Title: ADJUSTABLE SAFETY BARRIER SYSTEM

Abstract: The present invention provides a safety barrier for open-air floors, rooftops and openings from which an individual is at risk of falling from a height, such as windows and balconies. More specifically, the present invention relates to a safety barrier that can be pivotally adjusted between an open and closed position.
ADJUSTABLE SAFETY BARRIER SYSTEM

FIELD OF INVENTION

The present invention relates generally to a safety barrier for open-air floors of buildings under construction, rooftops and openings from which an individual is at risk of falling from a height, such as windows and balconies. More specifically, the present invention relates to a safety barrier that can be pivotally adjusted between an open and closed position.

BACKGROUND

In the construction of multiple-story buildings, both commercial and residential, considerable risk is present to craftsmen and others at the building site during various stages of construction. Specifically, there is considerable risk that workers may accidentally fall from an open-air floor and sustain a serious injury or even death. These concerns are especially high until exterior walls are installed around elevated floors and/or until a permanent bannister or safety barrier is installed on the outer perimeters of open-air floors, balconies, staircases and the like.

Understandably, there are important Occupational Health and Safety (OH&S) requirements that must be met at construction sites and the like, including the use of safety protection at locations where a risk is present that persons may fall. To satisfy such OH&S requirements, safety protection in the form of temporary safety barrier must exceed certain minimum lateral load requirements without experiencing permanent deformation or component failure. Numerous temporary safety rails have been designed to address these safety concerns. Over time, designs for safety rails have improved structurally.

Conventional safety barriers are typically modular systems that are adapted for temporary installation. Commonly, safety barriers are usually made up of individual sections, each section including longitudinally extending spaced rails that are secured in their relationship by uprights (stanchions) positioned at intervals along each section. Safety barrier systems can also be adjustable in length to guard platform perimeters of various lengths without the need of having to carefully align adjacent guide rail sections or fixed sectional components together. Various fixed structures may also impact on the configuration of the safety barrier system. For roof applications, for example, one or more sides of the roof may have a parapet that also requires a safety rail.
Whilst safety barrier systems are necessarily temporary and require assembly and disassembly, current designs are typically cumbersome, as they must be mounted and dismounted in situ; that is, after the open-air structure has been erected. They also require a coordinated effort from two or more individuals, which is not only labor-intensive, but it also poses safety concerns for those who are involved in the mounting, dismounting and/or repair of a safety rail system. For instance, mounting and dismounting a conventional safety barrier systems often requires a person on the outer perimeter of the open-air floor to access the point at which the safety barrier is temporarily secured and another person on the inner perimeter of the open-air floor to assist in the mounting and/or dismounting procedure.

Permanent barrier systems have also been employed for commercial and domestic use on the outer perimeter of windows and other passageways, primarily for the purpose of security; that is, for preventing unauthorized access to a room or building. However, such systems pose a real danger in emergency situations. For example, where there is an uncontrolled fire, the only safe passage to and from the burning building may be via a window to which a permanent barrier has been fixed, such that the only way to access the burning building would be to forcibly remove the barrier, which often takes considerable time, leaving those trapped in the building in real danger.

In light of the aforementioned problems in the art, there is an urgent need for a safety barrier system that is relatively easy to mount and dismount and that would allow for easy access beyond the safety barrier, particularly in time of need. The present invention solves or partly alleviates these problems in the art by providing a safety barrier system that can be easily adjusted between an open and closed position so as to provide access beyond the safety barrier when required.

**SUMMARY OF THE INVENTION**

In an aspect of the present invention, there is provided a safety barrier for an open floor or window, the safety barrier comprising:

(i) a base-plate adapted to be fixed to a structure located peripheral and adjacent to the open floor or window;

(ii) a guard;

(iii) a linkage pivotally mounted to the base-plate and guard about a pivot axis, wherein the guard is movable about the pivot axis relative to the base-plate between an open position,
allowing passage over the open floor or through the window, and a closed position preventing said passage; and

(iv) a locking means for securing the guard in the closed position.

In an embodiment, the guard comprises at least one stanchion.

In an embodiment, the guard comprises a stanchion having a first end pivotally mounted to the base-plate.

In an embodiment, the guard comprises a guard rail.

In an embodiment, the guard rail has a first end fixed to a first stanchion and a second end fixed to a second stanchion.

In an embodiment, the first and second stanchions are adjacent stanchions.

In an embodiment, the guard rail comprises (i) a first rail member fixed at one end to a first stanchion and (ii) a second rail member fixed at one end to a second stanchion, wherein the first rail member is connected at its opposite end to an opposite end of the second rail member and movable relative to the second rail member so as to allow the length of the guard rail to be adjusted between the first and second stanchions.

In an embodiment, the guard rail comprises (i) a first rail member fixed at one end to a first stanchion, (ii) a second rail member fixed at one end to a second stanchion, wherein the first rail member is connected at its opposite end to one end of an inner rail member and the second rail member is connected at its opposite end to the inner rail member, wherein the first and second rail members are movable relative to the inner rail member so as to allow the length of the guard rail to be adjusted between the first and second stanchions.

In an embodiment, the safety guard comprises a locking means for locking the first rail member to the second rail member.

In an embodiment, the safety guard comprises a locking means for locking the inner rail member to the first and/or second rail members.

In an embodiment, the linkage comprises an elongated member extending through an opening in the base-plate and through an opening in the stanchion, wherein the stanchion is movable about the pivot axis defined by the elongated member. In an embodiment, the elongated member is a pin.
In an embodiment, the guard is rotatable over about 180 degrees relative to the linkage (or base-plate).

In an embodiment, the locking means for securing the guard in the closed position is mounted to the base-plate. In another embodiment, the locking means for securing the guard in the closed position is mounted to the linkage.

In an embodiment, the guard comprises a kicker, the kicker comprising a first end fixed to a first stanchion and a second end fixed to a second stanchion.

In an embodiment, the guard comprises a plurality of kickers comprising:

(i) a first kicker comprising a fixed end and an open end, the fixed end connected to a first stanchion;

(ii) a second kicker comprising a fixed end and an open end, the fixed end connected to a second stanchion; and

(iii) a third kicker having a first end and a second end;

wherein the first end of the third kicker is releasably connected to the open end of the first kicker and the second end of the third kicker is releasably connected to the open end of the second kicker, wherein the third kicker is movable relative to the first and second kickers so as to allow the combined length of the kickers to be adjusted between the first and second stanchions.

In an embodiment, the base-plate comprises an attachment means for fixing the base-plate to the structure at a position that is peripheral and adjacent to the open floor or window.

In an embodiment, the base-plate comprises an opening through which the attachment means can be accessed.

In an embodiment, where the safety guard is in the closed position, access to the attachment means is obstructed.

In an embodiment, the locking means comprises a elongated member, a first opening through the base-plate and a second opening through a stanchion pivotally mounted to the base-plate, wherein locking means maintains the stanchion in a locked position when the elongated member is passed through the first opening and the second opening. In an embodiment, the elongated member is a pin.
In an embodiment, the base-plate comprises a flange extending upwardly from said base-plate, wherein said flange is adapted to receive the linkage and the locking means.

In another aspect, there is provided a safety barrier for an open floor or window, the safety barrier comprising:

(i) a base-plate adapted to be fixed to a structure located peripheral and adjacent to the open floor or window;

(ii) a guard connected to at least one stanchion;

(iii) a linkage pivotally mounted to the base-plate and stanchion about a pivot axis, wherein the guard is movable about the pivot axis relative to the base-plate between an open position allowing passage over the open floor or through the window and a closed position preventing said passage; and

(iv) a locking means for securing the guard in the close positions,

wherein the base-plate comprises a flange extending outwardly from said base-plate,

wherein said stanchion is pivotally mounted to said flange,

wherein the flange comprises a first opening, the at least one stanchion comprising a second opening, wherein the first and second openings are aligned when the guard in the closed position allowing the locking means to be inserted through the aligned first and second opening to secure the guard in the closed position.

In an embodiment, the pivot axis is substantially parallel to the base of the open floor or window such that the guard is moveable about the pivot axis in a forward and downward direction between the closed and open positions.

In another aspect, there is provided a safety barrier for an open floor or window, the safety barrier comprising:

(i) a base-plate adapted to be fixed to a structure located peripheral and adjacent to the open floor or window;

(ii) a guard;

(iii) at least one stanchion comprising a fixed portion and a moveable portion, wherein the fixed portion is fixed the base-plate and moveable portion is fixed to the guard;
(iv) a linkage pivotally mounted to the at least one stanchion between the fixed portion and the moveable portion, wherein the moveable portion and the guard fixed thereto is movable about a pivot axis relative to the fixed portion between an open position, allowing passage over the open floor or through the window, and a closed position preventing said passage; and

(v) a locking means for securing the guard in the closed position.

In an embodiment, the safety barrier comprises a locking means for securing the guard in the open position.

In an embodiment, the safety guard is substantially as herein described and with reference to any one of Figures.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The nature of the operation of the present invention will now be more fully described in the following detailed description of the preferred embodiments taken with the accompanying drawing figures, in which:

FIGURE 1 is a perspective view of a safety barrier installed on a perimeter wall in the open (fold back) and closed (upright) positions. The safety barrier is fixed to the balcony structure via base-plates.

FIGURE 2 is a perspective view of safety barrier installed on a concrete panel typically seen at a construction site, showing a universal locking hinge (base-plate, linkage and locking means), a sliding kicker, two stanchions and two guard (hand) rails.

FIGURE 3 is a perspective view of a base-plate comprising two outwardly extending flanges, each flange comprising three openings adapted to receive a locking means (removable pins) and a linkage (nut and bolt).

FIGURE 4 is a plan and elevation view of the base-plate comprising two outwardly extending flanges and attachment ports through which the base-plate is attached or fixed to a structure peripheral and adjacent to an open floor (e.g., balcony and the like) or a window.

FIGURE 5 is a detail view of the base-plate to which a stanchion has been pivotally mounted via a nut and bolt through openings in the flange and the stanchion. As can be seen, the
stanchion pivotally mounted to the base-plate can be adjusted between an open position (dotted outline of stanchion) and a closed position (solid outline of stanchion).

FIGURE 6 is a perspective, top and side view of the sliding kicker system.

FIGURE 7 is a sectional view of the safety barrier connected to a tilt-up concrete panel typically seen at construction sites and the placement of a new panel and the clearance between the stanchion and the panel.

FIGURE 8 is a sectional view of a residential apartment balcony mirror imaged to give heights of a chair, table and the safety barrier upright (i.e., in the closed position) and in the fold down (i.e., open) position.

FIGURE 9 is a perspective view looking into an apartment with one having no safety barrier (left) and the other having the safety barrier in the closed (upright) position (right), showing that the safety barrier can also provide privacy.

FIGURE 10 is a perspective view of a safety barrier comprising two adjacent stanchions, each pivotally mounted to a universal locking hinge, and two guard rails, each guard rail comprising two rail members. Also illustrated is an isometric view of the universal locking hinge (bottom right) showing placement of the stanchion between the flanges, secured therein by an elongated member (pin), allowing the stanchion to rotate about a pivot axis defined by the elongated member.

FIGURE 11 shows several perspectives of the safety barrier shown in Figure 10.

FIGURE 12A shows the perspective views of the safety barrier as shown in Figure 11, further comprising a kicker arrangement. FIGURE 12B shows the kicker arrangement in isolation.

FIGURE 13 shows a safety barrier adjustable in length between a substantially minimum width/length (A) and a substantially maximum width/length (B).

FIGURE 14 shows multiple safety barriers placed in a side-by-side arrangement along the perimeter of an open-floor of an erected structure.

FIGURE 15 shows a side view of a safety barrier in a closed (upright) position (far left) and in an open (lowered) position (centre). Also shown (far right) is a side view of a universal locking hinge and a portion of the stanchion shown here in a typical open position (as per centre figure).
FIGURE 16 shows various perspectives of a universal locking hinge.

FIGURE 17 shows various perspectives of a universal locking hinge.

FIGURE 18 shows various perspectives of a locking means.

Those skilled in the art will appreciate that the invention described herein is susceptible to variations and modifications other than those specifically described. It is to be understood that the invention includes all such variations and modifications that fall within the spirit and scope. The invention also includes all of the features referred to or indicated in this specification, individually or collectively, and any and all combinations of any two or more of said features.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The safety barrier of the present invention is relatively easy to install and, as a result, would typically save time, money and manpower in the construction industry. It is also relatively easy to disassemble for compact storage and transport. The ability to conveniently adjust the safety barrier of the present invention between an open and closed position means that it would be ideal for single and multi-story buildings as window barriers, as they would provide security whilst also allowing emergency personnel to adjust the safety barrier to an open position by removing (or temporarily removing) the locking means.

The safety barrier of the present invention also has important applications in the construction industry as protection for those working, for example, on open-floors or rooftops. With existing safety barriers, particularly those used in the building or construction industry, on concrete panels and the like, once erected (typically by two or more operators), require that the stanchions first be installed, followed by the hand-rails (guard rails). This process is cumbersome and labour intensive. The same dangers also exist during the removal of existing safety barriers.

By contrast, the safety barrier of the present invention may be installed (fixed) to a structure before the structure (e.g., a concrete wall) is erected. In an embodiment, the safety barrier would typically be installed in an open position, such that it does not protrude substantially from the edge of the structure (e.g., wall) defining the perimeter of an open floor (as shown, for example, in Figure 1). Once the structure has been erected, the safety barrier can be rotated about the pivot axis to its closed position, as herein described and illustrated, for
example, in Figure 1. The adjustment may be performed by a single operator, in contrast to existing safety barriers that typically require two or more operators.

In an embodiment, the length of the safety barrier can be adjusted to accommodate varying length requirements. For example, the safety barrier may comprise guard rails (e.g., hand rails) that are capable of being adjusted to different lengths, thus allowing the safety barrier to be adjusted to accommodated varying length requirements (e.g., for differing open-floor perimeters or window sizes). In an embodiment, the guard rail comprises (i) a first rail member fixed at one end to a first stanchion and (ii) a second rail member fixed at one end to a second stanchion, wherein the first rail member is connected at its opposite end to an opposite end of the second rail member and movable relative to the second rail member so as to allow the length of the guard rail to be adjusted between the first and second stanchions. In an embodiment, the opposite end of the first rail member is connected in a sliding relationship to the opposite end of the first rail member (see, for example, Figure 10).

In another embodiment, the guard rail comprises (i) a first rail member fixed at one end to a first stanchion, (ii) a second rail member fixed at one end to a second stanchion, wherein the first rail member is connected at its opposite end to one end of an inner rail member and the second rail member is connected at its opposite end to the inner rail member, wherein the first and second rail members are movable relative to the inner rail member so as to allow the length of the guard rail to be adjusted between the first and second stanchions. In an embodiment, the opposite end of the first rail member and the opposite end of the second rail members are each connected in a sliding relationship to the inner rail member.

The base-plate may be fixed onto a structure using any suitable means known to those skilled in the art. For example, fixing bolts can be used or pre-positioned ferrels within a concrete structure, such as a wall. The base-plate may be pivotally connected to a stanchion that has a connection to the guard, which can then be placed in position at the time the push-and-pulls are placed. The safety barrier can be placed on the panel in position and the first fixing screw can then be placed, at which point the guard can be pivotally adjusted and locked, typically in an open position, and the last fixing screw is then fixed. The structure is then ready to be erected, which is made easier because the safety barrier will not substantially protrude over the edge of the structure, which would otherwise make it difficult to erect or manoeuvre the structure into place.
The safety barrier may also find use in raising the height of a balcony perimeter, which will make such open areas safer, particularly for children, by preventing falls. Such a device may also add privacy by screening the balcony from view.

Suitable locking means will be known to those skilled in the art. In an embodiment, the locking means is a universal locking hinge that allows the guard to be fixed in a closed (e.g. upright) position without interference from intruders or young children. The safety barrier can then be unlocked from its closed position and, for example, swung down (e.g., approx. 180 degree) and fixed in an open (e.g., downward) position, where, for example, there are no young children or in case of a fire when access is needed.

Referring initially to Figure 1, it shows a safety barrier (1) formed in accordance with an embodiment of the present invention, operating in an upward or closed position (2) and in a downward or open position (3). In this example, there are two base-plates (4), each pivotally connected to a stanchion (5). The stanchions are each connected to a guard (6), which provides protection from falls when the safety barrier is fixed or secured in the closed position. The base-plate (4) is shown fixed to a structure (7), such a concrete wall.

Figure 2 shows a safety barrier in accordance with an embodiment of the present invention in further detail. The safety barrier includes a base-plate (7) comprising a universal locking hinge (21) fixed to a concrete structure (22). A kicker (23) is shown, the kicker comprising 3 separate units (kickers) (24, 25, 26). The outer kickers (24, 26) are fixed to the stanchions (5). The inner (centre) kicker (25) is releasably connected to each of the outer kickers (24, 26) by a sliding rail-type arrangement, whereby kicker (24) comprises tabs (not shown in this perspective) that fit within a rail (27) of the outer kickers (24, 26). The safety barrier comprises two guard (hand) rails (28) that are adjustable in length and fixed to each stanchion (5). Because concrete panels come in different widths, the guard rails (28) and the sliding kicker (23) allow for expansion and retraction of the safety barrier, thus allowing it to be adjusted to a suitable length, as herein described.

Figures 3 and 4 show a base-plate (7) in an embodiment of the present invention, adapted to form a universal locking hinge arrangement having three openings (30, 31, 32) positioned on each side of the outwardly protruding portions (flanges or brackets) (33). The centre opening (31) is typically where the elongated member (e.g., a pin or nut and bolt arrangement) would be placed to hold stanchion (5) and allow for the pivotal rotation of the stanchion(s) and guard about the pivot axis, as herein described. The remaining two openings (30, 32) are for
locking the stanchion(s) in the open or closed position, whether by a pin or other means known to those skilled in the art. In the centre of the base-plate there is a rectangular tube (35) that has a small opening (36) on the bottom of the base-plate (37) and a larger opening on top (38), the small opening on the bottom for receiving a fixing screw (for securing the base-plate to a structure, such a concrete wall), while the larger opening (38) allows for the head of the fixing screw and the socket to fix it in and finish flush with the top of the rectangular tube which is covered by the stanchion when the safety barrier is in the closed or open position. The undersides of the bracket has two substantially flat plates (39) on each side of the base-plate (7) to give strength and to assist with a more secure fit where the surface to which it will be attached is not flat.

Figure 5 shows a sectional view of the universal locking hinge arrangement (21) and its operation in a fixed (closed) position (40) and lowered to an open position (41). Also illustrated are the clearances of the stanchion (5) in that movement, as well as the clearance between the stanchion and the structure (e.g., concrete wall; 43). It also illustrates how the stanchion (5) covers the head of the fixing screw (44) and sits substantially flush with the rectangular tube (35) for support. The stanchion has two openings (45, 46) that align with the openings of the base-plate (30, 31) when the guard is in the closed position or (31, 32) when the guard is in the open position. One of said openings (46) is aligned with the centre opening (31) of the base-plate (7) and is fixed (e.g., with a pin or other elongated member that will define the pivot axis) to allow for the pivotal rotation of the stanchion relative to the base-plate about the pivot axis (7). The other opening (45) is aligned with an opening (30 and/or 32) of the base-plate to allow for the locking mechanism to take effect and secure the guard in the open or closed position. In additional, the two supporting plates (39) under the base-plate (7) and the clearance of the wall adds further stability and strength if the panels or surface of the structure is not substantially flat.

Figure 6 shows an embodiment of the adjustable kickers (23) that are designed to stop objects that can accidently be displaced from an open floor or other opening at heights from falling and injuring persons underneath. A sliding kicker arrangement (23) is shown in this instance, which comprises 3 separate units (kickers) (24, 25, 26). The centre kicker (25) is releasably connected each of the other kickers (24, 26) by a sliding rail-type arrangement, whereby kicker (25) comprises a tab (29) that fit within a rail (27) of the remaining kickers (24, 26). The sliding kickers can be adjusted to accommodate different lengths of safety rails/barriers. In an embodiment, the centre kicker is not utilised and the outer kickers are fixed at one end.
to the respective stanchions and are connected in a slidable fashion to each other at their opposite ends to allow for the combined length of the outer kickers to be adjusted, depending on the length of the guard and the distance between the two stanchions.

Figure 7 shows a sectional view of a first tilt-up panel (50), such as those typically seen on a building construction site, and the placement of a second tilt-up panel on top of the first tilt-up panel (51). It shows the relationship of the safety barrier (52) according to an embodiment of the present invention (in the closed position and fixed to the first panel at the base-plate (7)) and showing the clearance (53) from the second panel to be placed on top, which, in turn, has another safety barrier on it as well (not shown) during the time of placement over the existing (erected) panel (50). The second panel (51) is lowered over the erected first panel (50), as shown here between the spacing (58). For ease of use and to avoid the safety barrier being damaged, the safety guard fixed to the second tilt-up panel is in the open position with the guard preferably substantially flat against the panel. Once the second panel is put in place, the safety barrier on the first tilt-up panel can be adjusted (e.g., lowered) to an open position while the safety barrier of the second panel is adjusted (e.g., raised) to a closed position, providing security from falls until a permanent barrier is erected or a third panel is erected above the second panel.

Figures 8 and 9 show how a safety barrier (59) according to an embodiment of the present invention may operate on existing openings, such as balconies (60), to extend the height of existing barriers (61) when locked (secured) in the closed position (62) from an open position (63). The safety barrier can be measured and fitted to suit different size (e.g., width, length) requirements. The guards can also be fabricated from different materials to suit different aesthetic and/or functional requirements.

Figure 10 shows a safety barrier according to an embodiment of the present comprising two adjacent stanchions (5) pivotally mounted to a universal locking hinge (21) comprising base-plate (4). In this embodiment, the guard rails (28) are fixed at one end to the stanchions through a bracket (66), the bracket comprising an opening (67) through which a screw or other suitable locking means can be used to fix the guard rail to the stanchion. The guard rails comprise a first rail member (281) and a second rail member (282), each rail member having a fixed end attached to a stanchion through a bracket (66) and an opposite end connected in a sliding arrangement to the opposite end of the other rail member (64), whereby the distance between the two adjacent stanchions can be easily adjusted. Also
illustrated in Figure 10 is an isometric view of the universal locking hinge (21) showing placement of the stanchion (5) between the flanges (33), secured therein by an elongated member (pin) (65) that has been passed through openings in the two flanges and the stanchion, thereby securing the stanchion to the universal locking hinge and allowing the stanchion to rotate about a pivot axis defined by the pin (65). The stanchion is shown here in an upright position typically seen when the barrier is in the closed position.

Figure 11 shows several perspectives of a safety barrier according to an embodiment of the present invention – top view (69), side view (70), front view (72) and an isometric view (73). Also shown is a top view of the universal locking hinge (71). In this figure, a nut and bolt arrangement (65) is used to pivotally mount the stanchion (5) to the universal locking hinge and thereby defining the pivot axis (91) about which the safety barrier is able to rotate. In this instance, the stanchion is shown in a closed (upright) position, secured in the closed position by a spring pin (68) passing through the universal locking hinge and stanchion.

Figure 12A shows the same perspective views of the safety barrier according to an embodiment of the present invention, as shown in Figure 11. In this figure, the safety barrier further comprises a kicker arrangement, comprising by a first kicker (74) and a second kicker (75), each fixed at one of their respective ends to a stanchion (5). The opposite ends of the first and second kickers are connected to each other in a sliding arrangement, in which the second kicker is recessed into or against the first kicker to allow the second kicker to slide along the first kicker. Figure 12B shows an isometric arrangement of the kicker arrangement, wherein the second kicker (75) is recessed into or against the first kicker (74) in a sliding arrangement.

Figure 13 illustrates how the safety barrier in an embodiment of the present invention can be adjusted in length, or distance between two adjacent stanchions to accommodate varying length requirements. In this example, the safety barrier is shown in a minimal width/length arrangement (A) and in a substantially maximum width/length arrangement (B).

As shown in Figure 14, multiple safety barriers according to the present invention can be placed in a side-by-side arrangement to provide a protective barrier along the perimeter of an open-floor of a structure (7). The number of safety barrier will depend on the length of the perimeter of the open floor that requires securing.

Figure 15 shows the safety barrier in an embodiment of the present invention fixed to a structure (7) in a closed (upright) position (76) and rotated about the pivot axis (78) to an
open (lowered) position (77). In this embodiment, the stanchion is also secured in the open (lowered) position with a fixing pin (68) passed through an opening in the base-plate and stanchion, to prevent the guard swaying as the structure is being erected.

Figure 16 shows various perspectives of the universal locking hinge according to an embodiment of the present invention – a top view (79), a front view (80), a side view (81) and isometric views (82, 83). Also shown is the placement of the elongated member (e.g., pin) (65) through a central opening in the flanges (33) protruding from the base-plate (4). The elongated member passing through the central opening in the flanges defines the pivot axis (91) about which the stanchions (and hence the safety barrier) will rotate between the open and closed positions.

Figure 17 shows the base-plate (4) and flange (33) arrangement of the universal locking hinge according to an embodiment of the present invention, illustrated as a front view (A) and as a rear view (B). Shown are openings (84) through which the base-plate (4) can be secured to the structure (e.g., tilt-up panel).

Figure 18 shows an example of elongated members (pins) (85,86) that can be used within the universal locking hinge to secure the safety barrier of the present invention in a closed or open position, as herein described. In an embodiment illustrated in Figure 18, the pin (85) comprises a retension spring (87) and a clevis pin (88) that assist to secure the pin to the universal locking hinge as hereinbefore described. In this embodiment, the pin also comprises a handle (89) or chain (90) that can be used by an operator to forcibly remove the pin from the locking means thereby releasing the locking means and allowing the safety barrier to be adjusted between the open and closed positions.

The linkage allowing the guard to be rotated about a pivot axis between the open and closed positions may be located along the stanchion(s). Thus, in another aspect, there is provided a safety barrier for an open floor or window, the safety barrier comprising:

(i) a base-plate adapted to be fixed to a structure located peripheral and adjacent to the open floor or window;

(ii) a guard;

(iii) at least one stanchion comprising a fixed portion and a moveable portion, wherein the fixed portion is fixed the base-plate and moveable portion is fixed to the guard;
(iv) a linkage pivotally mounted to the at least one stanchion between the fixed portion and the moveable portion, wherein the moveable portion and the guard thereto is movable about a pivot axis relative to the fixed portion between an open position, allowing passage over the open floor or through the window, and a closed position preventing said passage; and

(v) a locking means for securing the guard in the closed position.

In an embodiment, the locking means for securing the guard in the closed position comprises a pin, a first opening through the fixed portion of the at least one stanchion and a second opening through the moveable portion of the at least one stanchion, wherein locking means maintains the fixed portion and the moveable portion in a locked position when the pin is passed through the first opening and the second opening.

The safety barrier of the present invention can be fabricated from any suitable material that will provide adequate protection against an accidental fall. Suitable material would be known to persons skilled in the art. Examples include aluminium, timber, plastic, steel and tempered glass. The base-plate and locking means may be fabricated from mild steel and stanchions, hand rails and kickers may be fabricated from mild steel or stainless steel, particularly where the safety barrier is intended for use in apartment balconies or windows.

As will be appreciated from the description herein, the safety barrier of the present invention offers ease of installation for a variety of apartment buildings and hotels, and for the safety of tilt-up panel installation and ease of installation, saving time and money, whilst complying to the rules and regulations that govern the construction industry. Moreover, the safety barrier of the present invention can be more compact than other systems currently in use, as all parts may be stored together (i.e., rails, stanchions and kickers) and pre-assembled by panel designers. The other advantage is that most existing safety barriers come apart separately and are left lying around on decks, which can present tripping hazards, whereas the safety barrier of the present invention may be removed in one piece, avoiding the aforementioned hazards.

A safety barrier of the present invention may be used for placement onto tilt-up concrete panels in the construction industry to protect the form workers and all construction workers at height from falls, and can also remain on the panels as they are lifted during construction. They can also remain in place on erected panels and have other panels placed on top of one another whilst the safety barrier on the already erected panel is still in place (in an open
position), thus avoiding repetitive installation and removal of safety barriers, as is typically required of existing systems.

The safety barrier of the present invention can be used in a variety of positions - horizontal, vertical, and upside down with the base-plate(s) on top of the opening. For example, the safety barrier may be installed above a balcony space by securing the base-plate to the ceiling or roof above the balcony.

The guard of the safety barrier according to the present invention can be lifted and locked into the upright (closed) position with a locking pin so that the locking pin is difficult to remove, but can be removed in emergency situations where access through an opening is required. The guard can be folded down to an open position so that it does not take up space and in case of a fire can easily be lowered for fire escape.

Throughout this specification, the word "comprise", or variations thereof such as "comprises" and "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as an acknowledgment or admission or any form of suggestion that that prior publication (or information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

The application to which this specification relates claims priority from Australian provisional patent application no. 2011901317, the contents of which are herein incorporated by reference in their entirety.

It must be noted that, as used in the subject specification, the singular forms "a", "an" and "the" include plural aspects unless the context clearly dictates otherwise.
Claims:

1. A safety barrier for an open floor or window, the safety barrier comprising:
   (i) a base-plate adapted to be fixed to a structure located peripheral and adjacent to the open floor or window;
   (ii) a guard;
   (iii) a linkage pivotally mounted to the base-plate and guard about a pivot axis, wherein the guard is movable about the pivot axis relative to the base-plate between an open position, allowing passage over the open floor or through the window, and a closed position preventing said passage; and
   (iv) a locking means for securing the guard in the closed position.

2. The safety barrier of claim 1, wherein the guard comprises at least one stanchion.

3. The safety barrier of claim 2, wherein the guard comprises a stanchion having a first end pivotally mounted to the base-plate.

4. A safety barrier for an open floor or window, the safety barrier comprising:
   (i) a base-plate adapted to be fixed to a structure located peripheral and adjacent to the open floor or window;
   (ii) a guard;
   (iii) at least one stanchion comprising a fixed portion and a moveable portion, wherein the fixed portion is fixed the base-plate and moveable portion is fixed to the guard;
   (iv) a linkage pivotally mounted to the at least one stanchion between the fixed portion and the moveable portion, wherein the moveable portion and the guard fixed thereto is movable about a pivot axis relative to the fixed portion between an open position, allowing passage over the open floor or through the window, and a closed position preventing said passage; and
   (v) a locking means for securing the guard in the closed position.
5. The safety barrier of any one of claims 1 to 4, wherein the guard comprises a guard rail.

6. The safety barrier of claim 5, wherein the guard rail has a first end fixed to a first stanchion and a second end fixed to a second stanchion.

7. The safety barrier of claim 6, wherein the first and second stanchions are adjacent stanchions.

8. The safety barrier of any one of claims 5 to 7, wherein the guard rail comprises (i) a first rail member fixed at one end to a first stanchion and (ii) a second rail member fixed at one end to a second stanchion, wherein the first rail member is connected at its opposite end to an opposite end of the second rail member and movable relative to the second rail member so as to allow the length of the guard rail to be adjusted between the first and second stanchions.

9. The safety barrier of any one of claims 5 to 7, wherein the guard rail comprises (i) a first rail member fixed at one end to a first stanchion, (ii) a second rail member fixed at one end to a second stanchion, wherein the first rail member is connected at its opposite end to one end of an inner rail member and the second rail member is connected at its opposite end to the inner rail member, wherein the first and second rail members are movable relative to the inner rail member so as to allow the length of the guard rail to be adjusted between the first and second stanchions.

10. The safety barrier of claim 8, comprising a locking means for locking the first rail member to the second rail member.

11. The safety barrier of claim 9, comprising a locking means for locking the inner rail member to the first and/or second rail members.

12. The safety barrier of any one of claims 1 to 11, wherein the linkage comprises an elongated member extending through an opening in the base-plate and through an opening in the stanchion, wherein the stanchion is moveable about the pivot axis defined by the elongated member.

13. The safety barrier of any one of claims 1 to 12, wherein the guard is rotatable over about 180 degrees relative to the linkage.
14. The safety barrier of any one of claims 1 to 13, wherein linkage comprises the locking means for securing the guard in the closed position.

15. The safety barrier of any one of claims 1 to 14, wherein the guard comprises a kicker, the kicker comprising a first end fixed to a first stanchion and a second end fixed to a second stanchion.

16. The safety barrier of any one of claims 1 to 15, wherein the guard comprises a plurality of kickers comprising:

(i) a first kicker comprising a fixed end and an open end, the fixed end connected to a first stanchion;

(ii) a second kicker comprising a fixed end and an open end, the fixed end connected to a second stanchion; and

(iii) a third kicker having a first end and a second end;

wherein the first end of the third kicker is releasably connected to the open end of the first kicker and the second end of the third kicker is releasably connected to the open end of the second kicker, wherein the third kicker is movable relative to the first and second kickers so as to allow the length of the kickers to be adjusted between the first and second stanchions.

17. The safety barrier of any one of claims 1 to 16, wherein the base-plate comprises an attachment means for fixing the base-plate to the structure that is peripheral and adjacent to the open floor or window.

18. The safety barrier of claim 17, wherein the base-plate comprises an opening through which the attachment means can be accessed.

19. The safety barrier of claim 18, wherein when the guard is in the closed position, access to the attachment means is obstructed.

20. The safety barrier of any one of claims 1 to 19, wherein the locking means for securing the guard in the closed position comprises a pin, a first opening through the base-plate and a second opening through a stanchion pivotally mounted to the base-plate, wherein locking means maintains the stanchion in a locked position when the pin is passed through the first opening and the second opening.
21. The safety barrier of any one of claims 4 to 20, wherein the locking means for securing the guard in the open and/or closed positions comprises a pin, a first opening through the fixed portion of the at least one stanchion and a second opening through the moveable portion of the at least one stanchion, wherein locking means maintains the fixed portion and the moveable portion in a locked position when the pin is passed through the first opening and the second opening.

22. The safety barrier of any one of claims 1 to 21, wherein the base-plate comprises a flange extending upwardly from said base-plate, wherein said flange is adapted to receive the linkage and the locking means.

23. A safety barrier for an open floor or window, the safety barrier comprising:

(i) a base-plate adapted to be fixed to a structure located peripheral and adjacent to the open floor or window; (ii) a guard connected to at least one stanchion; (iii) a linkage pivotally mounted to the base-plate and stanchion about a pivot axis, wherein the guard is movable about the pivot axis relative to the base-plate between an open position allowing passage over the open floor or through the window and a closed position preventing said passage; and (iv) a locking means for securing the guard in the closed position,

wherein the base-plate comprises a flange extending outwardly from said base-plate, wherein said stanchion is pivotally mounted to said flange, wherein the flange comprises a first opening, the at least one stanchion comprising a second opening, wherein the first and second openings are aligned when the guard in the closed position allowing the locking means to be inserted through the aligned first and second opening to secure the guard in the closed position.

24. The safety barrier of any one of claims 1 to 23, wherein the pivot axis is substantially parallel to the base of the open floor or window such that the guard is moveable about the pivot axis in a forward and downward direction between the closed and open positions.

25. The safety barrier of any one of claims 1 to 24, further comprising a locking means for securing the guard in the open position.

26. The safety barrier of claim 1 or 23, substantially as herein described and with reference to any one of Figures.
Figure 1

The safety glass screen can be made from a variety of materials or designs.

For balconies to prevent falls can also be used on windows externally.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl.
E04G 21/32 (2006.01)  E04F 11/18 (2006.01)
E04F 10/08 (2006.01)  E04B 9/06 (2006.01)

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)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPI, EPDOC: IPC: E04G21/32, E04F10/08/LOW, E04F11/18, E04H17/14/LOW, E05B9/06, E04G5, Keywords: pivot, safety, guard, kick and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>FR 2934624 A (ETS FRENEHARD ET MICHAUX SOCIETE ANONYME) 5 February 2010</td>
<td>1-7, 12-25</td>
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<tr>
<td>X</td>
<td>Figures 1-2</td>
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<td>DE 20214613 U1 (CTR FAHRZEUGTECHNIK GMBH) 28 November 2002</td>
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<td>US 5683074 A (PURVIS et al) 4 November 1997</td>
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Further documents are listed in the continuation of Box C

See patent family annex

* Special categories of cited documents:
  *A* document defining the general state of the art which is not considered to be of particular relevance
  *E* earlier application or patent but published on or after the international filing date
  *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  *O* document referring to an oral disclosure, use, exhibition or other means
  *P* document published prior to the international filing date but later than the priority date claimed
  *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
  *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
  *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
  *&* document member of the same patent family

Date of the actual completion of the International search
24 May 2012

Date of mailing of the international search report
29 May 2012

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Form PCT/ISA/210 (second sheet) (July 2009)
INTERNATIONAL SEARCH REPORT

Box No. II - Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.☐ Claims Nos.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2.☒ Claim No.: 26
   because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
   The claim does not comply with Rule 6.2(a) because it relies on references to the description and/or drawings.

3.☐ Claims Nos.:
   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III - Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1.☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2.☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3.☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4.☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)
This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX