An advance guard rail

The present application provides an advance guard rail for securing between opposed scaffolding or mobile tower frames, the advance guard rail comprising a frame comprising at least one horizontal upper rail bar, and at least one diagonal bar coupled to and at an oblique angle to said at least one horizontal upper rail bar, a first hook provided at a first end of said horizontal rail bar; and a second hook provided at the free end of said diagonal bar, and a brace member having a bracing clamp, said brace member having a first end and a second end, said first end hingedly coupled to the frame, said bracing clamp provided at said second end of said brace member, wherein said brace member is adapted to be rotated within the plane of said frame relative to said frame to allow said bracing clamp to releasably secure to an orthogonal bar of one of said opposed scaffolding or mobile tower frames.
Description

Field of the Invention

[0001] This invention relates to an advance guard rail for scaffolding and mobile towers.

Background of the Invention

[0002] Scaffolding and mobile towers are commonly used during construction or any associated works, or for safe access where work at height is required, providing a temporary work platform that can be easily assembled and disassembled on site. Such towers comprise a modular system of frames, each frame comprising at least two vertical bars having a plurality of horizontal bars extending between the vertical bars. The ends of the vertical bars are adapted to form a "plug-and-socket" arrangement with other frames, allowing for the construction of a structure through the interlocking arrangement of various frames as required. Platforms, boards or planks can be positioned between suitable horizontal bars as required, to create different levels to support operators during use.

[0003] A condition of various health and safety regulations is that, as towers are being constructed, a worker cannot stand on any work surface (platform or level) of the tower unless that platform is suitably guarded by a guard rail, to prevent against possible falls. In general, this means that the guard rails for a level are installed by a worker while sitting in the open trapdoor of the platform placed at that level. This construction method for standard guard rails has meant that such an operation can be relatively awkward.

[0004] Such problems have lead to the development of advance guard rail systems, such as the BetaGuard® system of Turner Access Limited (www.turner-access.co.uk), which allow the relatively easy installation of an advance guard rail for a higher working level while a worker is safely positioned on the preceding level. With reference to Fig. 1, the BetaGuard® system provides a rigid invented U-shaped frame structure indicated at 10, having a plurality of downward-facing tube clamps 12, the clamps 12 located at the external corners of the frame 10. The frame structure 10 can be vertically slotted down into position on adjacent orthogonally-located frames (not shown) in the direction indicated by the arrows, with the tube clamps 12 slotting into engagement with the horizontal bars of the adjacent frames, thereby forming a guard rail for the succeeding level.

[0005] It is an object of the invention to provide an alternative advance guard rail design that provides for relative ease of use, and which can be installed while a worker is on a preceding lower level.

Summary of the Invention

[0006] Accordingly, there is provided an advance guard rail for securing between opposed scaffolding or mobile tower frames, the advance guard rail comprising:

- a planar frame body formed by a plurality of co-planar members comprising at least one horizontal upper rail bar, and at least one diagonal bar coupled to and at an oblique angle to said at least one horizontal upper rail bar;
- a first hook provided at a first end of said horizontal rail bar; and
- a second hook provided at the free end of said diagonal bar.

characterised in that said first and second hooks are arranged such that said first hook is adapted to be coupled to a first bar of a first scaffolding or mobile tower frame to form a pivot point, said first bar running in a plane orthogonal to the plane of said frame body; and such that said second hook can be brought to couple with a second bar of a scaffolding or mobile tower frame by rotation of said advance guard rail relative to said first scaffolding or mobile tower frame about said pivot point, said second bar running in a plane orthogonal to the plane of said frame body.
opposed scaffolding or mobile tower frames.

Preferably, the advance guard rail further comprises:

- a second lower co-planar horizontal rail bar substantially parallel to said horizontal upper rail bar;
- at least one co-planar vertical brace orthogonal to said upper and lower rail bars; and
- a third hook provided at a first end of said lower rail bar, adjacent to said first hook, wherein said third hook is provided such that the open face of said third hook faces in a direction along the central axis of said lower rail bar.

This configuration means that, as the advance guard rail is rotated about the pivot point, the third hook will be brought to couple with an orthogonal bar of the first scaffolding or mobile tower frame below the bar to which the first hook is coupled.

Preferably, the advance guard rail further comprises a fourth hook provided at the second end of said upper rail bar, the fourth hook provided such that the open face of said fourth hook faces in a substantially vertically downwards direction, substantially parallel to the direction of the first hook.

Preferably, the advance guard rail further comprises at least one co-planar brace member having a bracing clamp, said brace member having a first end and a second end, said first end hingedly coupled to said frame body, said bracing clamp provided at said second end of said brace member, wherein said brace member is adapted to be rotated within the plane of said frame body relative to said frame body to allow said bracing clamp to releasably secure to an orthogonal bar of one of said opposed scaffolding or mobile tower frames.

Preferably, said first end of said brace member is hingedly coupled to said frame body adjacent the location where said diagonal bar extends from said frame body.

Preferably, said bracing clamp is arranged such that the open face of said bracing clamp faces in a direction orthogonal to the central axis of said brace member.

Preferably, at least one of said hooks comprises a latch to releasably retain an orthogonal bar within said frame body within the plane of said frame relative to the frame body.

There is further provided a method of installation of an advance guard rail onto a scaffolding or mobile tower frame, the advance guard rail comprising a planar frame formed by a plurality of co-planar members having a primary hook and at least one secondary hook, the method comprising the steps of:

- coupling a primary hook of an advance guard rail to a first bar of a first scaffolding or mobile tower frame to form a pivot point, said first bar running in a plane orthogonal to the plane of said frame; and
- rotating the advance guard rail within the plane of said frame relative to said first scaffolding or mobile tower frame about said pivot point, such that at least one secondary hook is brought into a coupling arrangement with a second bar of a scaffolding or mobile tower frame parallel to said first bar.

The use of this method provides a relatively simple two-step procedure for the installation of an advance guard rail, which utilises the existing scaffold or mobile tower frame structure as a support for the act of installation.

Preferably, the advance guard rail further comprises at least one brace member hingedly coupled to the frame, the brace member having a bracing clamp provided at the free end of the brace member, and wherein the method further comprises the step of:

- rotating a brace member of the advance guardrail within the plane of said frame relative to the frame such that the bracing clamp of the brace member is brought into a coupling arrangement with a third bar of a scaffolding or mobile tower frame parallel to said first and second orthogonal bars.

There is additionally provided an advance guard rail for scaffolding and mobile towers, the advance guard rail comprising:

- a planar frame body formed by a plurality of co-planar members comprising at least one horizontal rail bar; and
- at least one hook located at an end of said at least one horizontal rail bar, said hook operable to secure said frame body to a bar running in a plane orthogonal to the plane of said frame body,

characterised in that the advance guard rail further comprises at least one brace member having a bracing clamp, said brace member having a first end and a second end, said first end hingedly coupled to said frame body, said bracing clamp provided at said second end of said brace member, wherein said brace member is adapted to be rotated relative to said frame body within the plane of said frame body, to allow said bracing clamp to releasably secure to a bar running in a plane orthogonal to the plane of said frame body.

The use of a hinged brace member allows for a greater flexibility when employing the advance guard rail, as the brace member can be rotated until it meets an orthogonal bar of an adjacent scaffold frame to secure to. In addition, the components of the advance guard rail can be configured such that the advance guard rail may be used as a structural element of the tower, to provide sufficient tower stiffness to satisfy appropriate design regulations. In this regard, the advance guard rail of the invention can act as a combination of both a guard rail...
and structural braces.

[0024] Preferably, said advance guard rail further comprises a latch member provided on said frame structure, said latch member operable to releasably secure said brace member relative to said frame structure.

[0025] The latch member allows for the brace member to be affixed to the frame, preventing its rotation, and allowing for ease of transportation and storage.

Detailed Description of the Invention

[0026] An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a front plan view of a prior art advance guard rail;
Fig. 2 is a front plan view of an advance guard rail according to the invention; and
Figs. 3-5 illustrate the steps for installing the advance guard rail of Fig. 2 between a pair of opposed scaffolding frames.

[0027] With reference to Fig. 2, an advance guard rail according to the invention is indicated generally at 20. The advance guard rail 20 comprises a pair of spaced, parallel, adjacent horizontal rail bars 22 and 24, the upper rail bar 22 having a longer length than the lower rail bar 24, the bars 22,24 having respective first ends 22a,24a and second ends 22b,24b.

[0028] A plurality of spaced, parallel, vertical bars 26, 28 and 30 extend between the upper and lower horizontal rail bars 22,24, maintaining the upper and lower rail bars 22,24 in spaced parallel relationship such that the respective first ends 22a,24a of the upper and lower rail bars 22,24 are adjacent one another. The vertical and horizontal bars together form part of the overall frame structure of the advance guard rail 20.

[0029] As can be seen in Fig. 2, a first vertical bar 26 extends between the upper and lower rail bars 22,24 adjacent the respective first ends 22a,24a. A second vertical bar 28 extends from a first point 32 on said upper rail bar 22 to a second point 34 on said lower rail bar 24, said first and second point approximately 1/3 of distance along the length of the rail bars from said first ends 22a,24a. A third vertical bar 30 extends from a third point 36 adjacent the second end 22b of said upper rail bar 22 to a fourth point 38 at the second end 24b of said lower rail bar 24. Said third vertical bar 30 extends beyond said fourth point 38 to project below said lower rail bar 24, to a lower end 30a. It will be understood that the locations of said points may be varied according to the structural characteristics of the advance guard rail in question.

[0030] A diagonal bar 40, in the same plane as but at an oblique angle to said upper and lower rail bars 22,24, projects from a first end 40a located at said second point 34 on said lower rail bar 24 to a second end 40b beyond the lower end 30a of said third vertical bar 30, such that a right-angled triangle is formed by: that portion of said diagonal bar 40 between said second point 34 and the lower end 30a of said third vertical bar 30; that portion of said lower rail bar 24 between said second point 34 and the second end 38 of the lower rail bar 24; and that portion of said third vertical bar 30 between said fourth point 38 and the lower end 30a of said third vertical bar 30.

[0031] A hinged bracing arm 42 is further provided, the bracing arm 42 having a first end 42a and a second end 42b, the first end 42a of said bracing arm 42 hingedly coupled to said lower rail bar 24 adjacent said second point 34, such that said bracing arm 42 is free to rotate about the hinged coupling between a first position adjacent said diagonal bar 40 and a second position adjacent the first end 24a of said lower rail bar 24. A clasp 44 is provided on said diagonal bar 40, the clasp 44 arranged to receive said hinged bracing arm 42 when in said first position. The clasp 44 releasably retains said hinged bracing arm in the first position, to prevent the free rotation of the bracing arm 42 during, for example, storage or transportation. The advance guard rail 20 is secured to adjacent scaffolding frames through an arrangement of substantially C-shaped hooks or clamps arranged about the advance guard rail 20. A first hook 46 is provided at a first end 22a of said upper rail bar 22, a second hook 48 is provided at the second end 22b of said upper rail bar 22 and a third hook 50 is provided at the first end 24a of said lower rail bar 24, a fourth hook 52 is provided at the second end 24b of said upper rail bar 22, and a bracing clamp 54 is provided at the second end 42b of said bracing arm 42.

[0032] Said hooks or clamps are orientated to couple with at least one adjacent scaffolding or mobile tower frame:

- The open face of the first hook 46 faces in a downwards direction, orthogonal to the central axis of the upper rail bar 22;
- The open face of said second hook 48 faces in a direction orthogonal to the central axis of said diagonal bar 40, away from the central axis of said upper rail bar 22;
- The open face of said third hook 50 faces in a direction along the central axis of said lower rail bar 24;
- The open face of said fourth hook 52 faces in a downwards direction, orthogonal to the central axis of the upper rail bar 22, and parallel to the direction in which the first hook 46 faces; and
- The open face of said bracing clamp 54 faces in a direction orthogonal to the central axis of said bracing arm 42, away from said diagonal bar 40.

[0033] A method of installation of the advance guard rail 20 is now described with reference to Figs. 3-5.

[0034] During construction of scaffolding or a mobile tower, successive opposed scaffolding or mobile tower frames are mounted one on top of the other as the height advances. This provides an array of parallel opposed
An advance guard rail for securing between opposed scaffolding or mobile tower bars (indicated at 56a-f), to which appropriate advance guard rails can be attached.

Claims

1. An advance guard rail for securing between opposed

scaffolding or mobile tower frames, the advance guard rail comprising:

- a planar frame body formed by a plurality of coplanar members comprising at least one horizontal upper rail bar, and at least one diagonal bar coupled to and at an oblique angle to said at least one horizontal upper rail bar;
- a first hook provided at a first end of said horizontal rail bar;
- and a second hook provided at the free end of said diagonal bar,

characterised in that said first and second hooks are arranged such that said first hook is adapted to be coupled to a first bar of a first scaffolding or mobile tower frame to form a pivot point, said first bar running in a plane orthogonal to the plane of said frame body; and such that said second hook can be brought to couple with a second bar of a scaffolding or mobile tower frame by rotation of said advance guard rail relative to said first scaffolding or mobile tower frame about said pivot point, said second bar running in a plane orthogonal to the plane of said frame body.

2. An advance guard rail according to claim 1 in which the first and second hooks are arranged such that said second hook is brought to couple with a bar of a second scaffolding or mobile tower frame opposed to said first scaffolding or mobile tower frame.

3. An advance guard rail according to claim 1 or 2 in which the first hook is arranged such that the open face of said first hook faces in a substantially vertically downwards direction, substantially orthogonal to the central axis of said horizontal rail bar, and said second hook is arranged such that the open face of said second hook faces in a direction substantially orthogonal to the central axis of said diagonal bar.

4. An advance guard rail according to any preceding claim in which said diagonal bar extends away from said first end of said horizontal rail bar, and wherein the open face of said second hook faces in a direction away from the central axis of said horizontal rail bar.

5. An advance guard rail according to any preceding claim comprising a second lower co-planar horizontal rail bar substantially parallel to said horizontal upper rail bar;

- at least one co-planar vertical brace orthogonal to said upper and lower rail bars, said at least one vertical brace extending between said upper and lower rail bars; and
- a third hook provided at a first end of said lower rail bar, adjacent to said first hook, wherein said third hook is provided such that the open face of said third

With reference to Fig. 3, an advance guard rail 20 according to the invention is initially provided having the bracing arm 42 secured to the frame by said clasp 44. A worker (situated on a preceding scaffolding level) positions the advance guard rail 20 between two opposed scaffolding or mobile tower frames (indicated by the spaced arrays of bars 56a-f). The worker then manoeuvres the advance guard rail 20 such that the first hook 46 is coupled with an orthogonal upper scaffolding bar 56a at which height it is desired to have the upper bar of a suitable guard rail.

Using the coupling between the first hook 46 and the frame bar 56a as a pivot point, the worker then rotates the advance guard rail 20 in the direction of the arrows shown in Fig. 3, such that the second, third, and fourth hooks 48, 50, 52 are brought into coupling arrangement with the frame bars 56f, 56b, 56d respectively - Fig. 4.

The worker then releases the bracing arm 42 from the clasp 46, and rotates the arm 42 about the hinged coupling in the direction of the arrow shown, such that the bracing clamp 54 is brought into coupling arrangement with the lower frame bar 56c - Fig. 5.

The second hook 48 and the bracing clamp 54 are provided with releasable latching mechanisms to allow said hooks or clamps 48,54 to be securely locked in position on the respective bars 56f,56c. This provides an advance guard rail 20 extending between opposed scaffolding or mobile tower frames, which furthermore provides suitable structural support through the use of diagonal bracing members.

The above procedure can be repeated using the same steps using a second advance guard rail 20 to complete the required guard rail protection for the next level of the scaffolding or the mobile tower.

The particular orientation of the hooks or clamps allows for the relatively easy drop, rotate and lock installation method described above for the spaced parallel arrangement of scaffolding bars of adjacent scaffolding frames, as shown in the attached figures. It will be understood that alternative orientations of hooks or clamps may be used to accommodate alternative arrangements of frame bars in adjacent frames.

It will be also understood that any number of hooks or clamps may be provided with releasable latching mechanisms to secure the advance guard rail 20 to the adjacent scaffolding or mobile tower frames.

The use of this advance guard rail provides for a guard rail construction of relatively easy installation, and which also replaces the horizontal and diagonal braces of a standard mobile tower.

Characterised in that said first and second hooks are arranged such that said first hook is adapted to be coupled to a first bar of a first scaffolding or mobile tower frame to form a pivot point, said first bar running in a plane orthogonal to the plane of said frame body; and such that said second hook can be brought to couple with a second bar of a scaffolding or mobile tower frame by rotation of said advance guard rail relative to said first scaffolding or mobile tower frame about said pivot point, said second bar running in a plane orthogonal to the plane of said frame body.

The particular orientation of the hooks or clamps may be provided with releasable latching mechanisms to allow said hooks or clamps to be securely locked in position on the respective bars 56f,56c. This provides an advance guard rail 20 extending between opposed scaffolding or mobile tower frames, which furthermore provides suitable structural support through the use of diagonal bracing members.

The above procedure can be repeated using the same steps using a second advance guard rail 20 to complete the required guard rail protection for the next level of the scaffolding or the mobile tower.

The particular orientation of the hooks or clamps allows for the relatively easy drop, rotate and lock installation method described above for the spaced parallel arrangement of scaffolding bars of adjacent scaffolding frames, as shown in the attached figures. It will be understood that alternative orientations of hooks or clamps may be used to accommodate alternative arrangements of frame bars in adjacent frames.

It will be also understood that any number of hooks or clamps may be provided with releasable latching mechanisms to secure the advance guard rail 20 to the adjacent scaffolding or mobile tower frames.

The use of this advance guard rail provides for a guard rail construction of relatively easy installation, and which also replaces the horizontal and diagonal braces of a standard mobile tower.
6. An advance guard rail according to claim 5 comprising a fourth hook provided at the second end of said upper rail bar, the fourth hook provided such that the open face of said fourth hook faces in a substantially vertically downwards direction, substantially parallel to the direction of the first hook.

7. An advance guard rail according to any preceding claim comprising at least one co-planar brace member having a bracing clamp, said brace member having a first end and a second end, said first end hingedly coupled to said frame body, said bracing clamp provided at said second end of said brace member, wherein said brace member is adapted to be rotated within the plane of said frame body relative to said frame body to allow said bracing clamp to releasably secure to an orthogonal bar of one of said opposed scaffolding or mobile tower frames.

8. An advance guard rail according to claim 7 in which said first end of said brace member is hingedly coupled to said frame body adjacent the location where said diagonal bar extends from said frame body.

9. An advance guard rail according to claim 7 or 8 in which said bracing clamp is arranged such that the open face of said bracing clamp faces in a direction orthogonal to the central axis of said brace member.

10. An advance guard rail according to any preceding claim in which at least one of said hooks comprises a latch to releasably retain an orthogonal bar within said at least one hook.

11. A method of installation of an advance guard rail onto a scaffolding or mobile tower frame, the advance guard rail comprising a planar frame formed by a plurality of co-planar members having a primary hook and at least one secondary hook, the method comprising the steps of:

   coupling a primary hook of an advance guard rail to a first bar of a first scaffolding or mobile tower frame to form a pivot point, said first bar running in a plane orthogonal to the plane of said frame; and

   rotating the advance guard rail within the plane of said frame relative to said first scaffolding or mobile tower frame about said pivot point, such that at least one secondary hook is brought into a coupling arrangement with a second bar of a scaffolding or mobile tower frame parallel to said first bar.

12. A method according to claim 11 in which the advance guard rail further comprises at least one brace member hingedly coupled to the frame, the brace member having a bracing clamp provided at the free end of the brace member, and wherein the method further comprises the step of:

   rotating a brace member of the advance guard rail within the plane of said frame relative to the frame such that the bracing clamp of the brace member is brought into a coupling arrangement with a third bar of a scaffolding or mobile tower frame parallel to said first and second orthogonal bars.