

**(12) STANDARD PATENT**  
**(19) AUSTRALIAN PATENT OFFICE**

(11) Application No. **AU 2012222870 B2**

(54) Title  
**Safety frame and components therefor**

(51) International Patent Classification(s)  
**E04G 21/32** (2006.01)                      **E04H 17/14** (2006.01)  
**E01F 15/08** (2006.01)

(21) Application No: **2012222870**                      (22) Date of Filing: **2012.03.02**

(87) WIPO No: **WO12/116411**

(30) Priority Data

(31) Number	(32) Date	(33) Country
<b>2011900745</b>	<b>2011.03.02</b>	<b>AU</b>

(43) Publication Date: **2012.09.07**

(44) Accepted Journal Date: **2014.04.24**

(71) Applicant(s)  
**Natform Pty Ltd**

(72) Inventor(s)  
**Prokop, Margaret A.**

(74) Agent / Attorney  
**Allens Patent & Trade Mark Attorneys, Deutsche Bank Place Corner Hunter and Phillip Streets, SYDNEY, NSW, 2000**

(56) Related Art  
**WO 2006/042361 AI (COMBINED METAL FABRICATION PTY LTD) 27 April 2006**  
**US 5599006 A (GEY AUX et al.) 04 February 1997**  
**GB 2269837 A (BAILEY) 23 February 1994**



(43) International Publication Date  
7 September 2012 (07.09.2012)

(51) International Patent Classification:

E04G 21/32 (2006.01) E04H 17/14 (2006.01)  
E01F 15/08 (2006.01)

(21) International Application Number:

PCT/AU2012/000217

(22) International Filing Date:

2 March 2012 (02.03.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2011900745 2 March 2011 (02.03.2011) AU

(71) Applicant (for all designated States except US): NAT-FORM PTY LTD [AU/AU]; Suite 52, The Hub, 89-97 Jones Street, Ultimo NSW 2007 (AU).

(72) Inventor; and

(75) Inventor/Applicant (for US only): PROKOP, Margaret A. [AU/AU]; Suite 52, The Hub, 89-97 Jones Street, Ultimo NSW 2007 (AU).

(74) Agent: ALLENS ARTHUR ROBINSON; Patent & Trade Marks Attorneys, Deutsche Bank Place, Corner Hunter & Phillip Streets, Sydney NSW 2000 (AU).

(81) Designated States (unless otherwise indicated, for every kind of national protection available):

AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available):

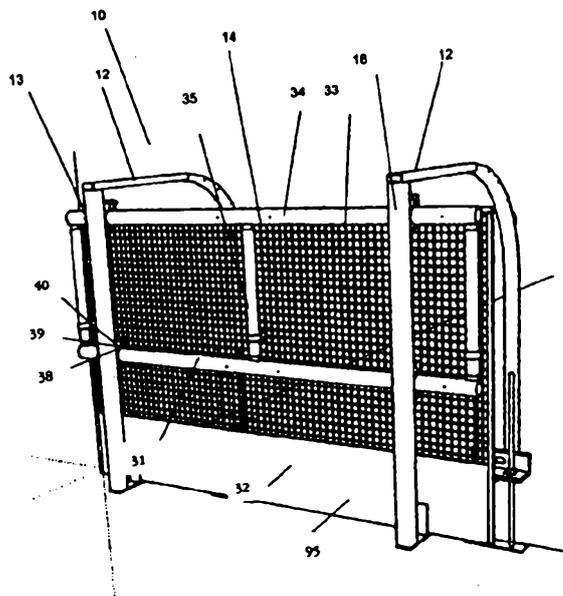
ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: SAFETY FRAME AND COMPONENTS THEREFOR

Figure 1



(57) Abstract: A safety frame is described. The safety frame in use inhibits access to an area, and includes at least one connector on the safety frame, the connector adapted to connect a barrier to the safety frame on one or other selected sides of the safety frame, the connector including a catch mounted on a swivel so that the catch may swivel to a selected position on either side of the safety frame. A flip lock is also described, which is adapted to connect an item to a structural member, the flip-lock including: a base comprising a collar for at least partially encircling a structural member; a stem extending from the collar and comprising a head region distal the collar; a slotted locking bar member pivotally mounted to a head region of the stem; wherein the flip-lock mount is movable along and around the structural member for selective positioning along the structural member.

## **SAFETY FRAME AND COMPONENTS THEREFOR**

### **Field of the invention**

[001] The present invention relates generally to a safety frame suitable for use on building sites. The present invention also relates to components usable with the safety frame and safety fencing. In some applications the building sites may be multi-storey buildings under construction.

### **Background of the invention**

[002] After a concrete slab floor of a multi-storey building is poured, its outer edge can present a fall hazard to workers. Full-height safety screens are often mounted at the outer edge to mitigate the risk of falls, however, these safety screens must be removed at certain critical times of the construction process. For example, certain curtain wall mounts and other items are generally installed, adjacent the outer edge of the floor.

[003] It has been proposed to provide workers with harnesses when working in the outer edge regions, to ameliorate falls and injuries from falls, however these involve limitations such as for example great expense, limited movement, trip hazards, distraction and may even increase the possibility of a fall, even though they may reduce the likelihood of death from that fall.

[004] Certain fencing has been proposed, however, known fences are cumbersome, expensive, heavy to handle and difficult to install.

[005] The present invention provides a new and useful safety frame, as well as a safety fence and components therefor.

### **Summary of the invention**

[006] According to one aspect of the present invention there is provided a safety frame for inhibiting access to an area, the safety frame including:

at least one connector on the safety frame, the connector adapted to connect a barrier to the safety frame on one or other selected sides of the safety frame, the connector including

a catch mounted on a swivel so that the catch may swivel to a selected position on either side of the safety frame.

[007] The catch may be any suitable device including a hook or the like. Preferably the catch includes a head portion which is movable between a free position and a catch position. Preferably the catch is in the form of a flip-lock.

[008] Preferably the flip lock includes a stem including a stem top and a stem base, and the head portion is in the form of a slotted locking member pivotally mounted to the stem top for releasably locking the barrier to the safety frame.

[009] In use, in the free position the slotted locking member extends so as to be in line with the stem so as to extend through one of the apertures in the barrier element panel. Once the stem stop extends through the aperture, the slotted locking member may be moved to the catch position in which it extends perpendicular to the stem.

[010] Typically the barrier is a panel, such as for example a sheet of mesh, or infill panel or other suitable guard. The panel may include apertures for receiving a catch.

[011] The safety frame may also be in the form of a panel.

[012] In one preferred arrangement, the safety frame is in the form of a safety ladder including spaced-apart stile members and a plurality of spaced-apart rungs extending between the stile members. In this preferred form, the at least one connector is preferably disposed on the ladder rungs.

[013] Preferably the stiles are telescoping, wherein a stile portion fits within another stile portion to facilitate adjustment of a length of the safety ladder.

[014] The telescoping stiles may include at least one locking pin assembly which cooperates in use with apertures in the walls of the stiles to lock them in a selected position. Preferably the locking pin assembly is biased to a locked position wherein the locking pin extends outwardly through the apertures.

[015] Preferably the safety frame is constructed from aluminium so that the rail, frame or ladder is lightweight and strong. The safety frame may be constructed from other lightweight and strong materials, including GRP, other thermoplastics, and other thermosetting plastics. The stiles may be welded to the rungs, or otherwise fixed thereto.

[016] The swivel preferably includes a follower to follow along the safety frame to a selected position along the safety frame. Preferably the follower is mounted on a rung of the safety ladder.

[017] Optionally the follower is in the form of a carriage. Preferably the follower is in the form of a collar to facilitate rotation of the connector about and movement along the safety frame.

[018] According to a further form of the present invention there is provided a safety fence including:

one or more post frames;

a safety frame as above described mounted on the one or more post frames; and

a barrier detachably connected by the connectors to the safety frame.

[019] According to another form of the invention a post frame is provided for supporting a safety barrier, the post frame including:

a post element;

a base element adapted to extend along a supporting surface, the base including a post end and a distal end;

an anchor mounting region for anchoring the post elements to the supporting surface and disposed at the distal end of the base element; and

one or more braces extending between the post element and the anchor mounting region.

[020] Preferably the post element includes mounting means for detachably mounting a safety barrier to the one or more post elements. The mounting means may include a clamp which may in turn be in the form of a scaffolding clamp. The clamp may be mounted at an intermediate position on the post element and may include a pivoting jaw member which in use opens to receive the stile member to detachably mount it to the post.

[021] The collars also facilitate selective positioning of the flip-locks along the rungs, so that the barrier element panel may be connected at any selected point along the rung. The collars also facilitate movement of the flip-lock around the stile or post so as to increase flexibility of installation. That is, in a preferred embodiment of the present invention, the safety ladder may be mounted on either of its sides against the post elements by the scaffolding clamps, and whatever the orientation of the safety ladder, the flip-locks can move to mount the barrier element panel against an inner face of the safety ladder.

[022] The stem of the flip-lock is preferably of a sufficient length to accommodate more than one barrier so that in use the barriers may overlap to form a continuous barrier.

[023] The post frame may also include a chain mount to mount a chain on the post. The chain mount may be disposed on the brace so as to form an exclusion zone from which unauthorised or inattentive workers should be excluded. The chain mount may be a partially-open ring or a closed ring for receiving a chain, and the ring may be mounted on

the support bracing which extends between the anchor mounting region and the post. Chain may be mounted on the chain mount.

[024] The post frame may also include a stop against which the barrier element may abut when in use. The stop may be a finger extending upwardly from the base support member, a selected distance rearward from the post base region.

[025] In operation the anchor mounting region is intended to anchor the base to an existing anchor bolt. The anchor bolt is generally set back a selected distance from the outer edge.

[026] According to a yet further aspect of the present invention there is provided a flip-lock mount which is adapted to mount an item to a structural member, the flip-lock mount including:

a base comprising a collar for at least partially encircling a structural member;

a stem extending from the collar and comprising a head region distal the collar;

a slotted locking bar member pivotally mounted to a head region of the stem;

wherein the flip-lock mount is movable along the structural member for selective positioning along the structural member.

[027] Preferably the collar is sized and/or shaped to provide pivoting or rotational movement about the structural member so that the stem can be disposed at selected angles about the structural member.

[028] Throughout this specification, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "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.

[029] Any discussion of documents, acts, materials, devices, articles or the like which has been included in the present specification is solely for the purpose of providing a context for the present invention. It is not to be taken as an admission that any or all of these matters form component of the prior art base or were common general knowledge in the field relevant to the present invention as it existed in Australia prior to development of the present invention.

**Description of the drawings**

[030] To enable a clearer understanding, the invention will now be further explained and illustrated by reference to the accompanying drawings in which:

[031] Figure 1 is a perspective view of a safety fence according to one preferred form of the invention, viewed from outside an outer edge of a concrete slab floor of a building;

[032] Figure 2 is another perspective view of the safety fence of Figure 1, viewed from a side position so as to look along an outer edge of a building floor slab, and along a rail;

[033] Figure 3 is a side elevation view of a connector shown in Figures 1 and 2;

[034] Figure 4 is a detail perspective view of the connector shown in Figure 3 shown mounted on a safety ladder rung;

[035] Figure 5 is a plan view of a concrete slab floor of a building, shown with the safety fence of an embodiment of the present invention shown in an installed position, with a telescoping safety ladder in an extended position;

[036] Figures 6a and 6b are elevation views of the telescoping safety ladder rail shown in the Figures, the telescoping rail shown in extended (6a) and retracted (6b) positions; and

[037] Figure 7 is a perspective view of the safety fence shown in the Figures, shown from behind the fence, standing on the concrete slab.

**Detailed Description of a Preferred Embodiment**

[038] Referring to the drawings there is shown a safety fence and various components thereof, the safety fence generally indicated at 10 in at least Figures 1 and 2. The safety fence 10 includes a post frame 12 and a barrier assembly 14. The safety fence 10 is adapted to be mounted to an outer edge region of a concrete slab floor 9 by anchor bolts 8 which are threaded bolts set into the floor and extending upwardly therefrom to support a perimeter safety screen system (not shown).

[039] The post frame 12 includes a post element 13 and a base element 15 for extending along the concrete slab floor 9 and a brace 19 including a post end and a distal end, the brace 19 extending between the post element 13 and the base element 15. The base element 15 includes an anchor mounting region 17 for mounting to a floor anchor bolt 8, the anchor mounting region 17 disposed in the distal region of the base element 15 so that the post element 13 may be adjacent the edge of the concrete slab floor 9, while the anchor bolts 8 are set back in a more secure portion of the slab 9.

[040] The brace 19 includes a brace assembly 22 extending from the base element 15 at the distal end which is the anchor mounting region 17, to a head region 16 of the post element 13. The brace assembly 22 includes a vertical brace element 23 extending upwardly from the anchor mounting region 17, a diagonal or curved brace element 25 and a horizontal brace element 24.

[041] The post frame 12 also includes a chain ring 26 for receiving a chain (not shown). The chain, chain ring 26 and brace assembly 22 facilitate an exclusion zone 28 behind the safety barrier assembly 14. The chain ring 26 is mounted on the diagonal or curved brace portion 25.

[042] The post frame 12 also includes a stop 29 against which a kickplate portion 95 of the barrier assembly 14 abut when assembled. The stop 29 is a plate 30 extending upwardly from the base support member 21 which is a selected distance rearward from the post member 13.

[043] The barrier assembly 14 includes a safety frame 31 in the form of a plurality of rails formed into a safety ladder 33, as well as a separate barrier 32 in the form of an apertured mesh infill panel 96. The safety ladder 33 includes spaced-apart stiles 34 and a plurality of spaced-apart rungs 35 extending between the stiles 34. When assembled the barrier 32 is connected to the safety frame 31 by connectors 41.

[044] The safety ladder 33 telescopes in use so that the stiles 34 extend and retract to a selected length. The telescoping stiles 34 are adapted to be lockable at selected intervals between a fully extended position and a fully retracted position (shown in Figures 6a and 6b). The telescoping stiles 34 include an outwardly-biased locking pin assembly (not shown) which cooperates in use with apertures 37 in the walls of the telescoping stiles 34 to lock them in a selected position.

[045] The post element 13 includes mounting means 38 for detachably mounting the safety ladder 33 to respective post elements 13. The mounting means 38 includes a clamp 39 which is in the form of a scaffolding clamp 40. The scaffolding clamp 40 is mounted at an intermediate position on the post element 13 and includes a pivoting jaw member (not shown) which in use opens to receive the stile 34 to detachably mount it to the post element 13.

[046] Connectors 41 are provided, which include a catch 47, in turn in the form of a flip-lock 42 adapted to move between a free position and a catch position. In the embodiment shown the flip locks 42 are mounted on the rung 35 of the safety ladder 33. The flip-lock 42 includes a stem 43 including a base region and a head region 45, and a slotted locking bar member 44 which is pivotally mounted to the head region 45 of the stem 43. In the

free position the slotted locking bar member 44 extends so as to be in line with the stem 43 so as to receive an aperture of the barrier panel 32. Once the barrier 32 has been passed over the head region 45 of the stem 43, the slotted locking bar member 44 moves to the locked position in which it extends perpendicular to the stem, usually under the influence of gravity.

[047] The flip-lock 41 includes a base in the form of a swivel 49 on which the catch 47 is mounted. The swivel 49 allows the catch 47 to swivel to a suitable position to enter an aperture on the mesh panel 96.

[048] The swivel 49 is in the form of a collar 46 which is movable along and/or around the ladder stile 34 or rung 35. A plurality of flip-locks are provided, some of the collars 46 being mounted on the stiles 34, while others are mounted on the rungs 35 of the safety ladder 33. The collars 46 allow selective positioning of the flip-locks 42 along the rungs 35 or stiles 34, so that the panel 32 may be accommodated at any selected point along the rung 35 or stile 34. The collars 46 also facilitate movement of the flip-lock 42 around the rung 35 or stile 34 so as to increase flexibility of installation.

[049] That is, when installing the preferred embodiment shown, the safety ladder 33 can be mounted on either of its sides against the post member 13 by the scaffolding clamps 40, and whatever the orientation of the ladder, the flip-locks 42 can move to mount the panel 32 against an inner face of the safety ladder 33.

[050] The stem 43 of the flip-lock 42 is of a sufficient length to accommodate more than one mesh, net or infill panel guard so that they may overlap one another when installed.

[051] In operation the anchor mounting region is intended to anchor the post to an existing anchor bolt which has been set in the concrete floor at pouring. The anchor bolt is generally set back a selected distance from the edge, and the base support member 21 disposes the post member 13 and therefore guard assembly 14 closer to the edge of the concrete slab floor. A safety rail closer to the edge is advantageous for workers actually working on the edge, and the base support member extends the safety guard nearer to a useful working region.

[052] Advantageously as shown most clearly in Figure 5 the telescoping safety ladder 33 facilitates flexibility of installation so as to be useful on curved slab edges. The base element allows re-use of anchor bolts 8 used also for other safety screens, and the safety ladder is disposed closer to an edge of the slab 9 than would otherwise be possible with normal posts, which allows work to be performed on the edge of the slab, such as for example, installing bolts for curtain wall supports.

[053] Transport of the assembly 10 may be conducted in pieces, so that the volume required to transport the assembly is smaller than that which would be required for an assembled rail.

[054] Advantageously, installation is very flexible. Rails can be extended and retracted, safety mesh, net or infill panels 32 can be curved, and overlapped, and flip-lock supports 41 for the mesh, net or infill panels 32 can be moved to either side of the ladder 33 and slid along the rungs to positions where they are required. If a portion of the edge region of the slab 9 needs work, a mesh, net or infill panel can be removed and/or repositioned quickly and flexibly due to the flip-locks 41.

[055] It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

**Claims:**

1. A safety frame for holding a barrier thereagainst, the safety frame including:
  - a pair of spaced-apart stile members and a plurality of spaced-apart rungs extending between the stile members;
  - at least one connector disposed on a stile or a rung of the safety frame, the connector adapted to connect a barrier to the safety frame on one or other selected sides of the safety frame, the connector including
    - a flip lock including a stem including a stem head and a pivot disposed at the stem head, and a locking member pivotally mounted to the pivot at an intermediate region of the locking member in use holding the barrier against the frame, the stem mounted on a swivel so that the flip lock may swivel to a selected position on either side of the safety frame.
2. The safety frame in accordance with claim 1 wherein the stem includes a stem base, and the locking member including a slot to receive the pivot on the stem head for facilitating releasable locking of the barrier to the safety frame.
3. The safety frame in accordance with claim 1 or 2 wherein the swivel includes a follower to follow along the safety frame to a selected position along the safety frame.
4. The safety frame in accordance with claim 3 wherein the follower is in the form of a collar to facilitate rotation about and movement along the safety frame.
5. The safety frame in accordance with claim 4 wherein the at least one connector is disposed on the rungs.
6. The safety frame in accordance with claim 4 or 5 wherein the stiles are adapted to telescope, wherein a stile portion fits within another stile portion to facilitate adjustment of a length of the safety frame.
7. The safety frame in accordance with claim 6 wherein the telescoping stiles include at least one locking pin assembly which cooperates in use with apertures in the walls of the stiles to lock them in a selected position.
8. The safety frame in accordance with any one of claims 1 to 7 wherein the barrier is a panel including apertures for receiving the catch.
9. A safety fence including:
  - one or more post frames;
  - a safety frame in accordance to any one of claims 1 to 8 mounted on the one or more post frames; and

a barrier detachably connected by the connectors to the safety frame.

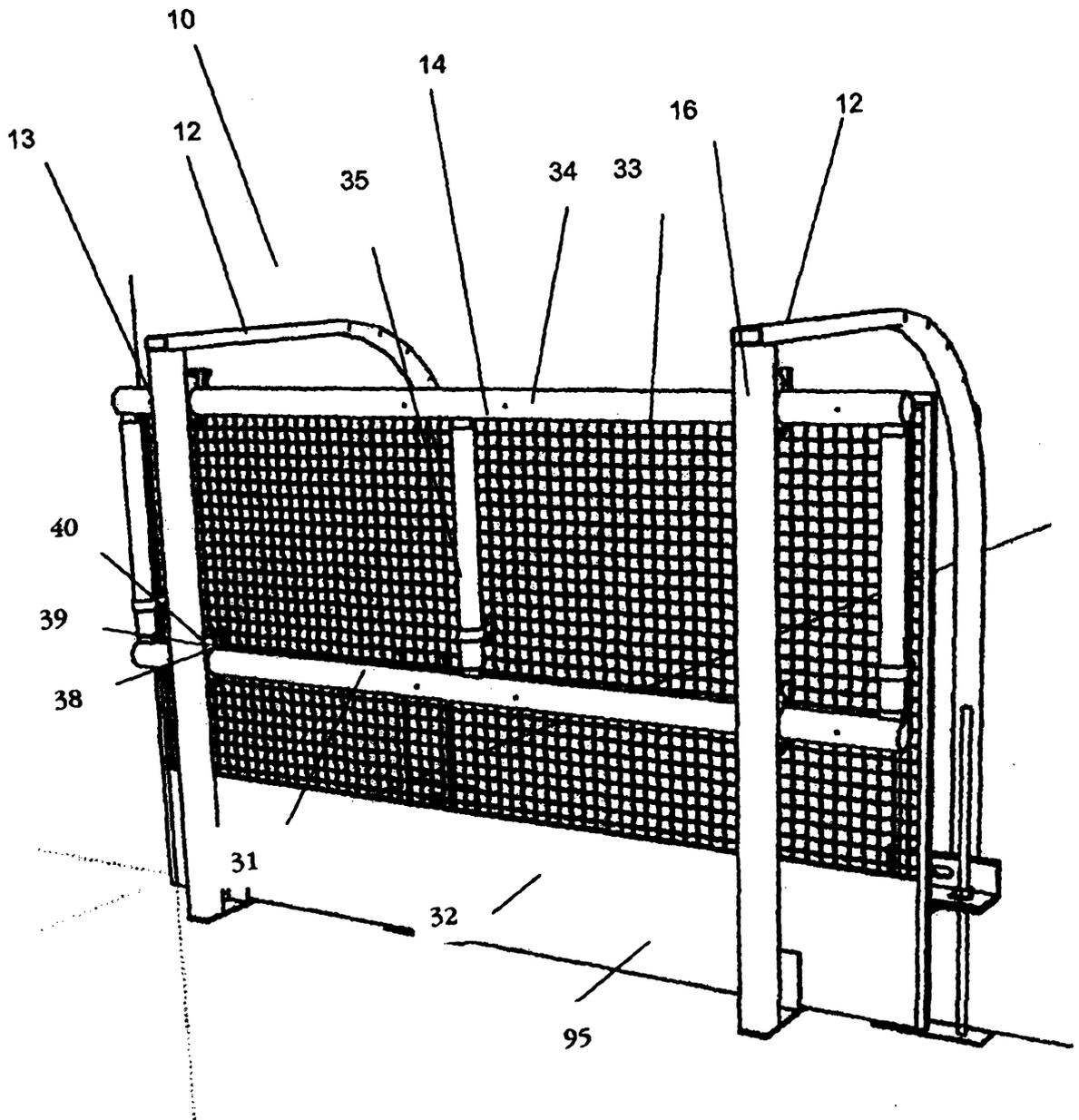
10. The safety fence in accordance with claim 9 wherein the post frame includes:
  - a post element;
  - a base element adapted to extend along a supporting surface, the base including a post end and a distal end;
  - an anchor mounting region for anchoring the post elements to the supporting surface and disposed at the distal end of the base element; and
  - one or more braces extending between the post element and the anchor mounting region.
11. The safety fence in accordance with claim 10 wherein the post element includes mounting means for detachably mounting the safety barrier to the one or more post elements.
12. The safety fence in accordance with claim 11 wherein the mounting means includes a clamp in the form of a scaffolding clamp.
13. The safety fence in accordance with any one of claims 9 to 12 wherein the post frame includes a chain mount to mount a chain on the post, the chain mount being disposed on the brace so as to form an exclusion zone from which unauthorised or inattentive workers should be excluded.
14. The safety fence in accordance with any one of claims 10 to 13 wherein the post element includes a stop against which the barrier element may abut when in use.
15. The safety fence in accordance with claim 14 wherein the stop is a finger extending upwardly from the base support member, a selected distance rearward from the post base region.
16. The safety fence in accordance with any one of claims 9 to 15 wherein the barrier is a panel including apertures to receive the catch.
17. A flip-lock connector adapted to hold a barrier against a safety frame including a pair of stiles and a plurality of rungs extending between the stiles, the flip-lock connector including:
  - a base comprising a collar for at least partially encircling the stile or rung of the safety frame;
  - a stem extending from the collar and comprising a head region distal the collar;
  - a slotted locking bar member for holding the barrier against the frame, the locking bar member comprising a slot, the slot being along an intermediate region of

the locking bar member, pivotally mounted to the pivot, a pivot disposed at the head region;

wherein the flip-lock is movable along and around the rung or stile for selective positioning along and around the safety frame.

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Figure 1



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Figure 2

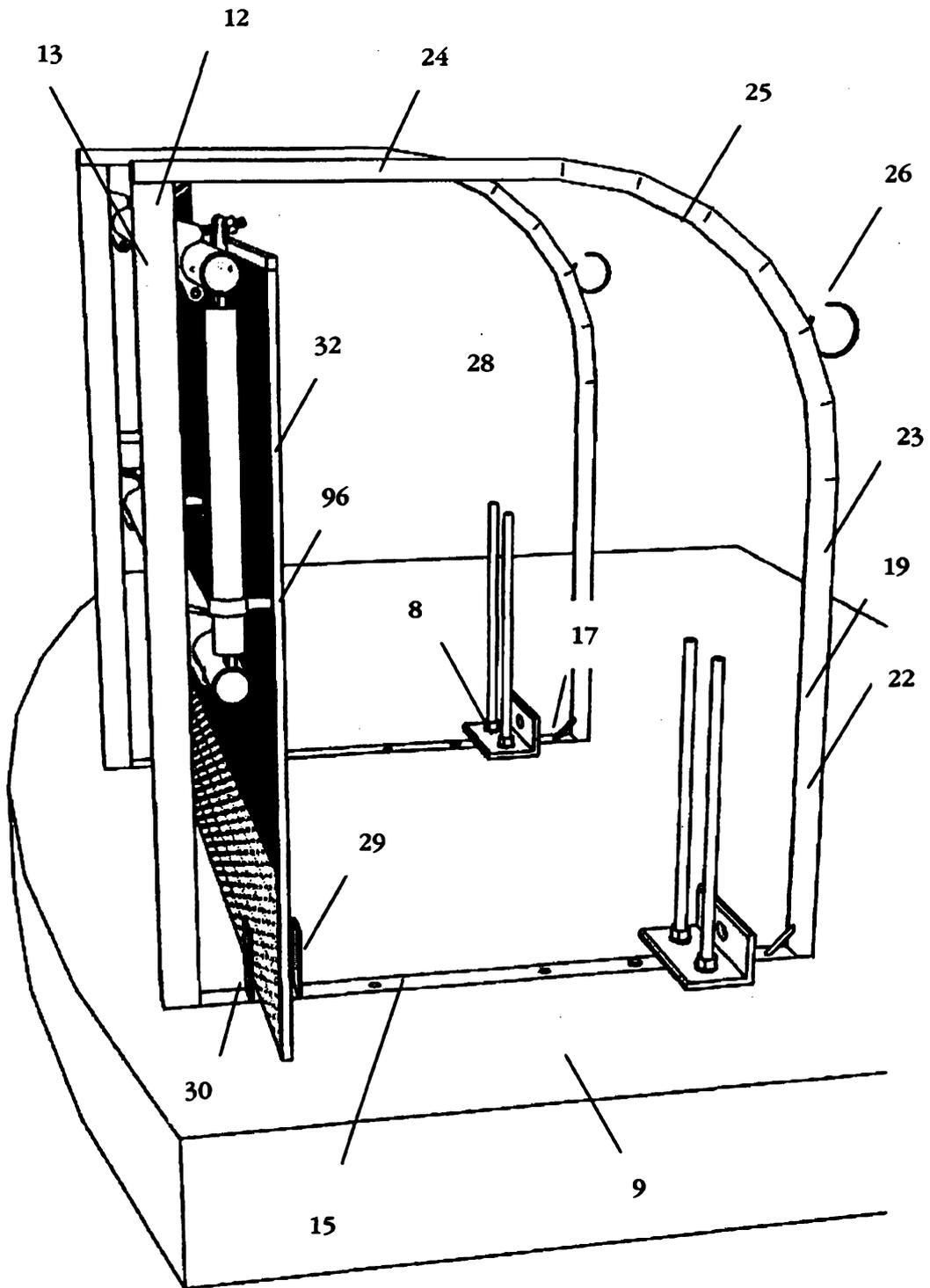


Figure 3

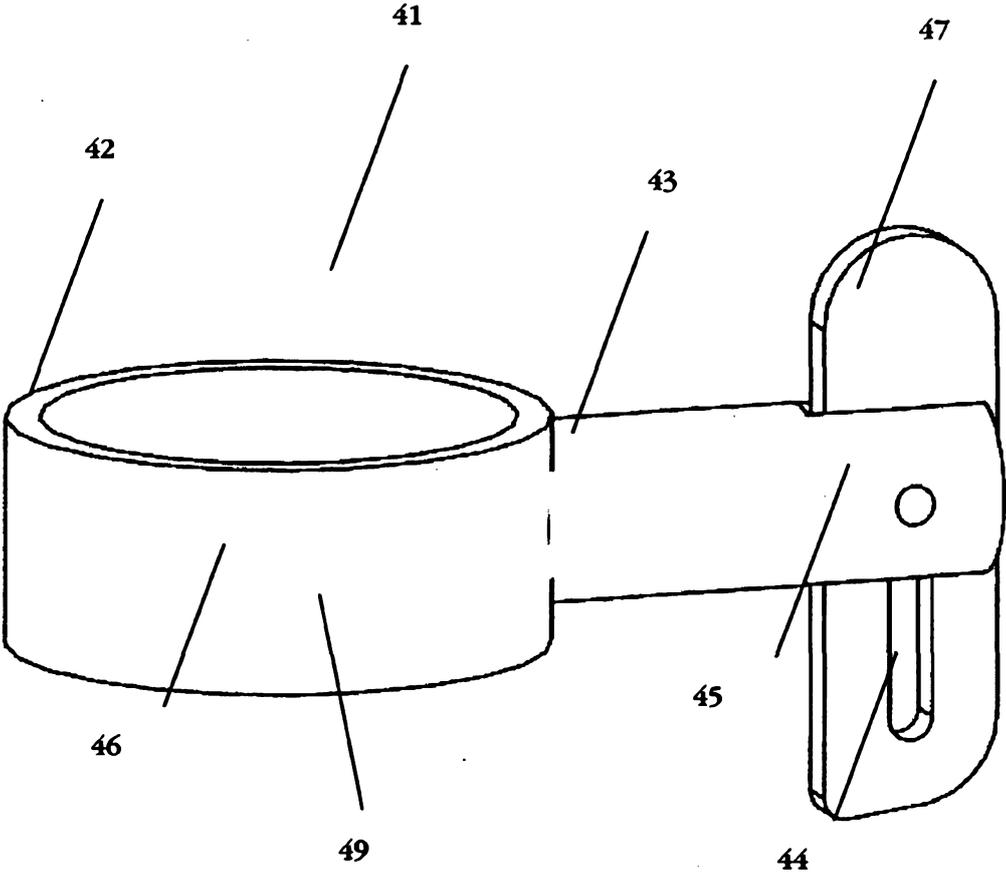
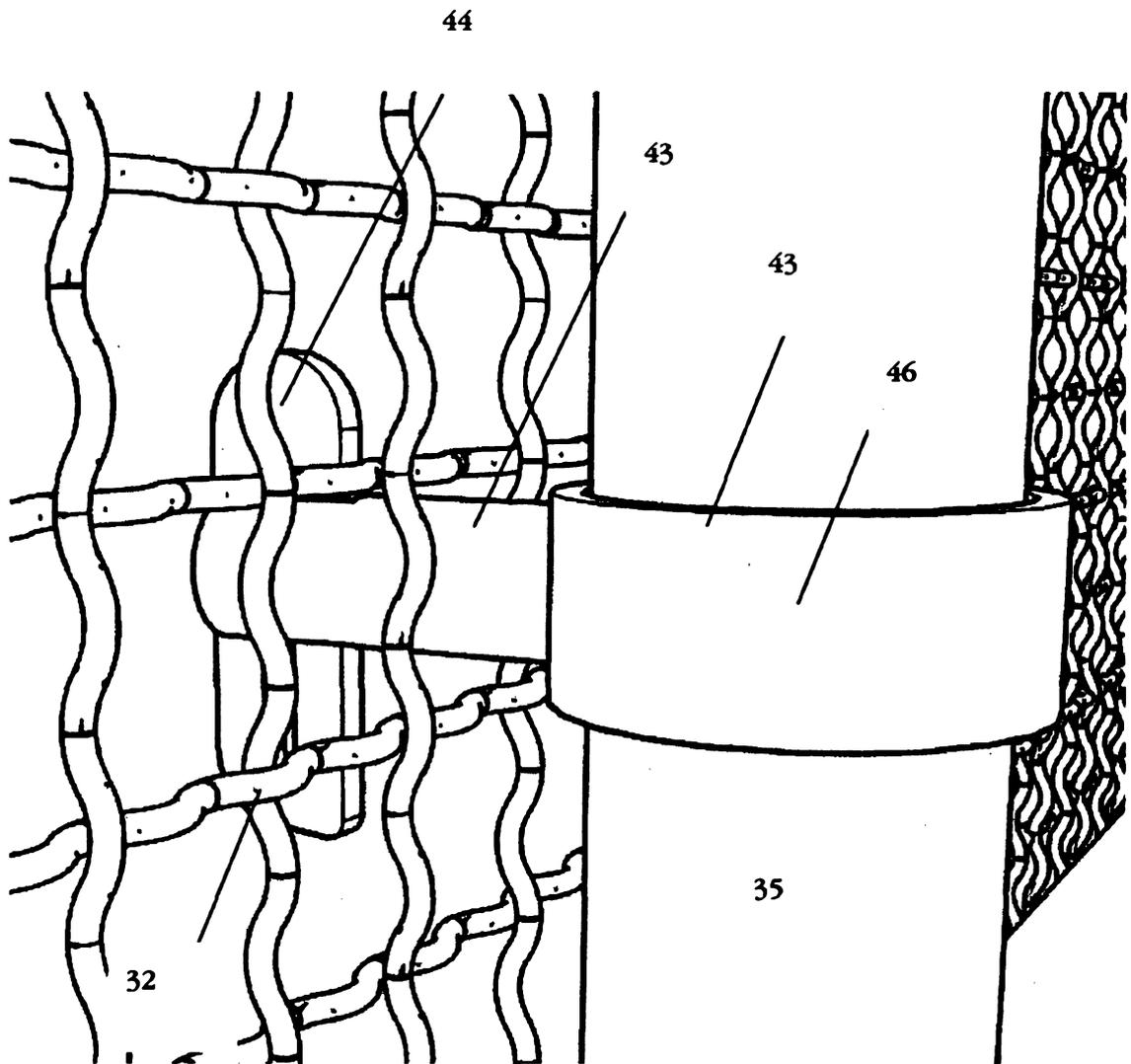
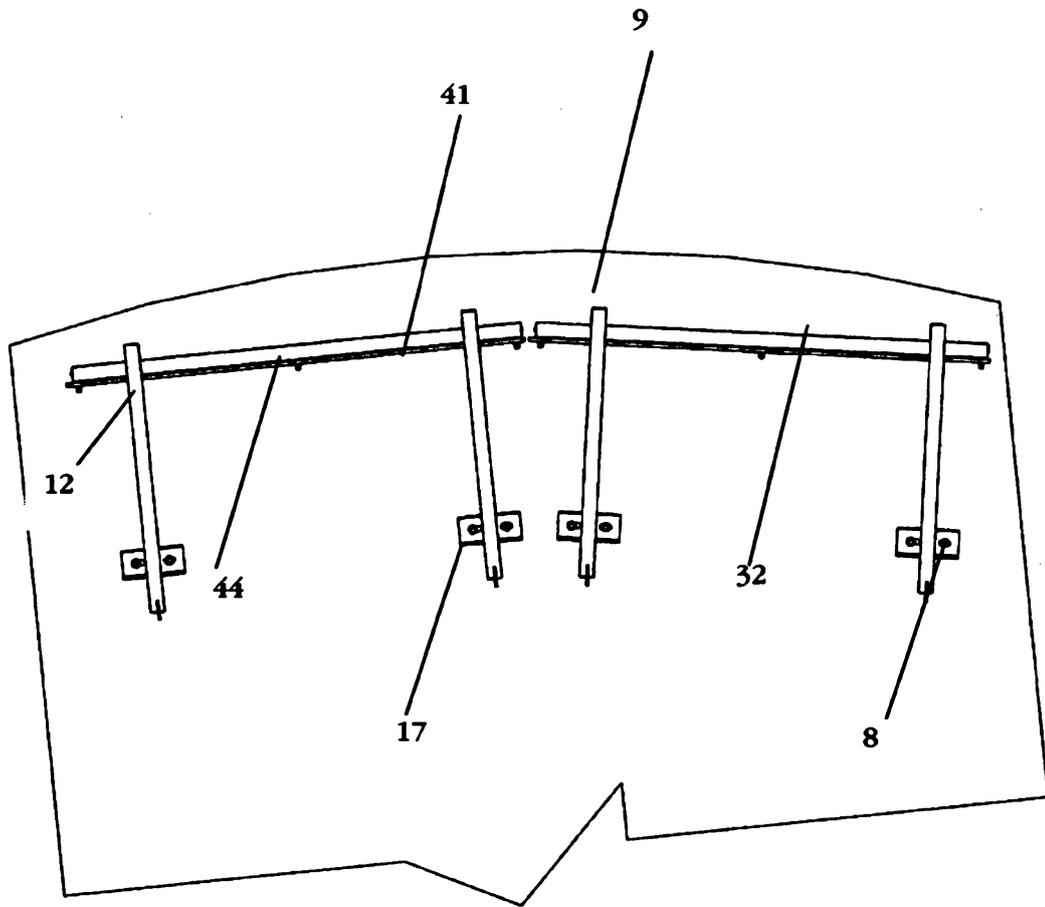


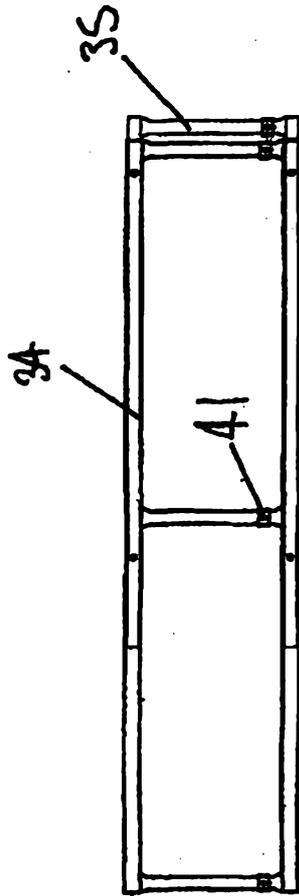
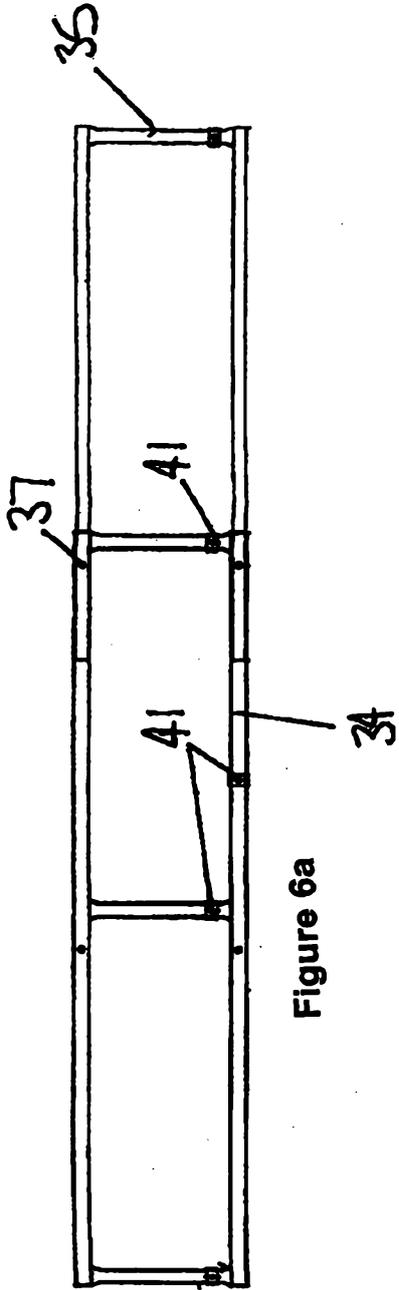
Figure 4



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Figure 5





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Figure 7

