An adjustable stanchion assembly (10) comprises a support post (30) for a safety barrier (48) which is secured to a connection rod (26) supported from two frame members (14, 16) of a building by respective engaging means (29, 90). The first engaging means (90) comprises a bracket (92) which hooks over its frame member (14) and positively clamps the frame member between it and the connection rod (26). A locking bolt (102) provides this clamping and prevents adjustment of the bracket (92) along the connection rod (26). The second engaging means (29) does not positively clamp onto its frame member (16) but has a projection (47) overlying the flange portion (24) of the frame member (16) to prevent pivotal movement of the stanchion assembly (10) about the other frame member (14). A locking bolt (53) prevents adjustment of the second engaging means (29) along the connection rod (26) so the second engagement means (29) is held in engagement with its frame member (16) by the positive clamping of the first engaging means (90) and of the connection rod (26).
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STANCHIONS FOR STEEL FRAMED BUILDINGS

The present invention relates to frame buildings, especially steel framed buildings, and is particularly concerned with an adjustable stanchion assembly for a frame building and capable of carrying a structure on the building.

Structures which may be advantageously supported on a building, or a building construction, include especially a safety barrier, for example, to prevent or assist in preventing site workers accidentally falling from the construction, and display signs. A safety barrier may advantageously be sufficiently secure to have connected to it a fall arrest system whereby someone connected to the safety barrier may be protected from serious injury in an accidental fall. In order to provide adequate support, it is necessary that a stanchion assembly be securely connected to the building and readily appropriate for use in different situations including on different frame buildings. It is advantageous if the stanchion assembly can be readily removed from the building, for example, in the case of a stanchion assembly associated with a safety barrier, when the building construction has been substantially completed.

Our Australian patent specification 38664/89 (or any overseas equivalent thereof derived from International Patent Application PCT/AU89/00291 the disclosure of which is incorporated herein by reference, including USSN 646776, all or any of which are hereinafter referred to as "the earlier application") proposes such an adjustable
stanchion assembly in which a support post for the safety barrier or other structure is secured to a clamping mechanism comprising generally elongate connection means adapted to extend from one frame member to the other and two engaging means which are selectively relatively adjustable along the connection means, each engaging means being engageable with a respective one of the two frame members, a first of the engaging means comprising a first bracket and releasable locking means adjustable relative to said first bracket to clamp said first bracket on the flange of one frame member.

In a preferred embodiment described in the earlier application each clamp comprises jaws having a mouth of restricted maximum width and a throat portion behind the mouth having a dimension substantially parallel to the width of the mouth which is greater than the restricted maximum width. Where at least one of the frame members includes a distal lip extending along a flange thereof and the height of the distal lip is greater than the restricted maximum width of the respective clamp, the flange can only be received in and withdrawn from the jaws by relative rotation of the clamp around the leg.

In use of this aforementioned preferred embodiment, the clamping of the elongate connection member to two frame members prevents rotation of the clamps and the assembly is therefore very securely connected to the building.

The present invention provides a stanchion assembly having a modified clamping arrangement in which at least one of the engaging means may be simplified compared to the preferred embodiment described in the earlier application.

According to the present invention there is provided an adjustable stanchion assembly for a frame building (as
herein defined) comprising two elongate flanged frame members, the assembly comprising a support post for a safety barrier or other structure to be carried on the building, which support post is secured to a clamping mechanism comprising generally elongate rigid connection means adapted to extend from one frame member to the other and two engaging means which are selectively relatively adjustable along the connection means, each engaging means being engageable with a flange of a respective one of the two frame members, a first of the engaging means comprising a first bracket and releasable locking means adjustable relative to said first bracket to directly or indirectly clamp said first bracket on the flange of one frame member, and wherein a second of the engaging means comprises a support bracket which, optionally with the connection means, defines an open mouth which is adapted to receive a flange of the other frame member by displacement of the support bracket towards said flange substantially in the longitudinal direction of the connection means, said second engaging means being adapted to be retained on said flange by the selective adjustment of the connection means relative to the engaging means being resisted.

The present invention also extends to a frame building (as herein defined) having mounted thereon an adjustable stanchion assembly as described in the immediately preceding paragraph.

The present invention recognizes and continues to utilize one of the advantages of the stanchion assembly described in the earlier application, particularly of spreading the load of the support post and any structure carried by it across two frame members of the building especially when the frame members are of a relatively lightweight construction formed by rolling or pressing relatively thin gauge steel or other suitable material into the desired cross-section. However, the present invention
also recognizes that there are substantial advantages to be gained, in terms of at least time, effort and simplicity of construction, if the stanchion assembly is only clamped onto one of the frame members and is merely supported by the other to resist rotation of the stanchion assembly about the one frame member.

In a preferred embodiment, the support post is secured to the clamping mechanism exteriorly of the building or in a well of the building in a cantilevered manner and the first engaging means is clamped onto the one frame member adjacent the exterior or well. Since it is not necessary to manually adjust the second engaging means comprising the support bracket in engagement with the other frame member, this means there is no requirement for the installer to move beyond the one frame member to install the stanchion assembly.

The stanchion assembly of the present invention is particularly adapted to use with, for example, C or Z shaped purlins or girts which may have a distal lip along a flange thereof defining with the flange an L-shaped section.

By the term "frame building" is meant a building or building construction having at least two frame members to which the adjustable stanchion assembly of the invention can be affixed. Thus, for example only the roof or floor construction of the building may comprise a frame construction.

The stanchion assembly may be connected to two frame members of a wall structure so that the connection means extends generally upright from one to the other, or the connection means may be engaged with two floor or roof frame members so that it extends generally horizontally (subject to the inclination of the roof). Generally, the support post of the stanchion assembly will extend
upwardly from the clamping mechanism, but in some circumstances it may be desirable to have it projecting downwardly or outwardly from the building.

5 The support post conveniently is adjustably secured to the clamping mechanism, preferably at one end, for example by a sleeve construction and a locking device, and may be removable from the clamping mechanism for storage and transportation purposes. The preferred adjustability of the securement of the support post to the clamping mechanism is particularly convenient where a portion of the connection means to which the support post is secured projects outwardly from the building since it facilitates variation of the distance between the support post and the building even with the clamping mechanism fixed. Conveniently the support post is variable in length, and this may be by way of a telescopic construction. The support post may include means by which the structure to be carried by the stanchion assembly may be mounted thereon, for example wedging means to receive the generally horizontal rails of a safety barrier and/or hooks to engage netting extending between adjacent stanchion assemblies.

25 One of the two engaging means may be rigidly connected with the support post or with a bracket of or for the support post which engages the connection means, whether or not the support post is adjustably secured to the connection means. Thus, for example, the second engaging means comprising the support bracket may be integral with or otherwise non-displaceable relative to the connection means. Preferably the two engaging means are selectively adjustable along the connection means and relative to the support post.

35 Advantageously, the clamping mechanism is such that at least the first engaging means, and preferably both engaging means, cannot be rotated relative to the
connection means. This may be by providing the connection means and relatively adjustable engaging means with a suitable key and keyway arrangement, for example. However, preferably the or each portion of the connection means relative to which the or each engaging means is selectively adjustable comprises a rod of non-circular cross-section, for example square, and the or each selectively adjustable engaging means has a sleeve or other opening of substantially corresponding cross-section to provide for the non-rotation of the connection means relative to the engaging means. Preferably the connection means comprises a single connection rod, conveniently of tubular cross-section.

The first engaging means may take the form of any of the clamps described in the earlier application. More generally, the first bracket may comprise opposed open-ended jaws adapted to receive a portion of the flange of the one frame member through an open side of the jaws. The jaws may be fixed or relatively adjustable. The releasable locking means may thus close the adjustable jaws towards each other to clamp the one frame member therein or may be adjustable to urge the one frame member against the fixed jaws, or one of them, to clamp the one frame member therein. In any case, the releasable locking means is adjustable to clamp the flange portion between the jaws.

Alternatively, the first engaging means may take any other suitable form to clamp onto the one frame member. Thus, the first bracket may engage one side of the flange and the releasable locking means is adjustable relative thereto to clamp the flange portion therebetween.

In one embodiment in accordance with this alternative, the bracket of the first engaging means has a distal portion and means to slidingly receive the connection means with the flange portion of the one frame member
between the distal portion of the bracket and the
connection means, the releasable locking means being
adapted to relatively displace the connection means
laterally towards the distal portion of the bracket to
clamp the flange portion of the frame member between the
distal portion of the bracket and the connection means.
Preferably the distal portion is particularly suited to a
frame member which includes the aforementioned distal lip
extending along the flange to define with the flange an
L-shaped section by being provided with a free leg
depending from a support portion to define a hook which
goes over the L-shaped section.

In another embodiment in accordance with the
aforementioned alternative, the releasable locking means
is pivoted relative to the first bracket, most preferably
in a parallel plane, and means may be provided to
facilitate locking of the first bracket and the
releasable locking means in a clamping condition. Thus,
the first bracket and releasable locking means may define
aligned openings when in the clamping condition through
which, for example, the connection means may pass to
prevent release from the clamping condition.
Advantageously, this bracket also defines a hook which
may go over the aforementioned L-shaped section of the
flange portion.

Conveniently, a first engaging means which is selectively
adjustable relative to the connection means incorporates
an arrangement such as a locking bolt for resisting such
adjustment. However, this is not essential since the
relative adjustment may be resisted by other means, for
example on the connection means or by part of the
stanchion assembly, such as the support post, otherwise
abutting the building.

The second engaging means may take any suitable form and
preferably comprises a sleeve or other means defining a
passage to receive the connection means and a projection which overlies the sleeve or the connection means when it extends through the sleeve. Means is preferably provided to resist adjustment along the connection means.

Alternatively, one or more stops may be provided on the connection means or the projection could be integral with the corresponding portion of the connection means. The projection may extend substantially parallel to the corresponding portion of the connection means, conveniently in opposed directions from a spacer which separates the projection from the passage means. Preferably the open mouth tapers away from the opening and may include a lip to cooperate with the aforementioned lip on the flange of the frame member.

Various embodiments of stanchion assembly in accordance with the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a side view of a first embodiment of the stanchion assembly engaged with roof supporting purlins of a building;

Figure 2 is an enlarged view of part of Figure 1 showing a first engaging means affixed to the purlin;

Figure 3 is a sectional view of the first engaging means taken along the line 3-3 in Figure 2;

Figure 4 is an enlarged sectional view of a second engaging means taken along the line 4-4 in Figure 1;

Figure 5 is a side view similar to Figure 1 showing a second embodiment in which a different first engaging means is employed with a modified second engaging means;

Figure 6 is an enlarged side view of the modified second engaging means;

Figure 7 is a sectional view of the modified second engaging means taken on line 7-7 of Figure 6;

Figure 8 is an enlarged side view of the first engaging means of Figure 5 shown being rolled onto the purlin;
Figure 9 is a side view similar to Figure 1 showing a third embodiment in which another first engaging means is employed with the second engaging means shown in Figure 1;

Figure 10 is an enlarged end view of the first engaging means of Figure 9 taken on the line 10-10 of Figure 9;

Figure 11 is a view similar to Figure 10 but showing the first engaging means in an open condition with the purlin omitted for convenience;

Figure 12 is a side view of a fourth embodiment of the stanchion assembly engaged with wall girts using the first engaging means of Figure 8 and a second engaging means slightly modified from that in Figure 6; and

Figure 13 is an enlarged end view of the second engaging means of Figure 12 taken on the line 13-13 of Figure 12.

Referring firstly to Figure 1, a stanchion assembly 10, including an upright stanchion 12 is shown secured to two parallel metal purlins 14 and 16 which are intended to support a roof 18 (shown in dashed lines) that is yet to be secured to the purlins.

Purlins 14 and 16 are respectively shown as "C"-shaped and "Z"-shaped but for the purpose of the invention purlin 14 could be "Z"-shaped and purlin 16 "C"-shaped, they could both be "C"-shaped or could both be "Z"-shaped. Other shapes are also possible. Both purlins include a central web 20, an upper flange 22 on which the roof 18 is to be supported and a bottom flange 24 which is "L"-shaped in cross section having a leg 24a (see Figure 2) connected to the web 20 and a lip 24b projecting from the leg 24a. As shown in Figure 1 the flanges 24 both extend to the right hand side of the respective web 20 but one or both may be reversed so that it extends to the left hand side of the web.
Roof 18 is shown inclined slightly so as to allow run-off of water and purlin 16 is inclined slightly also, to accommodate this. However, the web 20 of purlin 14 is used to support a fascia gutter 19 of the building and is therefore vertical. Upper flange 22 of the purlin 14 is inclined from normal to the web to accommodate the inclination of the roof.

The stanchion assembly 10 includes a clamping mechanism which comprises a connecting rod 26 which bridges the purlins 14 and 16 beneath the bottom flanges 24. The connecting rod is of square tubular cross-section and is supported on the bottom flanges 24 of purlins 14 and 16 by first engaging means 90 and second engaging means 29 to be described in detail hereinafter. The stanchion 12 of the assembly 10 comprises a lower support post 30 which is tubular and has welded at its lower end a sleeve 32 of square cross-section whose axis extends perpendicularly to that of the lower support post 30. The sleeve 32 is closely received in a sliding manner on a projecting end portion 34 of the connecting rod 26 and is lockable in the desired location by means of a screw threaded locking bolt 36 which threadedly engages the sleeve and projects through the sleeve wall to abut the end portion 34 of the connecting rod. The lower support post 30 may thus be readily spaced sufficiently from the end of the web 20 of purlin 14 to accommodate the gutter 19.

The lower support post 30 telescopically receives an upper support post 38 which can be locked at the desired height by means of a locking bolt 40 of similar construction to the locking bolt 36. The upper support post 38 carries a pair of barrier mounts 42 each of which has a pair of spaced plates 44 welded to the upper support post 38 and having aligned apertures therethrough to receive wedge shaped pegs 46. Each of the barrier mounts 42 is shown with a barrier rail 48 locked in place
between the respective spaced plates 44 by means of the peg 46 forcing the barrier rail into abutment with the upper support post 38. Each barrier mount 42 is preferably capable of receiving at least one barrier rail 48 transversely to the plane of Figure 1 as shown and at least one parallel to the plane of the Figure. As shown in Figure 1 each barrier mount 42 has two pegs 46 for receiving a barrier rail 48 on either or both sides of the upper support post 38.

The other end of the barrier rails 48 are supported on a second stanchion assembly 10 (not shown) clamped to the purlins 14 and 16. In an alternative embodiment, or in addition to the barrier mounts 42, the stanchion 12 may carry hooks or other devices to support netting or webbing between the stanchions 12 of the two spaced assemblies 10. Alternatively again, the stanchion 12 may comprise means for carrying, for example, a display sign.

Figures 2 and 3 shown an enlarged detail of engaging means 90 as shown clamped to purlin 14. Engaging means 90 comprises a formed metal bracket 92 to which is welded a sleeve 100 carrying adjustment means in the form of a locking bolt 102.

The bracket 92 comprises a short leg 94, a cross-member 96 and a longer leg 98 which is substantially parallel to the short leg 94 and to which the sleeve 100 is welded. The longer leg 98 has a rectangular aperture 99 punched in it in alignment with the sleeve 100 to allow the connecting rod 26 to pass through in a sliding manner to be closely received in the sleeve 100, as shown most clearly in Figure 3.

The short leg 94 and cross-member 96 define a distal hook portion of the bracket 92 which extends from the uppermost end of the longer leg 98. The distal or bottom end of the short leg 94 extends to approximately the same
level as the upper edge of the aperture 99 in the longer leg 98 so as to enable the hook portion of the bracket 92 to be hooked over the lip 24b of the purlin 14 and the flange 24a to be clamped between the distal end of the short leg 94 and the connecting rod 26 which projects through the aperture 99.

The locking bolt 102 is similar to the previously described locking bolt 36. A screw-threaded nut 103 is welded to the sleeve 100 around an opening (not shown) in the lower side of the sleeve through which the bolt 102 can protrude, when it is adjusted relative to the nut, to laterally displace the connecting rod 26 in the sleeve towards the upper edge of the aperture 99. Such adjustment enables the flange 24a of the purlin to be clamped as described and prevents movement of the connecting rod through the aperture 99 and sleeve 100.

The sleeve 100 is substantially U-shaped in cross-section to enable the desired lateral adjustment of the connecting rod therein towards the upper edge of the aperture 99. However, the sleeve could be enclosed provided it is sized to permit the desired lateral adjustment of the connecting rod in the aperture 99. Relative rotation of the connecting rod 26 in the bracket 92 is prevented by the size and shape of the aperture 99 and sleeve 100.

Prior to the connecting rod 26 being inserted into the engaging means 90 it will be appreciated that the distal portion of the bracket 92 just hooks over the lip 24b of the purlin 14 and the bottom end of the short leg 94 rests on the flange 24a of the purlin. When the connecting rod 26 is inserted through aperture 99 of the bracket 92, the engaging means cannot be removed from the purlin.

Turning now to the second engaging means, the support
bracket 29 is formed with oblong cross-section tubes 47 and 49, but these tubes could easily be formed from square tubes or solid sections. These tubes 47 and 49 are welded perpendicular to one another to form a cross and a sleeve 51 is welded to the opposite surface of tube 49, so that it extends parallel to and underlies tube 47. The sleeve is sized to receive the connecting rod 26 and can be locked onto the connecting rod by means of a locking bolt 53 which is similar to the locking bolt 102 previously described. The sleeve 51 is shown as having a substantially U-shaped cross-section, but as with the sleeve 100 may be enclosed, and prevents relative rotation of the connecting rod therein. The tube 49 is sized to enable the flange 24 of the purlin 16 to be received between the tube 47 and the sleeve 51 so that the support bracket 29 can be slid over the leg 24a of the purlin to allow the top of the lip 24b to bear on the tube 47 of the supporting bracket 29. The leg 24a can bear on the connecting rod 26 or the top of the sleeve 51 to prevent rotation of the whole assembly 10, or the spacing of the tube 47 from the sleeve 51 may be slightly greater as shown in Figures 1 and 4.

Conveniently, the support bracket 29 is associated with the inner purlin 16 since this permits erection of the stanchion assembly 10 from outside of the building.

Referring again to Figure 4 the engaging means 90 is hooked onto the purlin 14 and the connecting rod 26 is slidably accepted into the aperture 99 and sleeve 100 so that it protrudes a portion of the way past the sleeve towards purlin 16. The support bracket 29 is then engaged with the connecting rod 26 by slidably accepting the latter into the sleeve 51 of the support bracket. At a predetermined distance from the remote end of the connecting rod, the support bracket 29 is locked onto the connecting rod by means of the locking bolt 53. The connecting rod 26 is then passed further through the
aperture 99 and sleeve 100 of the engaging means 90 until the support bracket passes beneath the bottom flange 24 of the purlin 16. The connecting rod is then raised and retracted until the support bracket 29 engages fully with the lip 24b of the purlin 16 as shown in Figure 1. The locking bolt 102 is then adjusted to urge the connecting rod 26 towards the hook portion of the bracket 92 to clamp the bottom flange 24 of the purlin 14 between the hook portion and the connecting rod. This method enables the assembly 10 to be erected from outside the building, making it quicker to erect.

The various embodiments of stanchion assembly described hereinafter are closely similar in many respects to the embodiment described with reference to Figures 1 to 4, and, for convenience only, where the same or similar parts are referred to the same reference numeral will be used.

Referring now to Figures 5 to 8, a slightly modified stanchion assembly 108 is shown in which the only differences are the replacement of the first engaging means 90 by a clamp 28 of the type fully described in the earlier application and the use of a different second engaging means in the form of support bracket 110.

Referring now to Figure 8 in which the clamp 28 is shown in greater detail, the clamp comprises a sleeve 50 of square cross-section to closely receive the connecting rod 26 in sliding manner. The sleeve 50 has a locking bolt 52, which is of similar construction to the locking bolt 36, to secure the connecting rod 26 in the sleeve. The locking bolt 52 comprises a wing 54 welded to a threaded nut 56 from which a screw threaded stud 58 fixedly projects. The stud 58 screw threadedly engages a threaded nut 60 welded to the wall of the sleeve 50 and the nut 60 overlies an aperture (not shown) in the wall of the sleeve so that the stud 58 can project.
therethrough to engage the connecting rod 26.

The sleeve 50 of the clamp 28 is welded to a generally sleeve like clamping means 62 whose axis extends transversely of the sleeve 50 to engage the bottom flange 24 of the purlin 14. The clamping means 62 comprises an elongate G-shaped steel section 64 whose longer leg 66 is welded to the sleeve 50 and from which an upstanding leg 68 extends to a leg 70 which extends parallel to the longer leg 66. A depending leg 74 extends from the leg 70 and has a distal edge which is spaced slightly from the opposing leg 66 of the G-shaped section 64 to define an endless narrow mouth 76 between opposed jaws through which the lip 24b of the flange 24 of the purlin 14 can be received. The section 64 of the clamping means 62 defines an enlarged throat 78 inwardly of the mouth 76 whose height is greater than the height of the lip 24b. The lip 24b has a greater height than the spacing between the legs 66 and 74 which defines the mouth. Thus, flange 24 can only be received in the throat 78 by inserting the lip 24b through the mouth 76 and rotating the clamp 28 around the junction between the leg 24a and lip 24b of the flange. Likewise, the clamp 28 can only be removed from the flange 24 by rotating the clamp over the lip 24b.

It will be appreciated that once the connecting rod 26 extends through the sleeve 50 of the clamp 28 with the clamp mounted on the purlin 14 as described and the connecting rod is located relative to the purlin 16 by the support bracket 110, the clamp 28 cannot then be rotated relative to the purlin and is therefore securely held thereon. However, to releasably lock the clamp 28 onto the purlin 14 a locking bolt 80 is provided which is identical to the locking bolt 52 and whose stud 82 projects through the leg 66 of section 64 to engage the flange 24 in the mouth 76 and thereby urge the leg 24a into abutment with the distal end of the leg 74 of the
section 64. Preferably, two locking bolts 80 are provided, one located on each side of the sleeve 50 to spread any twisting load.

As noted previously the stanchion assembly 108 of Figures 5 to 8 is very similar to the assembly 10 shown and described in Figure 1 and the set up and erection from outside of building is as described for Figure 1. Again, either of the purlins 14 and 16 could be "C" shaped or "Z" shaped and the lower flange 24 of the purlin 16 could be in the opposite direction to that shown, in which case the support bracket 110 will be orientated 180 degrees prior to being placed onto the connection rod 26.

Referring now primarily to Figures 6 and 7 the support bracket 110 differs from the support bracket 29 previously described in that it has an angled projection 112 extending in only one direction from a sleeve 114 so that the bracket has to be orientated depending on direction of the flange 24 of the purlin 16 as discussed above. The angled projection 112 has a hollow oblong cross-section but any other shape or structure may be used. The angled projection is secured adjacent one end to the sleeve 114 by means of opposed side plates 116 welded each side of the sleeve 114 and the jaw projection.

The sleeve 114 is essentially identical to the sleeve 50 of clamp 28 to slidingly receive the connecting rod 26 therethrough in non-rotatable manner, and has a locking bolt 118 identical to the locking bolt 52 to prevent the relative sliding movement.

The opposite end of the angled projection 112 defines with the sleeve 114 an open mouth to receive the flange 24 of purlin 16. The mouth tapers towards the side plates 116. A lip 120 in the form of a flat bar section welded to the underside of the opposite end of projection
112 resists accidental removal of the flange 24 from the open mouth, for example if the locking bolt 118 is not fully engaged with the connection rod 26, by engaging the distal lip 24b of the purlin 16. Preferably the angled projection 112 is such that the top edge 24c of the distal lip 24b of the purlin 16 can wedge into contact with the underside of the projection 112 with the underside of the purlin flange 24a being forced into contact with the top of the sleeve 114. The support bracket 110 thus may remain solidly wedged onto the purlin 16 without any vertical movement as may be encountered using the support bracket 29 with differing heights of the distal lip 24a.

Referring now to Figures 9 to 11, the stanchion assembly 150 is identical to the assemblies 10 and 108 except for the engaging means, although an identical support bracket 29 to that described with reference to Figures 1 to 4 is engaged with the purlin 14 rather than 16.

The pitch of the roof 18 in Figure 9 is somewhat steeper than in previously described embodiments, and this is reflected in the inclined attitude of the purlin 16 and the inclination of the top flange of the purlin 14. A clamp 152 engaged with the purlin 16 allows the previously described support post 30 to extend substantially vertical, and therefore to be most effective, using the straight connecting rod 26 even though the purlins 14 and 16 are at substantially different heights.

The clamp 152 essentially comprises two metal plates 154 and 156 which are pivoted together by a pin 158 which extends substantially centrally of the plates perpendicularly to their principal planes. The plates are maintained slightly apart by a spacer 160 on the pin.

The first metal plate 154 is somewhat longer than the
second metal plate and has a distal portion 162 defining a hook whose outer end is in the principal plane of the second metal plate 156 but spaced therefrom by the thickness of the flange 24 of the purlin, at most, when the two metal plates are aligned. Accordingly, when the two metal plates are aligned with the flange 24 located therebetween and the lip 24b projecting into the hook, the clamp is securely located on the purlin 16.

The cooperating edge 164 of the second metal plate 156 is chamfered, as clearly shown in Figure 10, to facilitate moving the plates into alignment with the flange 24 therebetween. Each metal plate has a pair of openings 166 to respective sides of the pivot pin 158, and when the plates are in alignment the openings in the two plates are also in alignment enabling the connection rod 26 to be passed through one of the pairs of aligned openings to lock the clamp 152 in the clamping condition. The openings are of square cross-section like the connection rod 26 to prevent rotation of the connection rod in the openings. One or other of the pairs of aligned openings 166 may be used depending on the desired spacing of the connection rod 26 from the purlin 16. In the embodiment shown, the lower pair is utilized to have the connection rod extending substantially horizontally.

Referring to Figure 9 again, the stanchion assembly is mounted on the purlins 14 and 16 in the following manner. The sleeve 51 of the support bracket 29 is slid onto the connection rod 26 and the clamp 152 is locked onto the purlin 16 in the manner previously described. With the plates 154 and 156 of the clamp aligned, the free end of the connection rod 26 is slid through one of the pairs of aligned openings 166 in the metal plates until the support post 30 on the opposite end of the connection rod 26 is at the desired spacing from the roof 18 when the connection rod is held up to the purlin 14. The support bracket 29 is then slid back along the connection rod 26.
until it is supported on the lower flange 24 of the purlin 14. The locking bolt 53 is then tightened to resist relative displacement between the support bracket and connection rod.

As shown in Figure 9, the engagement of the support bracket 29 with the purlin 14 prevents the connection rod from being displaced outwardly from the building. While the close fit of the connection rod in the aligned openings 166 of the clamp 152 tends to resist displacement of the connection rod relative to the clamp, relative displacement therebetween is positively prevented in the outwards direction of the connection rod by the positive engagement of the clamp with the purlin 16 and by the aforementioned engagement between the purlin 14, the support bracket 29 and the connection rod, and in the inwards direction by abutment of the support post 30 with the building, particularly the gutter 19. If desired a stop or other device could be provided on the connection rod or on the clamp 152 to positively lock the clamp on the connection rod.

Turning now to Figures 12 and 13, a slightly modified stanchion assembly 108" to that shown in Figure 5 is illustrated secured to C-shaped girts 84 of the frame building which may support the wall or fascia cladding of the building. The girts 84 are identical to the previously described C-shaped purlin 14 except that they are shown with the web 20 extending horizontally. The upper girt opens downwardly while the lower girt opens upwardly, but either may be reversed with a corresponding reversal of the engaging means. A main modification in the stanchion assembly 108' compared to the assembly 108 is that a sleeve 32' is continuous and integral with the lower support post 30' of stanchion 12" so that the connecting rod 26 clamped to the vertically spaced girts 84 extends in an upright manner. The stanchion 12" is otherwise identical to the stanchion 12 and will not be
described further.

Clamp 28 engages the upper girt and is rotated onto the flange 24 of the girt as described with reference to the purlin 14 in Figures 5 and 8. The connecting rod 26 is then inserted through the sleeve 50 of the clamp and the locking bolt or bolts 80 are then engaged to lock the clamp firmly onto the girt.

The second engaging means cooperating with the lower girt 84 is a slightly modified support bracket 110' in which the sleeve 114' is shorter than the angled projection 112 and no lip 120 is provided on the angled projection 112' at the open mouth. Because of the shorter sleeve 114', the open mouth is defined between the angled projection 112' and the connection rod 26, as clearly seen in Figure 12. A further difference is the slightly increased spacing of the projection 112' from the sleeve 114' at the end opposite to the open mouth as shown in Figure 13 which is a cross-section taken close to the end of the support bracket 110'. The support bracket 110' is otherwise the same as the support bracket 110.

During assembly, the connection rod 26 with the support 110' secured thereto is allowed to slide downwardly through the sleeve of clamp 28 until the lip 24b of the lower girt 84 wedges between the angled projection 112' and the connection rod 26. The connection rod is then locked in the sleeve of the clamp 28.

It will be appreciated that many other modifications and variations to those described herein are possible to the stanchion assemblies, provided one first engaging means clamps onto the one frame member and one second engaging means cooperates with the other frame member. Other combinations of the first and second engaging means than those described with reference to the drawings may also be adopted.
The construction, arrangement and operation of the stanchion assembly and components thereof illustrated in the drawings can be readily understood by reference to the preceding description. It will be seen that the described stanchion assemblies can enable a stanchion to be readily supported from purlins, and/or girts of a frame building and the stanchion can be then used to mount barriers, horizontal rails, barrier netting, display signs and the like. The stanchion assemblies can be readily dismantled from the building for re-use at another location. Those skilled in the art will readily appreciate that many modifications and variations may be made to the stanchion assemblies described herein, and all such modifications and variations should be considered as falling within the scope of the present invention.
CLAIMS

1. An adjustable stanchion assembly for a frame building (as herein defined) comprising two elongate flanged frame members, the assembly comprising a support post for a safety barrier or other structure to be carried on the building, which support post is secured to a clamping mechanism comprising generally elongate rigid connection means adapted to extend from one frame member to the other and two engaging means which are selectively relatively adjustable along the connection means, each engaging means being engageable with a flange of a respective one of the two frame members, a first of the engaging means comprising a first bracket and releasable locking means adjustable relative to said first bracket to directly or indirectly clamp said first bracket on the flange of one frame member, and wherein a second of the engaging means comprises a support bracket which, optionally with the connection means, defines an open mouth which is adapted to receive a flange of the other frame member by displacement of the support bracket towards said flange substantially in the longitudinal direction of the connection means, said second engaging means being adapted to be retained on said flange by the selective adjustment of the connection means relative to the engaging means being resisted.

2. A stanchion assembly according to Claim 1 wherein the first engaging means comprises opposed open-ended jaws adapted to receive a portion of the flange of the one frame member through an open side of the jaws and the releasable locking means is adjustable to clamp the flange portion between the jaws.

3. A stanchion assembly according to Claim 2 wherein the opposed jaws are fixed and the releasable locking means is adjustable relative to one of the jaws to clamp the flange portion against the other of the jaws.
4. A stanchion assembly according to Claim 1 wherein the first bracket is adapted to engage one side of the flange and the releasable locking means is adjustable relative thereto to clamp the flange portion.

5. A stanchion assembly according to Claim 4 wherein the first bracket has a distal portion and means to slidingly receive the connection means with the flange portion of the one frame member between the distal portion of the first bracket and the connection means, the releasable locking means being adapted to relatively displace the connection means laterally towards the distal portion of the bracket to clamp the flange portion between said distal portion and the connection means.

6. A stanchion assembly according to Claim 5 wherein the distal portion of the first bracket comprises a free leg depending from a support portion.

7. A stanchion assembly according to Claim 4 wherein the releasable locking means is pivoted relative to the first bracket.

8. A stanchion assembly according to Claim 7 wherein means is provided to facilitate locking of the first bracket and the releasable locking means in a clamping condition.

9. A stanchion assembly according to Claim 8 wherein each of the first bracket and the releasable locking means has an opening therethrough, said openings being aligned in the clamping condition and adapted to receive the connection means therethrough to prevent release from the clamping condition.

10. A stanchion assembly according to Claim 7 wherein the releasable locking means cooperates with a distal portion of the first bracket to clamp the flange portion,
said distal portion comprising a free leg depending from a support portion.

11. A stanchion assembly according to Claim 10 wherein the distal portion of the first bracket extends from a substantially planar portion, said releasable locking means is substantially planar and said releasable locking means is pivoted in a substantially parallel plane to said substantially planar portion, said plane intersecting a free end of said free leg.

12. A stanchion assembly according to Claim 1 wherein the first engaging means is selectively adjustable relative to the connection means and incorporates means for resisting such adjustment.

13. A stanchion assembly according to Claim 1 wherein the second engaging means is selectively adjustable relative to the connection means and incorporates means for resisting such adjustment.

14. A stanchion assembly according to Claim 13 wherein the second engaging means comprises means defining a passage for the connection means and a projection which overlies said passage means or the connection means when it extends through the passage.

15. A stanchion assembly according to Claim 14 wherein the projection and the passage means are separated from each other by a spacer and said projection extends in opposed directions from the spacer parallel to the axis of the passage.

16. A stanchion assembly according to Claim 14 wherein the projection is inclined relative to the axis of the passage whereby the open mouth tapers towards the passage means.
17. A stanchion assembly according to Claim 16 wherein a lip is provided on the projection in the opening of the open mouth.

18. A frame building (as herein defined) having mounted thereon an adjustable stanchion assembly according to Claim 1.

19. A frame building according to Claim 18 wherein the support post is secured to the clamping mechanism to one side of both engaging means and the one frame member onto which the first engaging means is clamped is closer to the support post than the other frame member.
A. CLASSIFICATION OF SUBJECT MATTER
Int. CL E04G 21/32, E04G 1/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC E04G 21/32, E04G 1/26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC as above

Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of Box C.  
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Date of the actual completion of the international search:
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END OF ANNEX