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GUARDRAIL LOCKING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to a safety rail assembly and in particular, though not exclusively, to a locking device for a safety rail surrounding a specific area in a structure, such as for instance manhole on onshore and offshore structures.

In many industrial facilities, manholes or access openings provide access for workers to traverse from one level of the facility to another, for example to provide access to below deck equipment or to a underground tunnel. Unfortunately, the manholes also provide locations from which a worker could fall to a lower level. In order to make them safer, such access openings are usually provided with guard rails to help prevent a worker from accidentally stepping off the edge of the hole and falling.

There are several conventional methods of securing the guardrail adjacent the opening. One method involves the use of a guardrail with bracing support, which uses erection of scaffold poles as a guardrail for the openings. The guardrail is secured to a permanent structure in a designated rigid location of the base structure, such as for instance a shipside handrail. Such guard rails are rigidly secure but have a disadvantage of blocking or obstructing passageways where the workers need to move within the facility, forcing the workers to take detours to get to a work place. Moreover, such as structure occupies more useful space with its bracing supports.

Another known method of a tack-welded guardrail. In this method, erected scaffold poles are used as guardrails. They are secured to the structure by tack-welding of the scaffold stanchions to the deck. The tack-welded guardrail is rigid; it does not occupy too much space. However, the welding required to erect such guard rails creates a fire hazard, explosion hazard, as well as the danger of electrocution and bodily injury.

Still another method of securing a guard rail involves the use of bolts and nuts for fastening the guard rail cage with the manhole structure. Such guard rails are relatively easy to install. However, such cages are usually narrow, making access and egress difficult in an emergency. Additionally, the bolted guard rails cannot be used in every size manhole or every type of manhole.

Several patented attempts were made to solve the existing problems. U.S. Patent No. 3,480,257 for "Guard Rail Stanchion" teaches an adjustable-height upright members,



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the bottom of which is secured to a horizontal support member made of angle iron. The support member rests on a floor of a structure. An L-shaped clamping member is adjustably pivoted at one end of the support member; a portion of the clamping member extends below a floor section, where a stanchion is to be positioned. A locking assembly has a support bracket, which extends upwardly from the horizontal support member. The locking assembly pivotally secures the clamping member and moves it into engagement with the floor section to hold the stanchion in place.

U.S. Patent No. 6,006,862 for "Temporary guard rail assembly for scaffolding" teaches a first clamping assembly engaging the horizontal member of scaffolding, a second clamping member engaging an adjacent vertical member of the scaffolding, an adjustable arm assembly connecting the first and second clamping assemblies, and a guard rail support extending vertically from the first clamping assembly. The first and second clamping assemblies are fastened to the respective members of the scaffolding to provide, vertically extending guard rail supports above the uppermost members of the scaffolding. Guard rails are positioned on the supports and provide fall protection for workers prior to their moving to the top most level of the scaffolding.

The present invention contemplates elimination of drawbacks associated with the prior art and provision of a stable locking device for a guard rail.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a locking device for a guardrail of an access opening.

It is another object of the invention to provide a locking device for a guardrail, which facilitates stability of the guardrail assembly.

It is a further object of the invention to provide a guardrail locking device, which occupies minimum floor space.

These and other objects of the invention are achieved through a provision of a locking device for use with a guard rail erected adjacent an access opening having a peripheral lip. The locking device is configured to rest on a support surface adjacent the access opening. The locking device comprises a first elongate bar having a distant end and a proximate end, a second elongate bar having a proximate end and a distant end, said second elongate bar being configured for sliding engagement with the first elongate

bar, and a transverse bar secured to a proximate end of each of the first elongate bar and the second elongate bar; said transverse bar being configured to engage the peripheral lip of the access opening.

The transverse bar carries a channel bar guide within which the proximate ends of the elongate bars are engaged. The transverse bar has a J-shaped configuration, with a hook portion being adapted to engage the peripheral lip of the manhole. A stanchion-receiving sleeve is secured at a distant end of each of the first elongate bar and the second elongate bar. Each sleeve receives a stanchion of the guardrail.

A locking pin is engaged with each of the stanchion-engaging sleeve. The locking pin tightens the stanchion of the guard rail in the sleeve. A stop bracket is secured to the sliding bars near each of the stanchion-receiving sleeves to limit horizontal movement of the locking pin and prevent the locking pin from falling out of engagement with the sleeve.

BRIEF DESCRIPTION OF THE DRAWINGS

For a further understanding of the nature and objects of the invention reference should be made to the following description in conjunction with the attached drawings.

Figure 1 is an isometric view of the guardrail locking device of the present invention.

Figure 2 is a detail front view illustrating engagement of the locking pin with a stanchion-receiving sleeve.

DETAIL DESCRIPTION OF THE INVENTION

Turning now to the drawing in more detail, numeral 10 designates the locking device of the present invention. The locking device 10 comprises a pair of substantially planar elongated bars 12 and 14 that are configured to be positioned on a flat surface of a structure, for instance deck of a ship, or floor of a building, or other such location. Each elongated bar 12 and 14 can be of any desired length and width. In one aspect, the elongated bars 12 and 14 can be 1000mm long and 65mm wide and 9mm thick.

The elongated bar 12 has a distant end 16 and a proximate end 18; the elongated bar 14 has a distant end 20 and a proximate end 22. The proximate ends 18 and 22 overlap, as shown in Figure 1, such that at least a portion of the second elongated bar 14 slides on top of the first elongated bar 12. Of course, the position of the sliding bars 12

and 14 can be reversed, such that the distant end 20 of the second sliding bar 14 rests on the supporting surface, while the proximate portion 18 of the first sliding bar 12 slides atop the proximate portion 22 of the second sliding bar 14.

The locking device 10 further comprises a cross bar 30 configured to hook onto an edge of a manhole opening. The cross bar 30 comprises a generally J-shaped body having an elongated leg 32 and a hook-shaped part 34. The elongated leg 32 has a planar configuration with a flat bottom surface 36 that is configured to rest on the supporting surface of a ship's deck or building floor in a transverse relationship to the longitudinal axes of the elongated bars 12 and 14.

A proximate end 38 of the cross bar 30 is positioned under the proximate portions 18 and 22 of the elongated bars 12 and 14 when the locking device 10 is placed on the supporting surface. In one aspect, the leg 32 has the same width as the elongated bars 12 and 14 and be approximately 500mm long.

The hook-shaped part 34 is securely attached to the elongated leg 32. If desired, the hook-shaped part may be unitary connected with the leg 32. The hook-shaped part 34 comprises a first vertically extending member 50 which extends at a right angle to the normal plane of the leg 32, and a second member 52 which is bent at about 90 degrees in relation to the vertically extending member 50. In one aspect, the second member 52 extends in a substantially parallel relationship to the leg 32. As can be seen in Figure 1, the second member 52 of the hook-shaped part 34 is bent inwardly, toward the elongated bars 12 and 14. In one of the embodiments, the vertically extending member 50 is about 150mm long, and the second member 52 is about 50mm long, with the width being substantially the same – about 65mm.

A channel bar guide 60 is secured to an upper surface of the leg 32 adjacent the proximate end 38 of the cross bar 30. The channel bar guide 60 receives the proximate portions 18 and 22 of the elongated bars 12 and 14 in a sliding engagement therein. The channel bar guide 60 has opposing openings aligned with the normal planes of the first elongate bar 12 and the second elongate bar 14. The channel bar guide 60 ensures relative parallel movement of the sliding bars 12 and 14 while retaining the sliding bars 12 and 14 secured to the transverse bar 30. The channel bar guide 60 is formed by an inverted U-

shaped member that forms a channel at least slightly larger than the width of the sliding bars 12 and 14.

The distance between the distant ends 16 and 20 can be adjusted depending on the size of the manhole where the locking device is installed. The sliding relationship between the bars 12 and 14 allows the user to move the sliding bars' distant ends closer for smaller size manholes and farther apart for larger size manholes.

A stanchion receiving sleeve 62 is secured to the distant end 16 of the first sliding bar 12. A similar sleeve 64 is secured to the distant end 20 of the second sliding bar 14. The sleeves 62, 64 comprise hollow upright bodies extending upwardly from the sliding bars 12 and 14. In one of the embodiments, the height of each of the sleeves 62, 64 is about 100mm and the diameter of the opening about 50mm. Of course, the height, width and configuration of the sleeves 62, 64 may differ depending on the size and shape of the guardrail stanchions with which the locking device 10 is designed to be used.

A stop bracket 70 is secured to the first sliding bar 12 adjacent the upright sleeve 62. The bracket 70 has a generally L-shaped configuration with two plates 72, 74 secured at a right angle to each other. The horizontal plate 72 of the bracket 70 extends horizontally, while the vertical plate 74 is upright. The vertical plate 74 defines a stop plate for a locking pin 76 fitted to the sleeve 62. The locking pin 76 can be a threaded T-pin with a handle 78 and a locking end 79, which is configured to frictionally contact a stanchion of the guardrail.

A second stop bracket 80 is positioned adjacent the sleeve 64. The stop bracket 80 is a mirror image of the stop bracket 70. A locking pin (not shown) similar to the locking pin 76 is secured adjacent the sleeve 64, between the stop plate of the bracket 80 and the sleeve 64. The stop brackets 70 and 80 limit horizontal movement of the locking pins. The locking pins can be about 25.4mm long and about 9.42mm in diameter.

In operation, a user positions the locking device 10 adjacent a manhole and extends the vertical member 50 of the cross bar 30 into an opening of the manhole. The user then manipulates the locking bar so that the horizontal member 52 hooks onto the peripheral lip of the manhole structure. The length of the locking device 10 is adjusted by sliding the bars 12 and 14 relative to one another according to the width of the access opening.

A guardrail is then secured with the locking device 10 by inserting the lower ends of a stanchion into the sleeves 62, 64. The guardrail is further secured by tightening the locking pins located near the sleeves 62, 64 by moving the pins into frictional contact with the stanchions.

The locking device of the present invention replaces conventional structures and overcome their disadvantages. The locking device 10 occupies minimal space near the manhole; it can be positioned near any manhole having a horizontal support surface. The locking device 10 can be horizontally adjusted to accommodate different size access openings. No welding or additional bracing is required to secure the guardrail structure. The locking pin facilitates stable position of the guardrail, while the stop bracket prevents the locking pin from falling out and disengaging from the stanchion-receiving sleeve.

If desired, the locking device 10 can be painted a bright color, for instance yellow or orange to alert a worker of the manhole or other access opening.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims. Because many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

CLAIMS

We claim:

1. A locking device for use with a guard rail erected adjacent an access opening formed in a horizontal support surface and having a peripheral lip below the horizontal support surface, the locking device comprising:
a first elongate bar having a distant end and a proximate end;
a second elongate bar having a proximate end and a distant end, said second elongate bar being configured for parallel sliding engagement with the first elongate bar; and
a transverse bar extending in a transverse relationship to the first elongate bar and the second elongate bar, said transverse bar being configured to rest on the horizontal support surface and having a hook-shaped end with a first part configured to extend downwardly in relation to the horizontal support surface and a second part unitary connected to the first part, the second part being configured to extend transversely to the first part toward the first elongate bar and the second elongate bar so as to engage the peripheral lip of the access opening, said transverse bar being provided with a second end carrying an upwardly extending channel bar guide, said channel bar guide being configured to slidably receive the proximate end of the first elongate bar and the proximate end of the second elongate bar.
2. The device of claim 1, wherein each of said first elongate bar and said second elongate bar comprises a substantially planar body.
3. The device of claim 1, wherein the transverse bar extends in a transverse relationship to longitudinal axes of the first elongate bar and the second elongate bar.
4. The device of claim 1, wherein the transverse bar comprises a generally J-shaped body having an elongate leg with the hook-shaped end.
5. The device of claim 4, wherein the hook-shaped end comprises a vertically extending member and a horizontally extending member.
6. The device of claim 5, wherein the vertically extending member extends transversely to a normal plane of the transverse bar.

7. The device of claim 5, wherein the horizontally extending member extends in a substantially parallel relationship to a normal plane of the transverse bar.
8. The locking device of claim 1, further comprising a first sleeve secured to the first elongate bar adjacent the distant end of the first elongate bar and a second sleeve secured to the second elongate bar adjacent the distant end of the second elongate bar, said first sleeve and said second sleeve each being configured to receive an upright stanchion of the guardrail.
9. The device of claim 8, further comprising a first stop bracket secured to the distant end of the first elongate bar adjacent the first sleeve and a second stop bracket secured to the distant end of the second elongate bar adjacent the second sleeve.
10. The device of claim 9, further comprising a first locking pin mounted in the first stop bracket and configured to engage the first sleeve and a second locking pin mounted in the second stop bracket and configured to engage the second sleeve.
11. The device of claim 10, wherein said first locking pin is mounted between the first sleeve and the first stop bracket, and the second pin is mounted between the second sleeve and the second stop bracket.
12. A method of securing a guardrail adjacent an access opening formed in a horizontal support surface and provided with a peripheral lip, the method comprising the steps: providing a locking device comprising a first elongate bar having a distant end and a proximate end, a second elongate bar having a proximate end and a distant end, said second elongate bar being configured for parallel sliding engagement with the first elongate bar, and a transverse bar secured to a proximate end of each of the first elongate bar and the second elongate bar, said transverse bar extending in a transverse relationship to the first elongate bar and the second elongate bar, said transverse bar having a hook-shaped end with a first part configured to extend downwardly in relation to the horizontal support surface and a second part unitary connected to the first part, the second part being configured to extend transversely to the first part toward the first elongate bar and the second elongate bar; positioning the locking device adjacent the access opening such that the transverse bar rests on the horizontal support surface and engaging the hook-shaped end of the transverse bar with the peripheral lip of the access opening;

engaging stanchions of the guardrail with the first elongate bar and the second elongate bar, while slidably adjusting horizontal extension of the first elongate bar and the second elongate bar according to configuration of the access opening.

13. The method of claim 12, further comprising a step of providing stanchion-engaging sleeves on the first elongate bar and the second elongate bar.
14. The method of claim 13, further comprising a step of providing a locking pin configured to frictionally engage the stanchions of the guardrail, said locking pins being supported by the stanchion-engaging sleeves.
15. The method of claim 14, further comprising a step of providing a stop bracket for limiting horizontal movement of the locking pin.
16. The method of claim 12, wherein said transverse bar has a generally J-shaped configuration and is configured for resting on a horizontal surface adjacent the access opening.
17. The method of claim 16, further comprising a step of providing a channel bar guide and securing the channel bar guide to the transverse bar in a position to receive the proximate ends of the first elongate bar and the second elongate bar in a parallel sliding relationship therein.