.

2. The method according to claim 1 in which the fence members are clamped in the openings by the step of securing a clamping member to at least one of the rails.

3. The method according to claim 2 in which the openings are open-sided, the step of securing the clamping member acting to close off the opening.

4. The method according to claim 1 in which the openings are formed through the respective rails, the method including the steps of:
   {i} positioning at least one of the top rail and the bottom rail in a first orientation;
   {ii} passing a fence member through an opening in the top rail and an opening in the bottom rail; and
   {ii} moving said one of the top rail and the bottom rail to a second orientation whereby to clamp the fence members.

5. The method according to claim 4 in which the step of moving said one of the top rail and the bottom rail to its second orientation comprises rotating the rail through a small angle around an axis parallel to its longitudinal axis.

6. The method according to claim 4 or claim 5 in which said one of the top rail and the bottom rail includes a clamping flange spaced from the opening.

7. The method according to any one of claims 1-6 in which the fence member has an aperture therethrough and at least one of the top rail and the bottom rail has a projection adjacent to the opening, the method including the step of locating the projection into the aperture whereby to hold the fence member in position relation to the rail.

8. The method according to claim 1 in which the projection and aperture permit relative adjustment between the fence member and the rail whereby the assembled fence is adjustable.

9. A set of components for constructing a fence section, the set of components including a first rail, a second rail and a number of fence members, the first rail and the second rail each having a number of openings adapted to locate a part of a respective fence member, the set of components including a clamping means which can clamp a plurality of fence members to a rail.

10. A set of components for constructing a fence section according to claim 9 in which the clamping means is a separate clamping member which can be secured to the rail.

11. A set of components for constructing a fence section according to claim 10 in which the clamping member is adapted for securement to the rail at a number of locations along the length of the rail.

12. A set of components for constructing a fence section according to claim 9 in which the clamping means is part of the rail.

13. A set of components for constructing a fence section according to claim 12 in which the clamping means is a flange spaced from the opening.

14. A set of components for constructing a fence section according to any one of claims 9-14 in which the fence member has an aperture therethrough and in

which the rail has a projection adjacent to its opening, the projection being adapted to locate within the aperture.

15. A set of components for constructing a fence section according to claim 14 in which the projection and aperture are adapted to permit relative pivoting between the fence member and the rail.

16. A set of components for constructing a fence section constructed and arranged substantially as described in relation to Figs. 1-4, or Figs. 6 and 7, or Fig.8 of the accompanying drawings.

Application No: GB1119514.6 **Examiner:** Helen Harrop

Claims searched: 1-15 **Date of search:** 9 March 2012

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	X; 1-3, 7-11 & 14-15	WO2010/094081 A1 (GRYFFIN EPSS PTY LTD) See figure 3 and associated text
X	X; 1-2 & 7-11	US5660378 A (SCHALL) See figures 1 & 2 and associated text
X	X: 1-3 & 9-11	US2006/214149 A1 (HUNG) See figure 3 and associated text
X	X: 1-2 & 9-11	US2004/046162 A1 (ZHU) See figures 8 & 9
X	X: 1-2 & 9-10	US6341764 B1 (CONNER) See figures 7 & 8
X	X; 1-2 & 9	US2010/155683 A1 (PAYNE et al.) See figure 4 and associated text

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

E04H

The following online and other databases have been used in the preparation of this search report

EPODOC & WPI

International Classification:

Subclass	Subgroup	Valid From
E04H	0017/14	01/01/2006