

IMPROVEMENTS IN AND RELATING TO SAFETY BARRIERS

Field of the Invention

5 The present invention relates to safety barriers, to panels for safety barriers, to connectors for safety barriers to methods of erecting safety barriers and to methods of forming floors of building structures with safety barriers in place.

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Background to the Invention

It is known to construct buildings by first assembling a steel and concrete framework and then providing walls to
15 the framework. Buildings constructed in this manner may be several stories high and it is necessary to provide barriers during their construction to protect workers. Such barriers are also important to reduce the risk of objects falling from construction sites onto persons or
20 property below.

There are known a number of safety barriers for use during the construction of buildings. One such barrier comprises rails mounted between two posts with the posts secured a
25 fixed distance apart.

In use, the posts of such barriers are located into sockets attached to beams of a building framework. The sockets comprise tubes welded to steel beams and their
30 spacing from one another can vary from one construction site to another. Barriers thus have to be assembled for a particular construction site so that their posts are correctly spaced. The spacing of sockets may also vary in

different parts of the same construction site as barriers must fit around parts of the building framework such as pillars. Thus, it may be necessary to assemble barriers on site to ensure they fit correctly.

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There is thus a need for alternative barriers. Accordingly, the present invention aims to address at least one disadvantage associated with known barriers whether discussed herein or otherwise.

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Summary of the Invention

According to a first aspect of the present invention there is provided a panel for a barrier, which panel comprises
15 guard means extending between first and second side edges of the panel and mounting means for connecting the panel to first and second posts, wherein the mounting means comprises a set of attachment apertures comprising one or more first apertures, for receiving attachment means to
20 connect to said first post, and which first aperture or apertures are arranged to provide a number of positions relative to the first edge of the panel at which the first post can be connected, and further comprising at least one second attachment aperture for receiving attachment means
25 to connect to the second post.

Suitably, the set of attachment apertures comprises one or more second apertures, for receiving attachment means to connect to said second post, and which second aperture or
30 apertures are arranged to provide a number of positions relative to the second edge of the panel at which the second post can be connected.

Preferably, the panel comprises a mesh screen which defines the attachment apertures.

The panel may thus be such that, in use, it can be
5 connected to first and second posts which are mounted to a building structure with varying separations between said posts. The panel may thus be suitable for employment on a number of construction sites.

10 The panel may thus also be such that, in use, first and second like panels can be connected to a post and the first panel can be positioned relative to the post and second panel to provide varying degrees of overlap with the second panel. The panel may thus be arrangeable, in
15 use, to form a barrier with like panels which may fit closely to parts, such as pillars, columns or the like, of a building framework.

The panel may comprise a first set of first and second
20 attachment apertures. The panel may further comprise a second set of first and second attachment apertures. The first set of attachment apertures may be located to lie closer to an upper, in use, edge of the panel than the second set. Suitably, apertures of each set lie in
25 corresponding positions from a first side edge of the panel. The first and second sets of attachment apertures may be substantially identical. Thus, in use, each post may be connected to a panel at two points.

30 Suitably, the or each set of attachment apertures comprises a plurality of first attachment apertures spaced apart from the first edge toward the second edge. In use, an attachment member may be passed through one of the

first apertures which lie in a range of positions relative to the first edge and a first post can thus be connected to the panel at one of a number of positions.

- 5 The or each set of attachment apertures may comprise at least one elongate first aperture extending longitudinally away from the first edge. In use, an attachment member may be passed through said first aperture in a range of positions relative to the first edge and a first post can
10 thus be connected to the panel at one of a number of positions.

The mounting means may be arranged to allow a variation of between 10cm and 100cm, preferably of between 20cm and
15 50cm in the position at which the first post can be connected relative to the first edge of the panel. Preferably, in use, the mounting means is arranged to allow a variation of no more than 30cm, more preferably no more than 20cm, in the position of the first edge of the
20 panel relative to a post connected thereto without first disconnecting the panel. Thus, a worker may not be able to knock a panel and move it relative to a post to create a gap in a barrier through which they could fall.

- 25 The or each first aperture may comprise an elongate slot. The slot may have a length of between 5 and 30 cm, preferably of between 10 and 20 cm. The or each set of apertures may comprise two first apertures which comprise slots. Alternatively, the panel may comprise a plurality
30 of apertures in place of one or more elongate slots. Such apertures may for example comprise circular apertures. Preferably, the attachment apertures are defined by a mesh screen and may be square.

Suitably, the or each set of attachment apertures comprises a plurality of second attachment apertures spaced apart from the second edge toward the second edge. In use, an attachment member may be passed through one of
5 the second apertures which lie in a range of positions relative to the second edge and a second post can thus be connected to the panel at one of a number of positions.

Suitably, the or each set of attachment apertures
10 comprises at least one elongate second aperture extending longitudinally away from the second edge. In use, an attachment member may be passed through the second aperture in a range of positions relative to the second edge and a second post can thus be connected to the panel
15 at one of a number of positions.

The mounting means may be arranged to allow a variation of between 10cm and 100cm, preferably of between 20cm and 50cm in the position at which the second post can be
20 connected relative to the second edge of the panel. Preferably, in use, the mounting means is arranged to allow a variation of no more than 30cm, more preferably no more than 20cm, in the position of the second edge of the panel relative to a post connected thereto without first
25 disconnecting the panel.

The or each second aperture may comprise an elongate slot. The slot may have a length of between 5 and 30 cm, preferably of between 10 and 20cm. The or each set of
30 apertures may comprise two second apertures which comprise slots. Alternatively, the panel may comprise a plurality of apertures in place of one or more elongate slots. Such apertures may for example comprise circular apertures.

Preferably, the attachment apertures are defined by a mesh screen and may be square.

Suitably, the panel comprises a mounting member extending
5 from a first side to a second side thereof. The panel may comprise first and second mounting members each of which extends from a first side to a second side thereof.

Preferably, the panel comprises a mounting member
10 extending from a first side to a second side thereof and which is arranged, in use, to be carried by attachment means extending from said first and second posts. Suitably, a lower edge of said mounting member is arranged to be supported by the attachment means. Suitably, said
15 lower edge is arranged to rest on an attachment member.

Alternatively, the or each mounting member may comprise a set of attachment apertures.

20 The panel may comprise first and second mounting members which extend parallel to one another. Suitably, the first mounting member forms an upper, in use, edge of the panel. Suitably, the second mounting member is located toward a lower, in use, edge of the panel.

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The panel may comprise a frame, preferably a metal frame, forming part of the guard means. Suitably, the frame comprises an upper edge comprising a mounting member, preferably a first mounting member, and uprights at the
30 first and second side edges of the panel. The frame may comprise a an upper edge comprising the first mounting member, a lower edge comprising a lower frame member, which suitably comprises the second mounting member, and

uprights extending therebetween at the first and second side edges of the panel.

Suitably, the panel comprises a screen. The screen may
5 provide the guard means. Suitably, the screen is carried
by the frame. Suitably, the screen comprises a mesh,
preferably a metal mesh. The guard means may comprise the
screen and the mounting members. Thus, in use, the guard
means may provide protection against objects being dropped
10 through the panel as well as against workers falling.
Alternatively, the panel may comprise an open panel and
the guard means may simply comprise rails, which may
consist of the mounting members, to protect against
workers falling. Alternatively, the guard means may
15 simply comprise a mesh screen which may be carried by a
frame.

The screen may comprise a mesh and the attachment
apertures may be defined by the mesh and preferably by the
20 mesh and the first mounting member.

Suitably, the panel comprises one or more kick plates.
The panel may comprise two kick plates. Suitably, the or
each kick plate comprises a substantially solid panel.
25 Suitably, the or each kick plate is moveable. The or each
kick plate is suitably moveable relative to the remainder
of the panel. Preferably, the or each kick plate is
slidably connected to another part of the panel,
preferably to the frame. Alternatively, the or each kick
30 plate may be pivotally connected to the frame.

Suitably, in use, the or each kick plate can be moved to
adjust the distance between the lowermost part of the kick

plate and a beam to which a barrier comprising the panel is mounted.

Suitably, in use, the or each kick plate can be moved
5 upwardly away from a beam to which a barrier comprising the panel is mounted and fixed in place while a concrete floor is poured. Thus the barrier need not be removed in order for the floor to be poured. The panel may thus
10 continue to provide protection for workers while a floor is poured.

Suitably, in use, the kick plates are arranged to be spaced less than 5cm, preferably less than 2cm above a concrete floor once said floor is laid. In use, the kick
15 plates may thus substantially prevent objects being knocked off the floor onto objects or persons below.

The provision of a sliding kick plate and/or of two kick plates per panel may allow the panels to be overlapped
20 such that the kick plates can be moved. Suitably, in use, the panels overlap such that one kick plate of one panel overlaps with one kick plate of an adjacent panel.

According to a second aspect of the present invention
25 there is provided a barrier comprising one or more panels according to the first aspect and two or more posts to which the panel or panels are mounted.

Preferably, the barrier comprises a plurality of panels
30 and a plurality of posts. Suitably, each panel overlaps with an adjacent panel.

Suitably, the barrier comprises one more post than it does panels. Suitably, each post, other than those at the ends of the barrier, carries two panels.

- 5 The barrier may further comprise one or more guard rails. The barrier may comprise a top guard rail and/or a mid guard rail. Preferably, the barrier comprises two substantially parallel guard rails.
- 10 Suitably, the barrier comprises one ore more guard rails mounted to the posts on opposed sides to the panel(s). Suitably, the panel(s) are mounted to the posts on an inward side of a building and the guard rail(s) on an outward side.
- 15
- Suitably, the barrier is arranged such that the panel(s) can be detached from the posts while the guard rail(s) remain attached to the posts. In use, when the time comes to install the cladding of a building structure the
- 20 panel(s) may thus be removed to allow construction workers easier access while the guard rails may remain in place to protect the workers.

Suitably, each post is provided with fixing means to which

25 the guard rail(s) can be connected.

Each fixing means may comprise a pin arranged to pass through a mounting aperture in a guard rail. Suitably, the pin is fixedly connected to the post.

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Suitably, each fixing means comprises a retaining member for restricting removal of the pin from the mounting aperture. Suitably, the retaining member comprises a

latch. Suitably, the latch is pivotable relative to the pin such that it can extend either substantially axially relative to the pin or substantially perpendicularly relative to the pin. The latch may thus be pivoted to
5 allow installation and securement of the guard rail.

The guard rail(s) may comprise telescopic rails such that their length can be adjusted.

10 Suitably, each post is arranged to locate into a socket provided to a building framework. Suitably, each socket is welded to a beam. Alternatively, or in addition, each post may be arranged to locate into a socket of a connector which itself locates into a socket provided to a
15 building framework.

Each post may be arranged to be secured to a socket and/or connector such that it can be retained in place. Each post may comprise means for automatically securing it in
20 place when located into a socket.

Suitably, each post comprises attachment means for connecting to the panel.

25 Suitably, the attachment means is arranged such that it can connect the post to two overlapping panels.

Each post may comprises first and second attachment means for connecting to attachment apertures of first and second
30 sets of the panel respectively. Preferably, each post comprises only one attachment means.

Preferably, each post comprises attachment means comprising an attachment member for supporting a panel. Suitably, the attachment member comprises a bracket.

5 Suitably, said bracket is arranged to pass through an aperture defined by the first mounting member and mesh screen of the panel and to support said mounting member. Suitably, the bracket is arranged such that it can carry two panels in such a manner.

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Suitably, the bracket comprises two notches each arranged to receive and support a first mounting member of a panel. Suitably, in use, a mounting member of each of two panels sits in a notch of the bracket.

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Suitably, the attachment means further comprises a retaining member for retaining a panel in a position in which it is supported by the attachment member.

20 Suitably, the retaining member comprises a latch. Suitably, the latch is biased, preferably spring biased, towards a position in which it engages the first mounting member to retain it supported by a bracket.

25 Alternatively, each attachment means may comprise a pin arranged to pass through an attachment aperture in a panel. Suitably, the pin is arranged to pass through an aperture in a mounting member of the panel. Suitably, the pin is fixedly connected to the post.

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Suitably, each attachment means comprises a retaining member for restricting removal of the pin from the aperture.

Suitably, the retaining member comprises a latch. Suitably, the latch is pivotable relative to the pin such that it can extend either substantially axially relative to the pin or substantially perpendicularly relative to the pin. In the former position the latch may fit through the attachment aperture of a panel and the aperture may thus pass over the pin. In the latter position the latch may not fit through the aperture and the pin may thus be prevented from being removed from the panel.

The post may be connected to a panel such that the panel can move relative to the axis of the post. The position of the panel may thus be adjusted once connected to the post to fit the barrier around parts of a building framework and/or to adjust its overlap with other panels.

Suitably, the panel may be arranged to move no more than 30cm, preferably no more than 20cm relative to the axis of the post without detaching the panel from the post. Thus, the panel may not be able to move enough to create a gap through which a person could fall.

The barrier may employ panels comprising elongate attachment apertures. The provision of a plurality of elongate apertures may allow for fine adjustments to panel overlap to be made simply by moving panels while connected to the posts. For larger scale control of the overlap the panels and post may be connected using an alternate aperture.

The barrier may comprise a connector for each post wherein each connector comprises a stem for locating into a socket

attached to a beam of a building framework and an arm arranged to extend therefrom transverse to the stem and which carries a socket member having a socket arranged to receive a post.

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The connector may comprise an arm which is moveable relative to the stem.

The stem may carry fixing means for fixing the arm thereto. For example, the stem may comprise a clamp. Suitably, the stem comprises a first clamp member to which a second clamp member can be secured with the arm located therebetween.

10 Suitably, in use, the arm extends substantially perpendicularly relative to the axis of the stem.

Suitably, the socket member comprises a tube. Suitably, in use, the axis of the tube is arranged to extend substantially parallel to the axis of the stem. Suitably, the tube axis is arranged to extend substantially perpendicularly relative to the axis of the arm.

Suitably, the connector is arranged to allow a barrier to be erected at a leading edge of a floor of a building structure when said edge lies forward of the leading edge of a beam to which the barrier is connected.

Suitably, the fixing means is arranged such that the arm can be fixed in a number of positions such that the distance between the socket member and stem can be varied. The connector may thus be suitable for use with building structures having varying distances between the leading

edge of a floor and the leading edge of a beam to which the connector is mounted.

The connector may further comprise one or more restraints
5 for adding rigidity to the barrier and/or securing it in place relative to a beam.

Suitably, a restraint is arranged to extend from the base of a socket member.

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The base of the socket member may comprise attachment means to which a restraint can be attached.

Suitably, in use, a restraint extends between the socket
15 member and the beam. The restraint may thus brace the connector and help support the weight of the barrier.

According to a third aspect of the present invention there is provided a barrier assembly for forming a barrier, said
20 assembly comprising one or more panels according to the first aspect and two or more posts to which the panel or panels can be mounted.

Suitably, the barrier assembly further comprises one or
25 more guard rails.

Suitably, the barrier assembly further comprises one or more connectors.

30 Suitably, the barrier assembly may comprise any feature as described in relation to the barrier of the second aspect.

According to a fourth aspect of the present invention there is provided a panel for a barrier, which panel comprises guard means extending between first and second side edges of the panel and mounting means for connecting
5 the panel to first and second posts, wherein the panel comprises one or more kick plates forming a lower, in use, part of the panel and which are moveable relative to the remainder of the panel.

10 The panel may comprise two kick plates. Suitably, each kick plate is moveable. Preferably, each kick plate is moveable relative to the remainder of the panel. Preferably, the panel comprises one kick plate.

15 Suitably, the or each kick plate comprises a substantially solid panel. The or each kick plate may comprise a substantially solid panel at a lower part thereof and a mesh panel at an upper part thereof.

20 Preferably, the or each kick plate is slidable relative to the remainder of the panel. The panel suitably comprises a frame to which the or each kick plate is connected. The or each kick may be pivotally or preferably slidably connected to the frame.

25 Suitably, in use, the or each kick plate can be moved to adjust the distance between the lowermost part of the kick plate and a beam to which a barrier comprising the panel is mounted.

30 Suitably, the panel comprises fixing means to fix the kick plate in a desired position.

Suitably, in use, the or each kick plate can be moved upwardly and suitably secured in an upward position away from a beam to which a barrier comprising the panel is mounted and fixed in place while a concrete floor is poured. Thus the barrier need not be removed in order for the floor to be poured. The panel may thus continue to provide protection for workers while a floor is poured.

Suitably, in use, the kick plates are arranged to be spaced less than 5cm, preferably less than 2cm above a concrete floor once said floor is laid. In use, the kick plates may thus substantially prevent objects being knocked off the floor onto objects or persons below.

The provision of two kick plates per panel and/or of a sliding kick plate may allow the panels to be overlapped such that the kick plates can be moved. Suitably, in use, the panels overlap such that one kick plate of one panel overlaps with one kick plate of an adjacent panel.

The panel may thus be arranged such that it can remain in place during the whole of the construction process. The panel may thus allow all required activities to be carried out with safety protection regardless of the floor construction methodology or finished thickness.

The panel may comprise any feature as described in relation to the first aspect.

According to a fifth aspect of the present invention there is provided a barrier comprising one or more panels comprising guard means extending between first and second side edges of the panel and one or more kick plates

forming a lower, in use, part of the panel and which are moveable relative to the remainder of the panel, and two or more posts to which the panel or panels are mounted.

- 5 The panel or panels may be fixedly mounted to posts. Preferably, the panel or panels are removably mounted to posts.

The panel may comprise any feature as described in
10 relation to the fourth aspect. Suitably, the barrier comprises one or more panels according to the fourth aspect.

Preferably, the barrier comprises a plurality of panels
15 and a plurality of posts. Suitably, each panel overlaps with an adjacent panel.

The barrier may comprise one or more guard rails.

- 20 The barrier may comprise one or more connectors.

The barrier may comprise any feature as described in relation to the second aspect.

- 25 According to a sixth aspect of the present invention there is provided a barrier assembly for forming a barrier, said assembly comprising one or more panels according to the fourth aspect and two or more posts to which the panel or panels can be mounted.

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The barrier assembly may further comprise one or more guard rails.

The barrier assembly may further comprise one or more connectors.

Suitably, the barrier assembly may comprise any feature as
5 described in relation to the barrier of the fifth aspect.

According to a seventh aspect of the present invention there is provided a connector for connecting a post to a beam of a building framework, said connector comprising a
10 stem for locating into a socket attached to a beam and an arm arranged to extend therefrom transverse to the stem and bearing a socket member having a socket arranged to receive a post.

15 The connector may comprise an arm which is moveable relative to the stem.

The connector may comprise any feature as described in relation to the connector of the second aspect.

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According to an eighth aspect of the present invention there is provided a barrier comprising one or more panels, two or more posts to which the panels are mounted and two or more connectors according to the seventh aspect to
25 which the posts are connected.

The connector may comprise any feature as described in relation to the connector of the second aspect.

30 The barrier may comprise any panel or post feature as described in relation to the barrier of the second or fifth aspect.

According to a ninth aspect of the present invention there is provided a barrier assembly for forming a barrier, said assembly comprising one or more panels and two or more posts to which the panel or panels can be mounted and two
5 or more connectors according to the seventh aspect to which the posts can be connected.

The connector may comprise any feature as described in relation to the connector of the second aspect.

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The barrier assembly may comprise any panel or post feature as described in relation to the barrier assembly of the third or sixth aspect.

15 According to a tenth aspect of the present invention there is provided a barrier comprising one or more panels, one or more guard rails and two or more posts to which the panels and guard rails are separately mounted.

20 The barrier may comprise a top guard rail and/or a mid guard rail. Preferably, the barrier comprises two substantially parallel guard rails.

Suitably, the barrier comprises one or more guard rails
25 mounted to the posts on opposed sides to the panel(s). Suitably, the panel(s) are mounted to the posts on an inward side of a building and the guard rail(s) on an outward side.

30 The barrier may further comprise one or more connectors according to the seventh aspect.

Suitably, the barrier is arranged such that the panel(s) can be detached from the posts while the guard rail(s) remain attached to the posts. In use, there may thus be times when the barrier comprises only the posts and guard
5 rail(s).

The barrier may comprise any panel or post feature as described in relation to the barrier of the second, fifth or eighth aspect.

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According to an eleventh aspect of the present invention there is provided a barrier assembly comprising one or more panels, one or more guard rails and two or more posts to which the panels and guard rails are arranged to be
15 separately mounted.

The barrier assembly may comprise any feature as described in relation to the barrier of the tenth aspect.

20 The barrier assembly may further comprise one or more connectors according to the seventh aspect.

The barrier assembly may comprise any panel or post feature as described in relation to the barrier assembly
25 of the third, sixth or ninth aspect.

According to a twelfth aspect of the present invention there is provided a method of erecting a barrier comprising connecting first and second posts to a beam of
30 a building framework and connecting a panel to said posts.

Suitably, the method comprises locating said first and second posts into sockets attached to a beam of a building

framework. Suitably, said sockets are welded to said beam.

Alternatively, the method may comprise locating connectors
5 into sockets attached to a beam of a building framework
and locating first and second posts into sockets of the
connectors.

Suitably, the connectors comprise connectors according to
10 the seventh aspect.

Suitably, the barrier comprises a panel according to the
first aspect. The barrier may comprise a panel according
to the fourth aspect.

15

Suitably, the barrier comprises a barrier according to the
second aspect. The barrier may comprise a barrier
according to the fifth aspect. The barrier may comprise a
barrier according to the eighth aspect. The barrier may
20 comprise a barrier according to the tenth aspect.

The barrier may comprise a barrier assembly according to
the third, sixth, ninth or eleventh aspect.

25 Suitably, the method comprises erecting a barrier
comprising two or more panels. Suitably, the method
comprises connecting panels to posts such that the panels
overlap one another. Suitably, the method comprises
altering the degree of overlap to best fit the panels
30 between the posts and/or around features, for example
columns, of a building framework.

According to a thirteenth aspect of the present invention there is provided a method of forming a floor of a building structure wherein the method comprises installing a barrier by locating posts into sockets attached to a beam of a building framework and connecting a panel, which panel comprises guard means extending between first and second side edges of the panel and mounting means for connecting the panel to first and second posts and one or more kick plates forming a lower, in use, part of the panel and which are moveable relative to the remainder of the panel, to said posts and pouring a concrete floor whilst the barrier remains is installed, wherein the kick plates are located away from the beam during the pouring of the floor and moved towards the beam and floor once the floor is laid.

Suitably, the barrier comprises a barrier according to the fifth aspect. The barrier may comprise a barrier according to the second aspect. The barrier may comprise a barrier according to the eighth aspect. The barrier may comprise a barrier according to the tenth aspect.

Suitably, the barrier is installed according to the method of the twelfth aspect.

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The present invention will now be illustrated by way of example with reference to the accompanying drawings in which:

30 Figure 1 is a front view of a panel;

Figure 2 is a side view of a post;

Figure 3 is a rear (external to building) view of a barrier comprising one panel;

Figure 4 is a rear view of a barrier comprising one panel
5 in an alternate configuration to that of Figure 3;

Figure 5 is a rear view of a barrier comprising two panels;

10 Figures 6a to 6e are end views illustrating the installation of a barrier to a building structure and its manipulation during the subsequent laying of a floor;

Figure 7 is a detailed view of the attachment means of a
15 post;

Figures 8a to 8f are end views illustrating the installation of an alternative embodiment of a barrier to a building structure;

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Figure 9 is a side view of an alternative embodiment of a post;

Figure 10 is a front view of an alternative embodiment of
25 a panel;

Figure 11 is an end view of a barrier comprising the post and panels of Figures 9 and 10;

30 Figures 12a to 12c are perspective views showing an alternative embodiment of a barrier in various configurations;

Figure 13 is a perspective view showing the barrier of Figure 12 incorporating guard rails;

Figure 14 is a front view showing the barrier of Figure 13
5 with the panel removed; and

Figure 15 is a plan view of the barrier of Figure 14.

As illustrated by Figure 1 a panel 1 for forming a barrier
10 3 comprises mounting means 7 by which it can be connected to a post 5.

The mounting means 7 comprises a first metal mounting member 9 comprising a first set of attachment apertures
15 located at the upper, in use, edge of the panel 1. The mounting means further comprises a second metal mounting member 11 comprising a second set of attachment apertures located towards the lower, in use, edge of the panel.

20 The mounting means 7 comprises first attachment apertures 13 located towards a first side edge 15 of the panel and defined in the first and second mounting members 9, 11.

The mounting means 7 further comprises second attachment
25 apertures 17 located towards a second side edge 19 of the panel and defined in the first and second mounting members 9, 11.

The first and second attachment apertures 13, 17 are each
30 provided in two sets of pairs with the locations of those in the first mounting member 9 aligned with those of the second mounting member 11 such that the panel 1 can be

connect to substantially vertically extending posts as illustrated by Figures 3 and 4.

Each attachment aperture comprises an elongate slot
5 extending lengthwise along the respective attachment member. Each slot has a length of 16.5cm.

The panel 1 comprises a frame 21 with the first and second mounting members 9, 11 forming upper and lower, in use,
10 edges of the frame. Metal uprights 23, 25 form side edges of the frame 21 and panel 1. Mounted to the frame 21 is a wire mesh screen 27. The mounting members 9, 11 and screen 27 each extend between first and second side edges 15, 19 of the panel and thus provide guard means for
15 protecting workers against falling.

Hingedly connected to the lower edge of the frame 21 (provided by the second mounting member 11) are two kick plates 29, 31. Each kick plate 29, 31 comprises a
20 generally "L" shaped solid metal panel. The leg of the "L" is arranged to allow the kick plate 29, 31 to be rotated, in use, to abut the screen 27 without being obstructed by attachment means 33 connecting the panel 1, in use, to a post 5.

25

The post 5 comprises a tubular pole 35 having attachment means 33 connected thereto. As illustrated by Figure 7 the attachment means 33 comprise attachment members 37, 39 comprising pins 38 for extending through attachment
30 apertures 13, 17 in the first and second mounting members 9, 11.

Each attachment means 33 further comprises a retaining member comprising a latch 40 for retaining the pin 38 in position with the panel 1 and post 5 connected.

- 5 The latches 40 are mounted to the pins 38 and can pivot relative thereto to extend axially relative to the pin or perpendicular to the pins axis. In the former position the latch 40 can pass through the apertures 13, 17 of the panel and in the latter it can not.

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As illustrated by Figures 3 and 4 a barrier 3 comprises posts 5 installed into sockets 41 mounted to a beam 43 of a building structure and having a panel 1 connected thereto.

15

The spacing of the sockets 41 may vary depending on the construction site. However, the arrangement of the attachment apertures 13, 17 allows the same panel and posts to be used with different socket spacings.

20

As illustrated in Figure 3 the use of the apertures furthest from side edges 15, 19 can allow the panel to be attached to posts inserted into closely spaced sockets 41. The use of apertures closest to side edges 15, 19 can
25 allow the panel to be attached to post inserted into sockets 41 spaced further apart as illustrated by Figure 4.

The fact the apertures are elongate slots may allow for
30 simple installation as a construction worker need only choose which of two slots each post should be connected to, small adjustments can then be made by sliding the panel relative to the post. This design may also allow

the panel to compensate for discrepancies in the spacing of the sockets as the positioning of the post relative to the aperture need not be within strict limits.

- 5 The slots are however of limited length. This may ensure that should the panel 1 be knocked, in use, it can not slide relative to the post 5 by an amount sufficient to create a gap in a barrier through which a person could fall.

10

In an alternative embodiment (not illustrated) each slot may instead be replaced by a plurality of discrete apertures. Whilst these may not allow for such convenient fine adjustment they may allow the panel to be used with
15 posts having a range of separations there between.

Figure 5 best illustrates the arrangement of panels 1 and posts 5 to form a barrier 3. Adjacent panels 1a and 1b share a common post 5a. The barrier 3 further comprises
20 two other posts 5b, 5c supporting the panels 1a, 1b respectively. The panels 1a, 1b overlap such that they form an uninterrupted barrier. As the slots are elongate the panels may slide relative to the posts. However, whilst this may allow adjustment to compensate for
25 irregularities in socket spacing or to fit against building parts, such as columns, the panels may remain overlapping thus forming an unbroken barrier 3.

Figures 6a to 6e illustrate the installation of a barrier
30 3 and its use. First a part of a building structure comprising a beam 43 having sockets 41 mounted thereto is assembled (Fig 6a).

Following this posts 5 are located into the sockets 41 with the attachment means 33 facing into the building structure (Fig 6b). A panel 1 is then connected to the posts from the inside of the building structure (Fig 6c).

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The pins and latches of the attachment means 33 are passed through apertures 13, 17 (shown in Figures 3 and 4). A further like panel 1 can also be connected to each of the posts 5 in this manner if desired depending on the length
10 of barrier 3 required. The latches are then rotated to prevent the pins being withdrawn from the apertures and thus secure the panel or panels in place.

The kick plates 29, 31 of the panel are then lifted and
15 secured in a lifted position. Following which decking 45 is laid down over the beam 43 and notched around sockets 41 (Fig 6d). An edge trim is also located at the leading edge of the decking.

Concrete is then poured onto the decking 45 to the level
20 of the upper edge of socket 41 to create a floor 47. The kick plates 29, 31 are then released and returned to their position below the screen (Fig 6e). The kick plates 29, 31 then lie within 2cm of the floor 47 and can thus
25 substantially prevent objects being knocked from the floor onto persons or property below.

After the concrete floor 47 is poured and cured, the barrier 3 may remain in place to protect all personnel
30 subsequently involved in working on the construction floor until such time that a permanent horizontal barrier or cladding screen is installed. As the position of the barrier 3 is nominally inside of the floor edge 47a, it

will not impede the permanent screen installation. When appropriate, the final removal of the barrier 3 is achieved by lifting barrier sections 3 or firstly removing the panels 1 from the posts 5 by means of release of the
5 latches, then by lifting the posts 5 from the sockets 41 that remain within the concrete floor 47 depth. No up-stand or trip hazard is left behind, and the whole operation can be carried out from the same floor as that on which the barrier 3 is positioned with no requirement
10 for access from below the finished floor 47.

The fact the kick plates 29, 31 can be lifted may mean it is not necessary to remove the panels to lay a floor and the barrier 3 may thus provide increased safety for
15 construction workers. Additionally, the fact that the attachment means 33 are connected to the post 5 and do not for example comprise loose bolts reduces the risk of objects being dropped onto persons or property below. Further, this arrangement may allow a barrier to be
20 erected more expediently thus improving workers safety.

The installation method of Figures 6a to 6e may be appropriate where the leading edge 47a of the floor lies forward of the leading edge of the beam, by a limited
25 degree. However, if there is a more substantial distance between the leading edges and/or if construction workers need to work up to the leading edge of the floor it may be preferable to locate the barrier at the leading edge of the floor.

30

In this case the barrier components of Figures 1 and 2 may be employed together with connectors 50 to locate the barrier forward of the leading edge of the beam.

Figures 8a to 8f illustrate the installation of a barrier at a position corresponding to the leading edge 47a of a future floor 47 (shown in dotted outline).

5

As best illustrated by Figure 8e posts 5 (one shown) to which panels (not shown) can be attached are connected to a beam 43 of a building structure via connectors 50 (one shown). Each connector 50 comprises a stem 51 which bears
10 a first clamp member 52 and a second clamp member 53, an arm 54 and a socket member 55 defining a socket for receiving a post 5.

To install a barrier at the future leading edge 47a of a
15 floor 47 a part of a building structure comprising a beam 43 having sockets 41 mounted thereto is assembled (Fig. 8a). Following this the stem 51 of connector 50 is located into socket 41 (Fig. 8b). The arm 54 having socket member 55 mounted thereto is located into the first
20 clamp member and manoeuvred until the socket member 55 is located just beyond the intended leading edge of the floor (Fig. 8c). The second clamp member 53 is then located over the arm 54 and secured to the first clamp member 52 to clamp the arm 54 therebetween (Fig. 8d).

25

A post 5 is then located into the socket of socket member 55 and secured with a fixing pin (not shown) passing through apertures 55a in the socket member and in the post (not shown) (Fig. 8e). If needed a restraint 56 can then
30 be attached to the socket member 55 to brace against the beam 43 if there is a large cantilever (i.e. a significant distance between intended floor leading edge and the beam

leading edge) (Fig. 8f). Thus, the weight of the barrier may be better supported.

Finally panels (not shown) are mounted to the posts to
5 form the barrier.

As described, the barrier components comprising the posts and panels of Figures 1 and 2 may be employed with connectors 50 to erect a barrier according to the method
10 of Figures 8a to 8f. The only distinction being that the posts 5 have apertures (not shown) to allow them to be secured to the connectors.

In an alternative embodiment illustrated by Figures 9 to
15 11 a barrier mounted at the leading edge of a floor is of simpler construction than that of Figures 1 to 7. The panels in particular are of simpler construction. The method of erection may though be as illustrated by Figures 8a to 8f. The connector 50 of Figure 11 corresponds to
20 that of Figures 8a to 8f.

As best illustrated by Figure 10, the panel 101 simply comprises a metal frame 121 with a mounting member 109 and lower frame member 111 forming upper and lower edges of
25 the frame and of the panel 101. These are connected by uprights 123, 125 forming side edges of the frame and of the panel 101. Mounted to the frame 121 is a wire mesh screen 127.

30 As best illustrated by Figure 9, each post 105 comprises a bracket 106 having first and second curved notches 107, 108 each arranged to receive the mounting member 109 of a

panel. The bracket 106 thus comprises attachment means of the post 105.

The mounting means of the panel 101 comprises the mounting
5 member 109 and mesh screen 127. The bracket 106 supports mounting member 109 to bear the weight of the panel 101. The mesh screen 127 defines apertures between itself and the mounting member 109 which serve as attachment apertures 113, 117 and limit movement of the panel 101
10 relative to the post 105.

As illustrated by Figure 11, (which omits frame side members 123, 125 for clarity) a first panel 101A can be installed onto the bracket 106 of a post 105. The panel
15 is located such that, the bracket passes through an aperture in the first panel and the panel mounting member 109 sits in the notch 107 lying closet to the post. A second panel 101B can then be installed onto the bracket 109 such that the first and second panels overlap and the
20 bracket passes through an aperture in the second panel and the panel mounting member 109 sits in the notch 108 lying farthest from the post.

Figures 12 to 15 illustrate an alternative barrier 203.
25 As best illustrated by Figures 12a to 12c, the panel 201 generally corresponds to that of the embodiment of Figures 9 to 11 but differs in that it further comprises a kick plate 229. The kick plate 229 is slidably connected to the frame such that it can project below the lower edge of
30 a mesh screen 227 of the panel 201.

The panel 201 comprises a metal frame 221 with a mounting member 209 forming an upper edge of the frame and uprights

223, 225 forming side edges of the frame and of the panel 201. The mesh screen 227 is mounted to this frame. The frame 221 carries connection means 240 to which the kick plate 229 is slidably connected.

5

The kick plate 229 itself comprises a solid panel 242 at a lower part thereof and a mesh screen 244 at an upper part thereof. The kick plate 229 comprises connection means (not shown) by which it is slidably connected to the rest
10 of the panel 201.

As shown by Figure 12a when decking 45 has been laid but the floor slab not yet poured the kick plate 229 may extend below the uprights 223, 225 lower edges to minimise
15 the risk of objects being kicked from the floor onto persons or property below.

To allow a concrete floor to be poured the kick plate 229 can be lifted and fixed in a position away from the
20 decking as illustrated by Figure 12b.

Once the floor 47 is poured the kick plate 229 can be lowered to sit immediately above the floor level as illustrated by figure 12c to once again minimise the risk
25 of objects being kicked from the floor onto persons or property below.

As illustrated best by Figure 13 the mounting of the panel 201 to posts 205 is substantially the same as that
30 described in relation to the embodiment of Figures 9 to 11. However the attachment means further comprises a retaining member 246 which comprises a latch. This retaining member is spring biased to locate above the

mounting members 209 of the panels 201 to retain them in a position in which they are held by a bracket 206 of the attachment means. The retaining member thus reduces the risk of the panel 201 accidentally being knocked from the
5 post 205.

The barrier 203 has been illustrated with the posts 205 connected directly to sockets 41 mounted to a beam 43 of a building structure but in other embodiments (not
10 illustrated) the posts may be connected to sockets via connectors. The posts and sockets comprise locking means (not shown) comprising a slot and pin arrangement such that the posts are automatically secured in place when located into the sockets.

15

As shown by Figure 13, the barrier 203 further comprises top and mid guard rails 250, 252 (not shown in Figures 12a to 12c). These are mounted to the posts 205 by fixing means which comprise pins 260, 262 and latches (not
20 shown). The operation of the pins and latches is substantially as described in relation to the attachment means of the embodiment of Figure 7.

In use, the panel 201 may afford good protection and it
25 may be desirable to have it in place while many construction operations are performed. However, in order to install the cladding of a building structure it may be necessary for construction workers to work close to the edge of the building from inside the building and the
30 panel 201 may hinder this.

Accordingly, the guard rails 250, 252 and panel 201 are connected to the post 205 such that the panel 201 can be

removed whilst leaving the guard rails 250, 252 in position. As illustrated by Figures 14 and 15 the guard rails 250, 252 can thus continue to provide a barrier once the panels are removed. Construction workers may thus be
5 afforded good access to a floor 47 edge 47a whilst being protected by the barrier 203.

It will be appreciated that preferred embodiments of the present invention may provide a safety barrier which can
10 be erected expediently and which is adaptable to fit to various construction sites and/or parts of a construction site. Preferred embodiments of the present invention may also provide for safe working by use of safety barriers.

15 Preferred embodiments of the present invention may allow a barrier to be installed and removed without the need to access connectors from a floor below. They may also allow flexible positioning of handrail standards to provide a continuous barrier. Further, they may provide alternate
20 positions of edge protection relative to a beam and may also allow access to parts of a structure near the panel base while the panel remains installed.

Attention is directed to all papers and documents which
25 are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

30

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or

process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

5 Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each
10 feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any
15 novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS:

1. A panel for a barrier, which panel comprises guard means extending between first and second side edges of the panel and mounting means for connecting the panel to first and second posts, wherein the panel comprises one or more kick plates forming a lower, in use, part of the panel and which are moveable relative to the remainder of the panel.
2. A panel according to claim 1, wherein the or each kick plate is slidable relative to the remainder of the panel.
3. A panel according to claim 2, wherein the panel comprises a frame to which the or each kick plate is slidably connected.
4. A panel according to any preceding claim, wherein the mounting means comprises a set of attachment apertures comprising one or more first apertures, for receiving attachment means to connect to said first post, and which first aperture or apertures are arranged to provide a number of positions relative to the first edge of the panel at which the first post can be connected, and further comprising at least one second attachment aperture for receiving attachment means to connect to the second post.
5. A panel for a barrier, which panel comprises guard means extending between first and second side edges of the panel and mounting means for connecting the panel to first and second posts, wherein the mounting means

comprises a set of attachment apertures comprising one or more first apertures, for receiving attachment means to connect to said first post, and which first aperture or apertures are arranged to provide a number of positions relative to the first edge of the panel at which the first post can be connected, and further comprising at least one second attachment aperture for receiving attachment means to connect to the second post.

10

6. A panel according to claim 4 or 5, wherein the set of attachment apertures comprises one or more second apertures, for receiving attachment means to connect to said second post, and which second aperture or apertures are arranged to provide a number of positions relative to the second edge of the panel at which the second post can be connected.

15

7. A panel according to any of claims 4 to 6, wherein the panel comprises a frame forming part of the guard means and which comprises an upper edge comprising a mounting member.

20

8. A panel according to any of claims 4 to 7, wherein the panel comprises a mesh screen and the attachment apertures are defined by the mesh or by the mesh and a first mounting member.

25

9. A barrier comprising one or more panels comprising guard means extending between first and second side edges of the panel and one or more kick plates forming a lower, in use, part of the panel and which are moveable relative to the remainder of the panel, and

30

two or more posts to which the panel or panels are mounted.

10. A barrier according to claim 9, wherein the panel or
5 panels comprise panel(s) according to any of claims 1
to 8.
11. A barrier comprising one or more panels according to
claim 5 or any of claims 6 to 8 when dependent thereon
10 and two or more posts to which the panel or panels are
mounted.
12. A barrier according to claim 10 or 11, wherein the
barrier comprises one or more guard rails.
- 15 13. A barrier according to claim 12, wherein the barrier
comprises one or more guard rails mounted to the posts
on opposed sides to the panel(s).
- 20 14. A barrier according to claim 12 or 13, wherein the
barrier is arranged such that the panel(s) can be
detached from the posts while the guard rail(s) remain
attached to the posts.
- 25 15. A barrier according to any of claims 10 to 14, wherein
each post comprises attachment means arranged such
that it can connect the post to two overlapping
panels.
- 30 16. A barrier according to claim 15, wherein each post
comprises attachment means comprising an attachment
member which comprises a bracket for supporting a
panel.

17. A barrier according to claim 16, wherein the bracket comprises two notches each arranged to receive and support a first mounting member of a panel.
- 5 18. A barrier according to claims 16 or 17, wherein the attachment means further comprises a retaining member for retaining a panel in a position in which it is supported by the attachment member.
- 10 19. A barrier according to any of claims 10 to 18, wherein the barrier comprises one or more connectors.
20. A barrier according to claim 19, wherein the barrier comprises a connector for each post and wherein each
15 connector comprises a stem for locating into a socket attached to a beam and an arm arranged to extend therefrom transverse to the stem and which carries a socket member having a socket arranged to receive a post.
- 20 21. A barrier assembly for forming a barrier, said assembly comprising one or more panels according to any of claims 1 to 8 and two or more posts to which the panel or panels can be mounted.
- 25 22. A barrier assembly according to claim 21, wherein the barrier assembly further comprises one or more guard rails.
- 30 23. A barrier assembly according to claim 21 or 22, wherein the barrier assembly further comprises one or more connectors.

24. A connector for connecting a post to a beam of a building framework, said connector comprising a stem for locating into a socket attached to a beam and an arm arranged to extend therefrom transverse to the stem and bearing a socket member having a socket arranged to receive a post.
25. A connector according to claim 24, wherein the connector comprises an arm which is moveable relative to the stem.
26. A connector according to claim 24 or 25, wherein the stem carries fixing means for fixing the arm thereto.
27. A connector according to any of claims 24 to 26, wherein the connector is arranged to allow a barrier to be erected at a leading edge of a floor of a building structure when said edge lies forward of the leading edge of a beam to which the barrier is connected.
28. A connector according to any of claims 24 to 27, wherein the connector further comprises one or more restraints for adding rigidity to a barrier and/or securing it in place relative to a beam.
29. A barrier comprising one or more panels, two or more posts to which the panels are mounted and two or more connectors according to any of claims 24 to 28 to which the posts are connected.

30. A barrier according to claim 29, wherein the barrier comprises a barrier according to any of claims 10 to 20.
- 5
31. A barrier assembly for forming a barrier, said assembly comprising one or more panels and two or more posts to which the panel or panels can be mounted and two or more connectors according to any of claims 24
- 10 to 28 to which the posts can be connected.
32. A barrier assembly according to claim 31, wherein the barrier assembly comprises a barrier assembly according to any of claims 21 to 23.
- 15
33. A barrier comprising one or more panels, one or more guard rails and two or more posts to which the panels and guard rails are separately mounted.
- 20 34. A barrier according to claim 33, wherein the barrier comprises one or more guard rails mounted to the posts on opposed sides to the panel(s).
- 25 35. A barrier according to claim 33 or 34, wherein the barrier is arranged such that the panel(s) can be detached from the posts while the guard rail(s) remain attached to the posts.
- 30 36. A barrier according to any of claims 33 to 35, wherein the barrier comprises a panel according to any of claims 1 to 8.

37. A barrier assembly comprising one or more panels, one or more guard rails and two or more posts to which the panels and guard rails are arranged to be separately mounted.
38. A barrier assembly according to claim 37, wherein the barrier assembly comprises a barrier assembly according to any of claims 21 to 23 or claim 31 or 32.
39. A method of erecting a barrier comprising connecting first and second posts to a beam of a building framework and connecting a panel to said posts.
40. A method according to claim 39, wherein the barrier comprises a panel according to any of claims 1 to 8.
41. A method according to claim 39 or 40 wherein the barrier comprises a barrier according to any of claims 10 to 20 or claim 29 or 30 or claims 33 to 36.
42. A method of forming a floor of a building structure wherein the method comprises installing a barrier by locating posts into sockets attached to a beam of a building framework and connecting a panel, which panel comprises guard means extending between first and second side edges of the panel and mounting means for connecting the panel to first and second posts and one or more kick plates forming a lower, in use, part of the panel and which are moveable relative to the remainder of the panel, to said posts and pouring a concrete floor whilst the barrier remains is installed, wherein the kick plates are located away

from the beam during the pouring of the floor and moved towards the beam and floor once the floor is laid.

5 43. A method according to claim 42, wherein the barrier comprises a barrier according to any of claims 10 to 20, or claim 29 or 30 or claims 33 to 36.

44. A method according to claim 43, wherein the barrier is
10 installed according to the method of any of claims 39 to 41.

45. A panel substantially as described herein with reference to any of the accompanying drawings.
15

46. A barrier substantially as described herein with reference to any of the accompanying drawings.

47. A barrier assembly substantially as described herein
20 with reference to any of the accompanying drawings.

48. A connector substantially as described herein with reference to any of the accompanying drawings.

25 49. A method of erecting a barrier substantially as described herein with reference to any of the accompanying drawings.

50. A method of forming a floor of a building structure
30 substantially as described herein with reference to any of the accompanying drawings.