Abstract: A lockable post assembly includes a post member (12) having a vertical axis and an anchor portion (14) at a lower first end thereof. The anchor portion (14) has a head (16) and neck (18), the neck (18) defining a female constriction above the head (16). An anchor socket (22) secured within the ground is adapted to lockably receive the anchor portion (14) so as to hold the post member (12) upright. The anchor socket (22) has a keyway passageway (24) with an inward collar portion (26). The collar portion (26) defines a male constriction above a lower cavity (30). In use, the anchor socket (22) lockably receives the anchor portion (14) by the steps of inserting the anchor portion downwardly in a first orientation about the vertical axis so that the head (16) enters the lower cavity (30), and then rotating the anchor portion (14) to a second orientation about the vertical axis so that the head (16) is underneath or abuts a bottom surface of the collar portion (26). In this way, the post member (12) is held upright and cannot be lifted from the anchor socket (22) without counter-rotating the anchor portion (14) to the first orientation.
CROWD CONTROL BARRIER POST ASSEMBLY

FIELD OF THE INVENTION

The present invention relates to a lockable post assembly and, in particular, to a crowd control barrier post assembly that is lockable to the ground, although the invention may have wider application as a lockable post assembly in controlling access for other purposes or in supporting tables and the like. For ease of understanding, however, the background, objects and preferred embodiments of the invention will be hereinafter described by reference to a crowd control barrier post assembly.

BACKGROUND OF THE INVENTION

There are many kinds of barrier posts used to control crowds, and particularly to control groups of people queuing at airports, banks and the like.

Many barrier posts are free-standing, and these posts are commonly interconnected by a linking cord, rope or cable to define a barrier for use in guiding a queue of people.

Free-standing barrier posts, in order to maintain an upright position, have a base in the form of a heavy steel disc, which may typically be 300 mm in diameter. These posts are, however, easily and regularly knocked over by people, and their wide disc bases can sometimes also serve as floor obstacles that cause people to trip or stumble, and trolleys and wheelchairs to be impeded.

Personal injury may also result if these posts were to fall down upon someone. The interconnection of the posts by a guide cable may create a dangerous slinging effect on a post if it were to fall as a result of someone falling against the guide cable.
Worse still, these posts may cause serious injury or death if they were to be picked up and wielded as weapons. Such a problem with free-standing bollards has been well documented recently with a violent incident at Sydney Airport.

Some barrier posts, whilst free-standing, are adapted to be freely seated into preformed holes anchored in the ground, and thus do not require a heavy steel disc at their base. Whilst this may prevent them falling over or being a floor obstacle, they may nonetheless be easily removed from their anchoring holes and used as weapons.

**SUMMARY OF THE INVENTION**

It is an object of the present invention to overcome, or at least substantially ameliorate, the shortcomings and disadvantages of the prior art, or at least provide a useful alternative.

According to the invention, there is provided a lockable post assembly comprising:

(a) a post member having a vertical axis and an anchor portion at a lower first end thereof, the anchor portion comprising a head and neck, the neck defining a female constriction above the head,

(b) an anchor socket secured within the ground, the anchor socket being adapted to lockably receive the anchor portion of the post member so as to hold it upright, the anchor socket comprising a keyed passageway having a male constriction above a lower cavity of the passageway, the male constriction being so configured to allow the head to pass downwardly into the lower cavity when the anchor portion is in a first orientation about the vertical axis, but to disallow the head to pass upwardly out of the lower cavity when the anchor portion is in a second orientation about the vertical axis,
wherein, in use, the anchor socket lockably receives the anchor portion by:

(i) inserting the anchor portion downwardly in the first orientation into the anchor socket so that the head enters the lower cavity, and then

(ii) rotating the anchor portion to the second orientation so that the head lies underneath a bottom surface of the male constriction,

whereby the post member is held upright and cannot be lifted from the anchor socket.

Preferably, the head has one or more upper surface that is ramped downwardly so as to define a diverging mouth for receiving an edge of the male constriction when rotating the anchor portion to the second orientation.

The anchor portion preferably further comprises a shoulder above the neck, wherein the neck defines the female constriction between the head and the shoulder, so that when the head enters the lower cavity, a lower surface of the shoulder is above or abuts a top surface of the male constriction.

The keyed passageway of the anchor socket preferably further comprises an upper cavity above the lower cavity, wherein the male constriction is between the upper and lower cavities.

It is preferred that the shoulder has a compressible O-ring secured to and projecting from its lower surface so as to compressingly abut the top surface of the male constriction.

In a preferred form, the lower cavity includes a stop pin for preventing further rotating of the anchor portion beyond the second orientation.

The degree of rotation is preferably 90°.
In a further preferred form, the male constriction is defined by an inward collar portion having a first extent which is wider than a greatest width of the head and a second extent perpendicular to the first extent which is narrower than the greatest width of the head.

In this preferred form, the male constriction is substantially rectangular shaped, but excluding square shaped, the shorter sides of which are convex. The head of the anchor portion is preferably spear-head shaped.

In a further preferred form, the post member includes spring means having a first end mounted to an inner surface of the post member and a second end connected to a crowd control or guide cable that is adapted to retractably extend from the post member. The spring means are preferably coil tension springs.

Preferably, the anchor portion of the post member is rotated to the second orientation with the use of a key spanner or other tool which engages a key recess formed axially at an upper end of the post member.

There is preferably a lockable latch assembly connected to a free end of the guide cable.

In a preferred embodiment, the lockable latch assembly comprises a cable clamp and a latch rotatably connected thereto, the latch including a spring loaded lock pin and a swivel lock arm which is adapted to rotate between an open position and a closed position where the lock pin is extended with spring expansion and is received through a mating hole of the lock arm.

In a further preferred form of the invention, the lockable post assembly further includes a plug member for fitting into at least the upper cavity of the anchor socket and forming a top surface that is substantially level with the surrounding ground.
In a yet further preferred form, the lockable post assembly is used as a crowd control barrier post assembly, but may alternatively be used as a table support post assembly.

SUMMARY OF THE DRAWINGS

In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings, in which:

Fig 1 is a front vertical section view of a crowd control barrier post assembly according to a first preferred embodiment of the invention, showing the post member in the first orientation and about to be inserted into the anchor socket,

Fig 2 is a top view of the post member shown in Fig 1,.

Fig 3 is a side vertical section view of the post member shown in Fig 1,

Fig 4 is a vertical section view of the lower part of the post member shown in Fig 1 having been inserted into the anchor socket and rotated to the second orientation,

Fig 5 is a horizontal section view across X-X in Fig 4 showing the head engaged in the lower cavity below the male constriction of the anchor socket,

Fig 6 is a front view of the upper part of the post member shown in Fig 1 showing one of the guide cables partly extended therefrom,

Fig 7 is a side vertical section view of the anchor socket shown in Fig 1 having had the plug member fitted therein,

Fig 8 is a front vertical section view of the free end of a guide cable used in another preferred embodiment of the invention, showing a lockable latch assembly, and

Fig 9 is a front view of the lockable latch assembly shown in Fig 8.
DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The crowd control barrier post assembly 10 shown in Figs 1 to 7 includes a post member 12 having a vertical axis and an anchor portion 14 at a lower first end thereof. The anchor portion 14 has a head 16, neck 18, and shoulder 20. The neck 18 defines a female constriction between the head 16 and the shoulder 20. In another embodiment, the anchor portion has a head and neck only, and the neck defines the female constriction above the head.

The barrier post assembly 10 also includes an anchor socket 22 secured within the ground. The anchor socket 22 is adapted to lockably receive the anchor portion 14 of the post member so as to hold it upright. The anchor socket 22 has a keyed passageway 24 having, in this preferred embodiment, an inward collar portion 26 intermediate an upper cavity 28 and a lower cavity 30 of the passageway. The collar portion 26 defines a male constriction between the upper and lower cavities 28, 30. The male constriction is so configured to allow the head to pass downwardly into the lower cavity when the anchor portion is in a first orientation about the vertical axis, but to disallow the head to pass upwardly out of the lower cavity when the anchor portion is in a second orientation about the vertical axis. Regarding the preferred inward collar portion 26, it has a first extent (see A in Fig 1) which is wider than the greatest width of the head 16 (as also shown in Fig 1) and a perpendicular second extent (see B in Fig 4) which is narrower than the greatest width of the head 16. In another embodiment, the keyed passageway of the anchor socket has a lower cavity only, and the male constriction is above the lower cavity.

In use, the anchor socket 22 lockably receives the anchor portion 14 by the following process. The anchor portion 14 of the post member is inserted downwardly in the first orientation into the anchor socket 22 so that the head
16 enters the lower cavity 30 and the shoulder 20 is above or abuts a top surface of the collar portion 26 defining the male constriction. The anchor portion 14 is then rotated to the second orientation so that the head 16 is underneath or abuts a bottom surface of the collar portion 26, whilst the shoulder 20 continues to be above or abut a top surface of the collar portion 26 (as shown in Fig 4). In the embodiment where the shoulder is absent from the anchor portion, the head enters the lower cavity and is then rotated so that the head lies underneath or abuts a bottom surface of the male constriction.

By this arrangement, the post member 12 is held upright and cannot be lifted from the anchor socket 22 without counter-rotating the anchor portion 14 to the first orientation.

To facilitate ease of use, the head 16 has upper surfaces 32,34 that are ramped downwardly so as to define a pair of diverging mouths for receiving a respective bottom edge of the collar portion 26 when rotating the anchor portion 14 to the second orientation.

To facilitate a tight locking, the shoulder 20 has a compressible O-ring 36 secured to and projecting from its lower surface so as to compressingly abut the top surface of the collar portion 26.

The lower cavity 30 includes a stop pin 38 for preventing further rotating of the anchor portion 14 beyond the second orientation. The stop pin 38 is so located that the degree of rotation is about 90°.

In the present embodiment, the male constriction defined by the inward collar portion 26 is (with reference to the horizontal plane) substantially rectangular shaped, but excluding square shaped, the shorter sides 40 of which are convex, as shown in Fig 5.

The head 16 of the anchor portion 14 is (with reference to the vertical plane) spear-head shaped, as shown in Figs 1, 3 and 4.
For the purpose of rotating the anchor portion 14 of the post member 12 to the second orientation, a hex (hexagonal) key spanner or other tool is used to engage a hex key recess 50 formed axially at the top of the post member 12. Rotating the hex key spanner, when so engaged, about 90° until the anchor portion 14 contacts the stop pin 38, causes the O-ring 36 to be compressed and jammed into the limited space between the top surface of the collar portion 26 and the lower surface of the shoulder 20, thus facilitating a tight locking. It will be apparent that there are a variety of known key profiles other than the aforementioned hex key profile that can be used for the spanner and recess. The choice of key profile and tool will affect the extent to which the barrier post assembly of the invention is tamper proof.

So that the barrier post assembly 10 may be preferably used for crowd control, the post member 12 includes a pair of coil tension springs 42, 44, each having a first end 46 mounted to an inner surface of the post member 12 and a second end connected to a respective cord, rope or guide cable 48 that is adapted to retractably extend from the post member 12 so as to create a, say, 1.3 metre long barrier between adjacent post members 12. Each cable 48 has an eyelet or pull link 49 at its free end. The coil tension springs 42, 44 may alternatively be one or more non-coil tension springs, or compression or torsional springs.

In another embodiment of the invention, each guide cable 48 has a lockable latch assembly 56, as shown in Figs 8 and 9, at its free end. The latch assembly 56 is, to a large extent, tamper proof.

The lockable latch assembly 56 includes a cable clamp 58 which surrounds an end portion of the guide cable 48 and is held tightly thereto by a pin 60 that traverses the cable 48. An end portion of the clamp 58 has an aperture through which is securely located a swivel pin 62 that is fixed to a
yoke 64 of a latch 66. The swivel pin 62 allows the latch 66 to swivel or rotate about a longitudinal axis of the pin 62 relative to the cable clamp 58.

The yoke 64 of the latch 66 has an internal cavity 68 in which is securely located a coil compression spring 70. Partly housed within the cavity 68, and engaged with the spring 70, is a lock pin 72 having a chamfered annular edge at the end of the pin 72 adapted to protrude from the cavity 68. The lock pin 72 is so engaged with the spring 70 as to retract or depress into the cavity 68 against the tension of the spring 70, thereby compressing the spring, when a force is applied axially against its protruding end, and to extend or expand out of the cavity 68 with the expansion of the spring 70 when the force is released.

Rotatably connected to the yoke 64 by a pin 74 is a swivel lock arm 76. The arm 76 is curved in such a way that its free end 78 can be located, upon rotation of the arm 76, adjacent the part of the yoke 64 from which the lock pin 72 protrudes. A mating hole 80 for the lock pin 72 is located through the free end 78. In order for the mating hole 80 to receive the lock pin 72 therethrough, and so close the lock arm 76, the free end 78 of the arm 76 is brought towards the lock pin 72, and the lock pin 72 is variously depressed sufficiently into the cavity 68, against spring tension, to allow the lock pin 72 to axially align with the mating hole 80 and then extend sufficiently out of the cavity 68, with spring expansion, to enter and be received through the mating hole 80. The spring 70 allows the protruding end of the lock pin 72 to expand only so far as to stop at a concealed position just below, or flush with, the outermost surface of that part of the swivel lock arm 76 that immediately surrounds the mating hole 80. This concealed stop position of the lock pin 72 is sufficient to prevent, to a large extent, unauthorised persons tampering with the latch 66 and causing the lock arm 76 to open, whereby a latched part of, say, an adjacent post member or other barrier forming element can escape its capture by the latch 66. Opening
of the lock arm 76 can only occur if a person uses an appropriately sized tool to press axially against the concealed end of the lock pin 72 and force it to a sufficiently retracted position where it is no longer received within the mating hole 80.

After use of the barrier post assembly 10, the post member 12 can be lifted from the anchor socket 22 by using the hex key spanner to counter-rotate the post member 12 to the first orientation. The now empty anchor socket 22 may present an injury risk, and so a removable plug member 52 is fitted into at least the upper cavity 28 of the anchor socket 22 so as to form a top surface 54 that is substantially level with the surrounding ground, thereby temporarily plugging-off the anchor socket.

A large number of anchor sockets 22 may typically be arranged in a predetermined grid pattern across the floor area of, say, an airport terminal or wherever variation in crowd queue lines may be required. For example, a grid pattern where the anchor sockets are spaced apart by 1.3 m in both directions of the grid, and where the grid covers an area of 10.4 m by 15.6 m at an airport terminal, would have 117 anchor sockets available for engagement with, say, 50 post members. It will be apparent that, with this arrangement, the post members can be organised into a variety of desired crowd queue lines. Those anchor sockets not being used would be plugged off for possible later use.

It will be apparent to persons skilled in the art that various modifications may be made in details of design and construction of the lockable post assembly described above, and in the applications thereof, without departing from the scope or ambit of the present invention.

For example, the tip of the spear-head shaped head 16 of the anchor portion 14 of the post member 12 may have a slot into which is inserted a rubber dowel that also protrudes outwardly (or downwardly) from the tip so as
to protect tiled floors and the like from being damaged in the event that the post member is dropped vertically thereon.
CLAIMS

1. A lockable post assembly comprising:
   (a) a post member having a vertical axis and an anchor portion at a lower first end thereof, the anchor portion comprising a head and neck, the neck defining a female constriction above the head,
   (b) an anchor socket secured within the ground, the anchor socket being adapted to lockably receive the anchor portion of the post member so as to hold it upright, the anchor socket comprising a keyed passageway having a male constriction above a lower cavity of the passageway, the male constriction being so configured to allow the head to pass downwardly into the lower cavity when the anchor portion is in a first orientation about the vertical axis, but to disallow the head to pass upwardly out of the lower cavity when the anchor portion is in a second orientation about the vertical axis,
   wherein, in use, the anchor socket lockably receives the anchor portion by:
   (i) inserting the anchor portion downwardly in the first orientation into the anchor socket so that the head enters the lower cavity, and then
   (ii) rotating the anchor portion to the second orientation so that the head lies underneath a bottom surface of the male constriction,
whereby the post member is held upright and cannot be lifted from the anchor socket.
2. The lockable post assembly of claim 1 wherein the head has one or more upper surface that is ramped downwardly so as to define a diverging mouth for receiving an edge of the male constriction when rotating the anchor portion to the second orientation.

3. The barrier post assembly of claim 1 wherein the anchor portion further comprises a shoulder above the neck, wherein the neck defines the female constriction between the head and the shoulder, so that when the head enters the lower cavity, a lower surface of the shoulder is above or abuts a top surface of the male constriction.

4. The barrier post assembly of claim 1 wherein the keyed passageway further comprises an upper cavity above the lower cavity, wherein the male constriction is between the upper and lower cavities.

5. The lockable post assembly of claim 3 wherein the shoulder has a compressible O-ring secured to and projecting from its lower surface so as to compressingly abut the top surface of the male constriction.

6. The lockable post assembly of claim 1 wherein the lower cavity includes a stop pin for preventing further rotating of the anchor portion beyond the second orientation.

7. The lockable post assembly of claim 1 wherein the post member includes spring means having a first end mounted to an inner surface of the post member and a second end connected to a respective guide cable that is adapted to retractably extend from the post member.
8. The lockable post assembly of claim 7 wherein the spring means are coil tension springs.

9. The lockable post assembly of claim 1 wherein the post member has a key recess formed axially at an upper end thereof, the key recess being adapted to engage a key spanner or other tool for use in rotating the anchor portion of the post member to the second orientation.

10. The lockable post assembly of claim 1 wherein the degree of rotation is 90°.

11. The lockable post assembly of claim 7 wherein the guide cable has a free end to which is connected a lockable latch assembly.

12. The lockable post assembly of claim 11 wherein the lockable latch assembly comprises a cable clamp and a latch rotatably connected thereto, the latch including a spring loaded lock pin and a swivel lock arm which is adapted to rotate between an open position and a closed position where the lock pin is extended with spring expansion and is received through a mating hole of the lock arm.
INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU201/000446

A. CLASSIFICATION OF SUBJECT MATTER

Int. CI.

E04H 12/22 (2006.01) E01F 13/02 (2006.01) E04H 17/22 (2006.01) E01F 9/011 (2006.01)

E01F 13/04 (2006.01) E01F 9/013 (2006.01) E01F 15/10 (2006.01) E01F 9/012 (2006.01)

E02D 5/54 (2006.01) E02D 5/80 (2006.01)

Action Date: 17 June 2011

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)

Documented a search 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)

EPDOC, WPI: IPC Marks E04H 12/-, E04H 17/-, E01F 9/-, E01F 10/-, E01F 11/-, E01F 12/-, E01F 13/-, E01F 14/-, E01F 15/-, E02D/54, E02D/80 & keywords (post+, bollard?, barrier, socket+, anchor+, sleeve+, lock+, clamp+, twist+, rotat+, groove+, recess+, constrict+, lug+, collar+, ground) and like terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>WO 2002/018707 A1 (ROACH) 7 March 2002 see figures 4-5, 7-8 and page 3 lines 25-26, page 4 lines 8-14, page 5 lines 1-22, page 6 lines 3-25</td>
<td>1-3, 6-10</td>
</tr>
<tr>
<td>Y</td>
<td>See figures 4-5 &amp; 7-8</td>
<td>6, 11-12</td>
</tr>
<tr>
<td></td>
<td>GB 2084226 A (JOHNSTONE SAFETY LIMITED) 7 April 1982 See figures 1-3, page 1 lines 10-15 and 81-85</td>
<td>1-5, 9-10</td>
</tr>
<tr>
<td></td>
<td>Y See figures 1-3, page 1 lines 10-15 and 81-85</td>
<td>6</td>
</tr>
</tbody>
</table>

X Further documents are listed in the continuation of Box C. X 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 invention 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
  "K" document member of the same patent family

Date of the actual completion of the international search 29 June 2011

Date of mailing of the international search report 6 JUL 2011

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustralia.gov.au
Facsimile No. +61 2 6283 7999

Authorized officer

KALPANA NARAYAN
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No: +61 3 9935 9632

Form PCT/ISA/2 10 (second sheet) (July 2009)
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>AU 1997/46805 A1 (ROACH) 17 June 1999 See figures 2-3, 4-5, 8-9 and page 5 lines 13-16, page 7 lines 11-13, page 10 line 20-page 12 line 4</td>
<td>1-3, 9-10</td>
</tr>
<tr>
<td>Y</td>
<td>See figures 2-3, 4-5, 8-9 and page 5 lines 13-16, page 7 lines 11-13, page 10 line 20-page 12 line 4 US 5634246 A (JERMYN) 3 June 1997</td>
<td>6</td>
</tr>
<tr>
<td>Y</td>
<td>See figures 1-2 and col. 3 line 21-col. 6 line 13</td>
<td>11-12</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WO 02 18707</td>
<td>AU 35246/01</td>
</tr>
<tr>
<td>GB 2084226</td>
<td>NONE</td>
</tr>
<tr>
<td>AU 199746805</td>
<td>NONE</td>
</tr>
<tr>
<td>US 5634246</td>
<td>NONE</td>
</tr>
</tbody>
</table>

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

END OF ANNEX