



(12) **DEMANDE DE BREVET CANADIEN  
CANADIAN PATENT APPLICATION**

(13) **A1**

(22) Date de dépôt/Filing Date: 2018/04/03

(41) Mise à la disp. pub./Open to Public Insp.: 2018/10/03

(30) Priorité/Priority: 2017/04/03 (US62480623)

(51) Cl.Int./Int.Cl. *E01F 9/669* (2016.01),  
*E04G 21/32* (2006.01), *E04H 17/14* (2006.01)

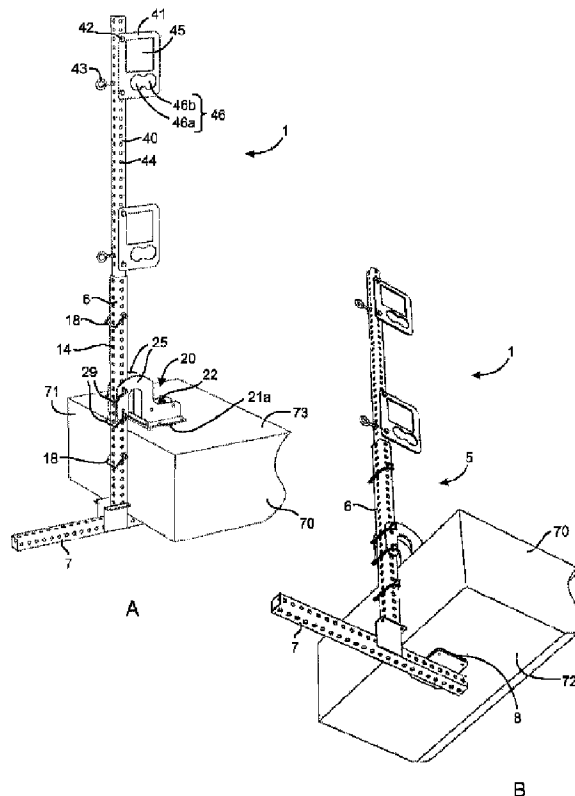
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(54) Titre : COLONNETTE RECONFIGURABLE ET SYSTEME DE GLISSIERE DE SECURITE

(54) Title: RECONFIGURABLE STANCHION AND GUARDRAIL SYSTEM



(57) **Abrégé/Abstract:**

A reconfigurable stanchion for supporting a guardrail on a support surface has a substantially vertically oriented elongated guardrail support configured to support a guardrail, a mounting arm configured to reversibly receive the guardrail support and an adjustable fastening assembly releasably attached to the mounting arm. The ability to reversibly mount the guardrail support on different portions of the mounting arm and the ability to relocate and reconfigure the fastening assembly on the mounting arm permits the use of the same stanchion in a guardrail system for a variety of different support surfaces, including balconies, open-hole ledges, flat roofs and parapet roofs.

## ABSTRACT

A reconfigurable stanchion for supporting a guardrail on a support surface has a substantially vertically oriented elongated guardrail support configured to support a guardrail, a mounting arm configured to reversibly receive the guardrail support and an adjustable fastening assembly releasably attached to the mounting arm. The ability to  
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## RECONFIGURABLE STANCHION AND GUARDRAIL SYSTEM

### Field

This application relates to stanchions for supporting guardrails and to guardrail systems and kits utilizing such stanchions.

### 5 Background

Portable guardrail systems are used to protect workers from falling from high places, such as roofs and balconies, while performing work. Portable guard rail systems generally comprise stanchions, guardrails supported on the stanchions and some means of securely supporting the stanchion on the roof or balcony. However, portable guardrail systems are generally designed for only one type of application. Different systems are generally required to erect guardrails for different types of applications. For example, systems designed for a parapet roof could not be effectively used on a flat roof, a balcony or an open-hole ledge without using significantly different parts. Thus, multiple systems are required for different applications. Existing systems are therefore not generally reconfigurable for a plurality of different applications.

There remains a need for a reconfigurable guardrail system that can be used in a variety of different applications.

### Summary

A reconfigurable stanchion for supporting a guardrail on a support surface has a substantially vertically oriented elongated guardrail support configured to support a guardrail, a mounting arm configured to reversibly receive the guardrail support and an adjustable fastening assembly releasably attached to the mounting arm. The ability to reversibly mount the guardrail support on different portions of the mounting arm and the ability to relocate and reconfigure the fastening assembly on the mounting arm permits the use of the same stanchion in a guardrail system for a variety of different support surfaces, including balconies, open-hole ledges, flat roofs and parapet roofs.

In one aspect, there is provided a reconfigurable stanchion for supporting a guardrail on a support surface, the reconfigurable stanchion comprising: a substantially vertically oriented elongated guardrail support configured to support a guardrail; a mounting arm, the mounting arm comprising a first elongated portion and a second elongated portion, the first elongated portion oriented substantially perpendicular to the second elongated portion, the first elongated portion having a first end configured to be able to securably and

reversibly receive the guardrail support, the second elongated portion having a first end configured to be able to securably and reversibly receive the guardrail support, the guardrail support received by and reversibly secured to either the first elongated portion or the second elongated portion, the second elongated portion comprising a first external support engagement surface configured to engage a first surface of a supporting structure for the stanchion; and, an adjustable fastening assembly releasably attached to the first elongated portion, the fastening assembly releasably attachable to the first elongated portion in a plurality of configurations and at a plurality of locations along a length of the first elongated portion, the fastening assembly having a second support engagement surface configured to engage a second surface of the supporting structure when the fastening assembly is attached to the first elongated portion, the fastening assembly further having a flange comprising spaced-apart portions forming a channel in the fastening assembly between the spaced-apart portions, the second support engagement surface situated on the adjustable fastening assembly outside the channel.

In another aspect, there is provided a kit comprising: a plurality of elongated guardrail supports; a plurality of mounting arms, each mounting arm comprising a first elongated portion and a second elongated portion, the first elongated portion oriented substantially perpendicular to the second elongated portion, the first elongated portion having a first end configured to be able to securably and reversibly receive one of the guardrail supports, the second elongated portion having a first end configured to be able to securably and reversibly receive one of the guardrail supports, the second elongated portion comprising a first external support engagement surface configured to engage a first surface of a supporting structure; a plurality of adjustable fastening assemblies, each adjustable fastening assembly releasably attachable to the first elongated portion of one of the mounting arms in a plurality of configurations and at a plurality of locations along a length of the first elongated portion, the fastening assembly having a second support engagement surface configured to engage a second surface of the supporting structure, the fastening assembly further having a flange comprising spaced-apart portions forming a channel in the fastening assembly between the spaced-apart portions, the second support engagement surface situated on the adjustable fastening assembly outside the channel; and, instructions for assembling the elongated guardrail supports, mounting arms and fastening assemblies into stanchions for a guardrail system supported on the supporting structure.

A plurality of the reconfigurable stanchions may be used in a guardrail system in which at least one guardrail is mounted on at least two of the stanchions. The kit provides

portability of the system between work sites where the guardrail system may be used in a variety of guardrail applications.

5 The supporting structure may be, for example, a balcony, an open-hole ledge, a flat roof or a parapet roof. The supporting structure may be made of any generally suitable construction material, for example wood, metal (e.g. steel), concrete (poured or pre-cast) and the like. The type of fasteners that may be used in some embodiments to assist with reinforcing the stanchion on the supporting structure may be prescribed by the type of construction material of the supporting structure.

10 The guardrail support may be adjustable along at least a portion of a length of the elongated portion to which the guardrail support is reversibly secured. Further, the guardrail support may be reversibly securable to the elongated portion at a plurality of locations along the elongated portion to which the guardrail support is reversibly secured.

15 The guardrail support may comprise at least one rail bracket reversibly secured thereto. The at least one rail bracket may be reversibly securable to the guardrail support at a plurality of locations along a length of the guardrail support. The rail bracket may comprise a first aperture configured to receive and support a guardrail having a polygonal cross-section (e.g. triangular, square, rectangular, etc.). The rail bracket may comprise a second aperture configured to receive and support a guardrail having a circular and/or ellipsoidal cross-section. Guardrails having substantially cylindrical cross-sections may be secured within the second aperture in a side-by-side configuration by a bolt tightened against a side of one of the two guardrails. If desired, guardrails may be secured together by other fasteners, for example screws, bolts, clamps and the like, for added security. Guardrails may be made of wood, metal (e.g. steel), high strength plastic or any other suitably durable material. The kit may comprise a plurality of the rail brackets releasably securable to the plurality of guardrail supports. The instructions in the kit may further describe how the rail brackets are secured to the guardrail supports and how the rail brackets support guardrails on the stanchions.

30 The mounting arm comprises first and second elongated portions. The first elongated portion may comprise a first tube or post, preferably a tube. The second elongated portion may comprise a second tube or post, preferably a tube. Where the first and second elongated portions comprise tubes, the first ends of the first and second tubes may be configured to be able to reversibly receive the guardrail support therein. The ability to secure the guardrail support to either the first or second elongated portions and at

different heights on the first or second elongated portions helps permit reconfiguration of the stanchion for different applications.

5 The fastening assembly advantageously provides a plurality of different fastening modes for securing the stanchion to the support structure. In one mode, the fastening  
assembly may be a clamp that clamps a portion of the support structure between the first  
external support engagement surface of the second elongated portion and the second  
support engagement surface of the fastening assembly. In the clamp mode, the fastening  
assembly comprises a clamp bolt threadingly mated in a nut, preferably a nut welded to the  
fastening assembly. The clamp bolt may comprise the second support engagement surface  
10 that engages the second surface of the supporting structure when the clamp bolt is  
tightened against the second surface of the supporting structure. A locknut may be  
employed as a travel limiter to limit travel of the clamp bolt. In a second mode, the fastening  
assembly may comprise a plate, the plate having an external surface that acts as the  
second support engagement surface in the second mode. In the second mode, the first  
15 external support engagement surface and/or the second support engagement surface may  
comprise a plurality of apertures through which fasteners (e.g. screws) may be deployed to  
further secure the stanchion to the supporting structure. In the second mode, the clamp  
bolt may be removed. The clamp mode is especially useful when the supporting structure  
is a balcony, open-hole ledge or a parapet roof. The second mode is especially useful when  
20 the supporting structure is a flat roof. The ability to reconfigure the fastening assembly in a  
plurality of different fastening modes helps permit reconfiguration of the stanchion for  
different applications.

The fastening assembly comprises a flange comprising spaced-apart portions  
forming a channel in the fastening assembly between the spaced-apart portions. When the  
25 supporting structure is a balcony or an open-hole ledge, the channel may be configured to  
receive and contain an elongated rail. The elongated rail may be a toe board. Because the  
second support engagement surface of the fastening assembly is situated on the adjustable  
fastening assembly outside the channel, the toe board does not interfere with the clamping  
function of the fastening assembly on the balcony or open-hole ledge. The flange of the  
30 fastening assembly may comprise a bracket, for example a c-bracket, to which the first  
elongated portion is releasably attached when the fastening assembly is attached to the  
first elongated portion.

The guardrail system or kit may further comprise auxiliary elements, for example  
mounting arm extensions, ballasts, various fasteners and the like. A mounting arm  
35 extension may be secured to one of the elongated portion to increase the elongated

portions effective length. For example, when the stanchion is to be mounted on a particularly wide parapet, the mounting arm extension may be secured to the end of the first elongated portion to permit the first elongated portion to traverse the entire width of the parapet. In another example, when the stanchion is to be mounted on a balcony, the mounting arm extension may be secured to the end of the second elongated portion to provide more potential contact length of the second elongated portion with an underside of the balcony. Ballasts, for example sand bags, cement blocks, water-filled containers and the like, may be placed on top of horizontally extending elongated portions to further help secure the stanchions to the supporting structure. Ballasts are particularly useful on flat roofs and parapet roofs, where the first elongated portion extends horizontally over the roof.

Further features will be described or will become apparent in the course of the following detailed description. It should be understood that each feature described herein may be utilized in any combination with any one or more of the other described features, and that each feature does not necessarily rely on the presence of another feature except where evident to one of skill in the art.

#### Brief Description of the Drawings

For clearer understanding, preferred embodiments will now be described in detail by way of example, with reference to the accompanying drawings, in which:

Fig. 1A depicts a perspective view of a reconfigurable stanchion configured for a balcony or an open-hole ledge;

Fig. 1B depicts a perspective view of the stanchion of Fig. 1A from a different angle;

Fig. 2 depicts a perspective view of the stanchion of Fig. 1A configured for a flat roof;

Fig. 3A depicts a perspective view of the stanchion of Fig. 1A configured for a parapet roof;

Fig. 3B depicts a perspective of the stanchion of Fig. 3A from a different angle;

Fig. 4A depicts a mounting arm of the stanchion of Fig. 1A;

Fig. 4B depicts a fastening assembly of the stanchion of Fig. 1A;

Fig. 4C depicts a guardrail support post of the stanchion of Fig. 1A;

Fig. 5 depicts a top view of the mounting arm shown in Fig. 4B;

Fig. 6 depicts a side cross-sectional view of the fastening assembly shown in Fig. 4C;

Fig. 7A depicts a rail bracket shown in Fig. 4A;

5 Fig. 7B depicts a perspective view of a portion of the guardrail support post of Fig. 4A with the rail bracket of Fig. 7A attached thereto and guardrails supported in the rail bracket;

Fig. 8A depicts a perspective view of the fastening assembly shown in Fig. 4C connected to the mounting arm shown in Fig. 4B together with a toe board configured for a balcony or an open-hole ledge;

Fig. 8B depicts a perspective view of the fastening assembly shown in Fig. 4C connected to the mounting arm shown in Fig. 4B together with a toe board configured for a flat roof or a parapet roof; and,

Fig. 9 depicts a reconfigurable guardrail system erected on a balcony.

15 Detailed Description

Referring to Fig. 1A and Fig. 1B, a reconfigurable stanchion **1** for a guardrail system is shown securely mounted on a balcony deck **70**. The same configuration may be used for mounting the guardrail system on an open-hole ledge. In a balcony or an open-hole configuration as shown in Fig. 1A and Fig. 1B, the stanchion **1** comprises a mounting arm **5**, which is shown in a T-shape although other shapes such as an L-shape or a cross-shape are possible. The mounting arm **5** comprises a first elongated portion **6** secured at a substantially right angle to a second elongated portion **7**, with the first elongated portion **6** oriented vertically and the second elongated portion **7** oriented horizontally. The first elongated portion **6**, along an abutment section of the first elongated portion **6**, abuts a vertical end surface **71** of the balcony deck **70**, while an abutment surface **8** on the second elongated portion **7** abuts a horizontal bottom surface **72** of the balcony deck **70** (see Fig. 1B). The first elongated portion **6** has a fastening assembly **20** mounted thereon in a clamping configuration such that an abutment face **21a** on a clamping bolt **22** of the fastening assembly **20** engages a horizontal top surface **73** of the balcony deck **70** across a thickness of the balcony deck **70** from the abutment surface **8** on the second elongated portion **7**. Tightening the clamping bolt **22** clamps the mounting arm **5** on the balcony deck **70**.

A guardrail post **40** may be secured to the first elongated portion **6** in a vertical orientation and one or more guardrails (not shown) may be supported in a horizontal orientation by one or more rail brackets **41** (only one labeled) In the illustrated embodiment, the guardrail post **40** and the first elongated portion **6** are rectangular tubes, the guardrail post **40** having smaller outer dimensions than inner dimensions of the first elongated portion **6** so that the guardrail post **40** and the first elongated portion **6** can form a tube-in-tube arrangement with the guardrail post **40** slidable inside the first elongated portion **6**. The height of the guardrail post **40** may be conveniently adjusted by sliding the guardrail post **40** to a desired depth in the first elongated portion **6**. Pins (e.g. hitch pins **18** or threaded pins such as bolts or screws) or other fasteners may be used to secure the guardrail post **40** to the first elongated portion **6** at the desired depth. Apertures **14** (only one labeled) in the first elongated portion **6** and apertures **44** (only one labeled) in the guardrail post **40** may be aligned at the desired depth to permit the hitch pins **18** to be inserted therethrough to secure the guardrail post **40** in the first elongated portion **6**. In other embodiments, the first elongated portion may slide within or beside the guardrail post, the tubes may be of different cross-sectional shapes (e.g. circular, oval, triangular, etc.), one or the other or both of the first elongated portion and the guardrail post may be solid, or some combination thereof.

The rail brackets **41** may be releasably mounted on the guardrail post **40**, for example by fasteners, for example pins (e.g. threaded pins such as bolts, screws or the like), clamps, and the like. In one embodiment, the fasteners may be bolts **42** (only one labeled) passed through the apertures **44** in the guardrail post **40** and bolt holes in the rail brackets **41**, and secured with nuts. Vertical positioning of the rail brackets **41** may be adjusted by removing the fasteners and positioning the rail brackets **41** at different positions before securing the rail brackets **41** again with the fasteners. The rail brackets **41** each comprise a first rail aperture **45** for side-by-side supporting of overlapping ends of two rectangular guardrail studs (not shown), and a second rail aperture **46** having two substantially circular portions **46a**, **46b** for side-by-side supporting of overlapping ends of two circular guardrail pipes (not shown). Although the embodiment shown show the rail brackets with two apertures, any number of apertures may be present, and the apertures may be of any convenient shape to support a variety of differently shaped guardrails. To help secure circular guardrail pipes in the round portions **46a**, **46b** of the second rail aperture **46**, an eyebolt **43** may be threaded through the apertures **44** to be tightened against one of the guardrail pipes thereby tightening both of the guardrail pipes against an inner edge of the second rail aperture **46**.

Further, a toe board (not shown in Fig. 1A and Fig. 1B but illustrated in Fig. 8A) may be inserted through a space between the first elongated portion **6** and the fastening assembly **20** created by one or more (in this embodiment two) mounting flanges **25** of the fastening assembly **20**, the mounting flanges **25** securely and releasably mounted on the first elongated portion **6** by fasteners, for example pins (e.g. hitch pins **29** or threaded pins such as bolts, screws and the like).

As seen in Fig. 2, the stanchion **1** may be reconfigured and securely mounted on a flat roof **80** in a flat roof configuration. The stanchion **1** in Fig. 2 utilizes the same parts as the stanchion **1** in Fig. 1A. However, because the flat roof **80** does not have a horizontal bottom surface on which to clamp the stanchion **1**, the mounting arm **5** is configured with the first elongated portion **6** oriented horizontally pointing over the roof **80**, and the second elongated portion **7** oriented vertically with the abutment surface **8** abutting an vertical outer surface **81** of the roof **80** or an outer vertical surface of a building which the roof is covering. Further, because the fastening assembly **20** is releasably attached to the first elongated portion **6**, the fastening assembly **20** may be reconfigured on the first elongated portion **6** so that the mounting flanges **25** are securely mounted on the first elongated portion **6** in a different configuration and through a different section of the mounting flanges **25**. Reconfiguring the position and configuration of the fastening assembly **20** on the first elongated portion **6** permits reorientation of an abutment face **21b** on the fastening assembly **20** so that the fastening assembly **20** may abut a horizontal top surface **83** of the roof **80**, while positioning an unused arcuate toe board-containing section **39** of the fastening assembly **20** away from an edge of the roof **80**. Because the fastening assembly **20** is not in a clamping configuration, auxiliary fasteners **26** (e.g. screws, only two of eight labeled) may be used to secure the first elongated portion **6** and the fastening assembly **20** to the vertical outer surface **81** and the horizontal top surface **83** of the roof **80**, respectively. In addition, the guardrail post **40** is secured in a vertical orientation to the second elongated portion **7** rather than to the first elongated portion **6**. Because the second elongated portion **7** is designed similarly to the first elongated portion **6**, the guardrail post **40** may be secured to the second elongated portion **7** in a manner the same as or similar to the manner in which the guardrail post **40** is secured to the first elongated portion **6** in connection with Fig. 1A and Fig. 1B. Thus, apertures **15** (only one labeled) in the second elongated portion **7** and the apertures in the guardrail post **40** may be aligned at the desired depth to permit the hitch pins **18** to be inserted therethrough to secure the guardrail post **40** in the second elongated portion **7**.

As seen in Fig. 3A and Fig. 3B, the stanchion 1 may also be reconfigured and securely mounted on a parapet 90 of a parapet roof in a parapet configuration. The stanchion 1 in Fig. 1C utilizes the same parts as the stanchion 1 in Fig. 1A. However, because the parapet 90 does not have a horizontal bottom surface on which to clamp the stanchion 1, the mounting arm 5 is configured with the first elongated portion 6 oriented horizontally pointing over the roof, and the second elongated portion 7 oriented vertically with the abutment surface 8 abutting an vertical outer surface 91 of the parapet 90. The mounting arm 5 and the guardrail post 40 are therefore in the same configuration as in the flat roof configuration shown in Fig. 2. However, similar to the balcony configuration (Fig. 1A and Fig. 1B) and unlike in the flat roof configuration (Fig. 2), the fastening assembly 20 in the parapet configuration (Fig. 3a and Fig. 3B) is attached to the first elongated portion 6 so that the abutment face 21a on the clamping bolt 22 of the fastening assembly 20 can engage an vertical inside surface 93 of the parapet 90 across a thickness of the parapet 90 from the abutment surface 8 on the second elongated portion 7. Tightening the clamping bolt 22 clamps the mounting arm 5 on the parapet 90.

Fig. 1A, Fig. 1B, Fig. 2, Fig. 3A and Fig. 3B show the rail brackets 41 oriented to support guardrails in a direction parallel to an edge of the roof. However, the rail brackets 41 may also be oriented to support guardrails in a direction perpendicular to the edge of the roof, which may be accomplished by one of two convenient methods. In a first method, the guardrail post 40 may be removed from the elongated portion (either the first or second elongated portions 6, 7 depending on the roof configuration), rotated 90° and reinserted into the elongated portion so that the first and second rail apertures 45, 46 face outwardly and inwardly from the edge. In a second method, the rail brackets 41 may be removed from the guardrail post 40 and remounted on a perpendicular side of the guardrail post 40, because all four sides of the guardrail post 40 comprise the apertures 44 and the rail brackets 41 may be mounted on any of the four sides.

Thus, by designing both the first and second elongated portions 6, 7 to be able to securably and reversibly receive the same guardrail post 40, and by providing an adjustable fastening assembly 20 releasably attachable to the first elongated portion 6 in a plurality of configurations and at a plurality of locations, it is possible to utilize the same parts of the stanchion 1 in a variety of guardrail applications.

With reference to Fig. 4A and Fig. 5, the mounting arm 5 may comprise the first elongated portion 6 and the second elongated portion 7 joined together substantially perpendicular to each other at one or more, in this embodiment two, joining brackets 9. The first and second elongated portions 6, 7 may be rigidly secured to the joining brackets 9,

preferably by welding. The joining brackets **9** may each comprise an L-bracket between which the first and second elongated portions **6, 7** are mounted. Each joining bracket **9** may comprise an outwardly flaring flange **10** having apertures **11** therein (only one labeled) through which screws may be inserted to assist in securing the mounting arm **5** to surfaces or to assist in securing a toe board to the mounting arm **5**. The joining brackets **9** reinforce the joint between the first and second elongated portions **6, 7** and facilitates installation of a toe board in the flat roof and parapet configurations (as illustrated in Fig. 8B).

The second elongated portion **7** comprises the abutment surface **8**, which is comprised of an abutment plate **16** having a flat surface forming the abutment surface **8**. The abutment plate **16** further comprises apertures **17** (only one labeled) through which screws may be inserted to assist in securing the mounting arm **5** to surfaces, especially in the flat roof configuration (see Fig. 2).

In the illustrated embodiment, the first and second elongated portions **6, 7** may be square tubes having the same cross-sectional dimensions to be able to accommodate insertion of the same guardrail post into open ends **12, 13** of the first and second elongated portions **6, 7**, respectively. The first and second elongated portions **6, 7** further comprise the plurality of apertures **14, 15**, respectively (only one of each labeled). The apertures **14** in the first elongated portion **6** serve to provide locations at which the fastening assembly **20** (not shown in Fig. 4A) may be releasably attached. The apertures **14** and **15** both serve to provide locations at which the guardrail post **40** (not shown in Fig. 4A) may be reversibly secured in the elongated portions **6, 7**. While the plurality of apertures may be along any one or more side of the respective elongated portions **6, 7**, it is preferred to have apertures along each side of the respective elongated portions **6, 7**, and it is further preferred that the apertures on opposite sides of a given elongated portion align to permit passage of a fastener from one side of the elongated portion to the other. Further, while there is no constraint on aperture spacing, it is preferred that the apertures are equally spaced at intervals suitable to provide sufficient flexibility of guardrail and fastening assembly placement on the mounting arm **5**, and sufficient flexibility of fastening assembly configuration on the first elongated portion **6**.

With reference to Fig. 4B and Fig. 6, the fastening assembly **20** comprises a base plate **23** and one or more mounting flanges **25** securely mounted on the base plate **23**, for example by welding, bolting and the like. Welding is preferred. In the embodiment depicted, the fastening assembly **20** comprises two spaced-apart mounting flanges **25**, one of which is shown partially cut away to illustrate a nut **57** welded to the base plate **23** between the mounting flanges **25**. The two spaced-apart mounting flanges **25** are preferably parallel to

each other, as seen in Fig. 4B. Each mounting flange **25** may comprise a c-bracket **30** (see Fig. 6) comprising spaced-apart first and second bars **31**, **32**, respectively, forming a channel **33** therebetween, the spaced-apart bars **31**, **32** connected together by a connecting bar **34**, the first bar **31** connected to an extension bar **35**, the extension bar **35** securely mounted on the base plate **23**. A plane of the base plate **23**, a longitudinal axis of the extension bar **35** and a longitudinal axis of the connecting bar **34** are oriented parallel to each other, whereas longitudinal axes of the spaced-apart first and second bars **31**, **32**, respectively, are oriented parallel to each other and substantially perpendicular to the plane of the base plate **23** and the longitudinal axes of the extension bar **35** and connecting bar **34**. A distal end **32a** of the second bar **32** is disposed beyond a distal edge **23a** of the base plate **23**. The connecting bar **34** connects a proximal end **32b** of the second bar **32** to a distal end **31a** of the first bar **31**. A proximal end **31b** of the first bar **31** is connected to the extension bar **35**. The c-bracket may be formed by attaching two or more separate bars, or may be formed of a single piece of material shaped into the desired shape. The bars may be flat, rectangular or circular or have any other suitable profile. The c-bracket is preferably formed from a single flat piece of material formed into the desired shape. A distal edge **23a** of the base plate **23** may comprise a raised lip **27** having apertures **28** (only one labeled in Fig. 4B) therein to permit the use of screws, nails or the like therethrough to secure a toe board (not shown in Fig. 4B or Fig. 6) in the channel **33** when the stanchion **1** is configured in the balcony or open-hole configuration. An aperture **36** (see Fig. 6) in the base plate **23** directly under the welded nut **57** between the spaced-apart mounting flanges **25** receives the clamping bolt **22** when the stanchion **1** is configured in the balcony or open-hole configuration or the parapet configuration.

The mounting flanges **25** may comprise apertures **37**, **38** through which fasteners, for example pins (e.g. hitch pins **18** or threaded pins such as bolts, screws or the like), may pass to secure the fastening assembly **20** to the first elongated portion **6**. The apertures may be located at any convenient locations on the mounting flanges to enable reconfiguration of the fastening assembly on the first elongated portion. In one embodiment, a first set of apertures **37** (see Fig. 6) may be positioned on the second bar **32** to permit the use of fasteners therethrough to releasably attach the fastening assembly **20** to a suitable location along the first elongated portion **6** when the stanchion **1** is configured in the balcony, open-hole ledge or parapet configuration. A second set of apertures **38** (see Fig. 6) may be positioned on the extension bar **35** to permit the use of fasteners therethrough to releasably attach the fastening assembly **20** to a suitable location along the first elongated portion **6** when the stanchion **1** is configured in the flat roof configuration. The apertures in respective bars **32**, **35** are preferably spaced to align with

the spacing of the apertures **14** in the first elongated portion **6**. Further, because two spaced-apart mounting flanges **25** may be used, the apertures **37, 38** in respective bars **32, 35** of one flange **25** are preferably positioned to align with corresponding apertures **37, 38** in the other flange **25** to permit a single fastener to pass through both of the flanges **25**.

5           Positioning and configuration of the c-bracket **30** on the first elongated portion **6** depends on the particular application. The position at which the c-bracket **30** is releasably attached to the first elongated portion **6** is selected to ensure that the abutment face **21a** of the clamping bolt **22** (see Fig. 4B) or the abutment face **21b** of the base plate **23** is close enough to an appropriate surface of the support surface. The configuration of the c-bracket  
10 **30** on the first elongated portion **6** is selected to ensure that the abutment face **21a** of the clamping bolt **22** or the abutment face **21b** of the base plate **23** is able to engage the appropriate surface of the support surface. Apertures **48** (only one labeled, see Fig. 4B) in the base plate **23** may receive fasteners (e.g. screws) for securing the base plate **23** to the support surface when the stanchion **1** is in the flat roof configuration.

15           With further reference to Fig. 4B, the fastening assembly **20** may further comprise the clamping bolt **22** when the fastening assembly **20** is in a clamping configuration. The fastening assembly **20** is configured to act as a clamp when the stanchion is in the balcony, open-hole ledge or parapet configuration. The clamping bolt **22** comprises screw threads  
20 **51**, a swivel head **53** at a distal of the bolt **22** and a disc **54** comprising the abutment face **21a**, the disc **54** attached to the swivel head **53** so that the diameter of the disc **54** is oriented perpendicularly to a longitudinal axis of the clamping bolt **22**. The screw threads **51** are mated with the welded nut **57**, whereby the screw threads **51** may be threaded through the welded nut **57** as the clamping bolt **22** is inserted through the aperture **36** in the base plate **23**. Once the fastening assembly **20** is properly positioned, the clamping bolt  
25 **22** may be rotated to tighten to the disc **54** against the support surface thereby clamping the support surface between the abutment face **21a** of the clamping bolt **22** and the abutment surface **8** of the second elongated portion **7** of the mounting arm **5**. A locknut **52** may be threaded on to the screw threads **51** and tightened against the welded nut **57** to limit travel of the clamping bolt **22** through the welded nut **57** after the disc **54** has been  
30 tightened against the support surface. A plurality of teeth **55** (only one labeled) at the distal edge **23a** of the base plate **23** extending in an opposite direction as the raised lip **27** serve to grip the support surface when the fastening assembly **20** is clamped to the support surface.

35           With reference to Fig. 4C, the guardrail post **40** may be a tube or solid post, and is shown as a tube in the Figures. The guardrail post may have any cross-sectional profile,

for example polygonal, cylindrical or ellipsoidal, provided the guardrail post is reversibly securable to the elongated portions of the mounting arm. In the illustrated embodiment, the guardrail post **40** is a square tube having dimensions sufficiently small to be able to slide the guardrail post **40** into ends of the first and second elongated portions **6**, **7** of the mounting arm **5**. The guardrail post **40** may comprise a plurality of the apertures **44** (only one labeled), which serve to provide locations at which the guardrail post **40** may be secured to the mounting arm **5**, at which the rail brackets **41** may be releasably attached, and through which the eyebolts **43** may be inserted. The number and spacing of the apertures **44** should provide sufficient flexibility to adjust the height of the guardrail post **40** and to locate the rail brackets **41** in a desired manner. Securing the guardrail post **40** to the first or second elongated portions **6**, **7** and securing the rail brackets **41** to the guardrail post **40** may be accomplished with fasteners, for example pins (e.g. threaded pins such as bolts, screws or the like) inserted through one or more of the apertures **44**. In the illustrated embodiment, the bolts **42** secure the rail brackets **41** to the guardrail post **40**.

With reference to Fig. 7A and Fig. 7B, the rail bracket **41** comprises a flat plate **56** having the first rail aperture **45** therein for side-by-side support of overlapping ends of two rectangular guardrail studs **62**, and the second rail aperture **46** therein having the two substantially circular portions **46a**, **46b** for side-by-side supporting of overlapping ends of two circular guardrail pipes **61**. In this fashion, an extended guardrail may be formed from separate studs and/or from separate pipes. The overlapping ends of the rectangular guardrail studs **62** may be secured together by screws, clamps or the like for added security, if desired. To help secure the circular guardrail pipes **61** in the round portions **46a**, **46b** of the second rail aperture **46**, the eyebolt **43** may be threaded through opposed apertures **44** in the guardrail post **40** to be tightened against one of the guardrail pipes in the round portion **46a** thereby tightening both of the guardrail pipes against an inner edge of the second rail aperture **46**. The flat plate **56** offers simplicity of fabrication and may be bolted on to the guardrail post **40** facilitating replacement and repositioning of the rail bracket **41**. Further, because the plate **56** is flat, the plate **56** may be readily hammered flat in the event of damage to the plate **56**.

All of the parts of the stanchion **1** may be constructed of any suitably strong and durable material, for example a metal (e.g. steel).

With reference to Fig. 8A and Fig. 8B, the fastening assembly **20** may be attached to first elongated portion **6** in either the balcony configuration (Fig. 8A) or the flat roof configuration (Fig. 8B) so that toe boards **50** may be secured to the stanchion **1**. In the balcony configuration (Fig. 8A), the toe board **50** may be inserted through and secured in

the channel **33** formed by the flanges **25** of the fastening assembly **20**. Screws **59** through the apertures **28** in the raised lip **27** of the base plate **23** of the fastening assembly **20** help secure the toe board **50** in the channel. In the flat roof configuration (Fig. 8B), the toe boards **50** may be secured to the mounting arm **5** with screws **59** through the apertures **11** in the outwardly flaring flanges **10** of the joining bracket **9** of the mounting arm **5**.

With reference to Fig. 9, a portion of a reconfigurable guardrail system **101** is shown erected on a balcony **100**. Two stanchions **1** (only one labeled) are illustrated in the balcony configuration in which the second elongated portions **7** extend horizontally under the balcony **100** and the stanchions **1** are clamped to the balcony **100** between the fastening assemblies **20** and the second elongated portions **7**. The fastening assemblies **20** are each attached to the first elongated portions **6** by two fasteners, which in the illustrated embodiment are hitch pins **29**. A toe board **50** is inserted in the channel **33** in the arcuate toe board-containing section **39** of the fastening assembly **20**. The toe board **50** helps prevent a person's foot from slipping off the edge of the balcony **100**. Cylindrical galvanized steel pipes **61** (only one labeled) are mounted in the second rail apertures **46** of the rail brackets **41** to act as guardrails.

The novel features will become apparent to those of skill in the art upon examination of the description. It should be understood, however, that the scope of the claims should not be limited by the embodiments, but should be given the broadest interpretation consistent with the wording of the claims and the specification as a whole.

Claims:

1. A reconfigurable stanchion for supporting a guardrail on a support surface, the reconfigurable stanchion comprising:

5 a substantially vertically oriented elongated guardrail support configured to support a guardrail;

10 a mounting arm, the mounting arm comprising a first elongated portion and a second elongated portion, the first elongated portion oriented substantially perpendicular to the second elongated portion, the first elongated portion having a first end configured to be able to securably and reversibly receive the guardrail support, the second elongated portion having a first end configured to be able to securably and reversibly receive the guardrail support, the guardrail support received by and reversibly secured to either the first elongated portion or the second elongated portion, the second elongated portion comprising a first external support engagement surface configured to engage a first surface of a supporting structure for the stanchion; and,

15 an adjustable fastening assembly releasably attached to the first elongated portion, the fastening assembly releasably attachable to the first elongated portion in a plurality of configurations and at a plurality of locations along a length of the first elongated portion, the fastening assembly having a second support engagement surface configured to engage a second surface of the supporting structure when the fastening assembly is attached to the first elongated portion, the fastening assembly further having a flange comprising spaced-apart portions forming a channel in the fastening assembly between the spaced-apart portions, the second support engagement surface situated on the adjustable fastening assembly outside the channel.

20 2. The stanchion of claim 1, wherein the guardrail support is adjustable along at least a portion of a length of the elongated portion to which the guardrail support is reversibly secured, and the guardrail support is reversibly securable to the elongated portion at a plurality of locations along the elongated portion to which the guardrail support is reversibly secured.

30 3. The stanchion of claim 1 or 2, wherein the first elongated portion comprises a first tube and the second elongated portion comprises a second tube, wherein the first ends of the tubes are configured to be able to receive the guardrail support therein.

4. The stanchion of any one of claims 1 to 3, wherein the guardrail support comprises at least one rail bracket reversibly secured thereto, the rail bracket comprising a first aperture configured to receive and support a guardrail having a polygonal cross-section and a second aperture configured to receive and support a guardrail having a circular and/or ellipsoidal cross-section.
5. The stanchion of any one of claims 1 to 3, wherein the guardrail support comprises at least one rail bracket reversibly secured thereto, the rail bracket comprising a first aperture configured to receive and support a guardrail having a rectangular cross-section and a second aperture configured to receive and support two guardrails having substantially cylindrical cross-sections, wherein the two guardrails having substantially cylindrical cross-sections are secured within the second aperture in a side-by-side configurations by a bolt tightened against a side of one of the two guardrails.
6. The stanchion of claim 4 or 5, wherein the rail bracket is securable to the guardrail support at a plurality of locations along a length of the guardrail support.
7. The stanchion of any one of claims 1 to 6, wherein the fastening assembly is a clamp and the clamp comprises a clamp bolt threadingly mated in a nut, the clamp bolt comprising the second support engagement surface that engages the second surface of the supporting structure when the clamp bolt is tightened against the second surface of the supporting structure.
8. The stanchion of any one of claims 1 to 7, wherein the flange comprises a c-bracket to which the first elongated portion is releasably attached when the fastening assembly is attached to the first elongated portion.
9. The stanchion of any one of claims 1 to 8, wherein the supporting structure is a balcony, an open-hole ledge, a flat roof or a parapet roof.
10. The stanchion of any one of claims 1 to 8, wherein the supporting structure is a balcony or an open-hole ledge, and wherein the channel in the fastening assembly is configured to receive and contain an elongated rail.
11. The stanchion of claim 10, wherein the elongated rail is a toe board.
12. The stanchion of any one of claims 1 to 11, wherein the first external support engagement surface and/or the second support engagement surface comprise a plurality of apertures through which fasteners may be deployed to further secure the stanchion to the supporting structure.

13. A guardrail system comprising a plurality of stanchions as defined in any one of claims 1 to 12 and at least one guardrail mounted on at least two of the stanchions.

14. A kit comprising:

a plurality of elongated guardrail supports;

5 a plurality of mounting arms, each mounting arm comprising a first elongated portion and a second elongated portion, the first elongated portion oriented substantially perpendicular to the second elongated portion, the first elongated portion having a first end configured to be able to securably and reversibly receive one of the guardrail supports, the second elongated portion having a first end configured to be able to securably and  
10 reversibly receive one of the guardrail supports, the second elongated portion comprising a first external support engagement surface configured to engage a first surface of a supporting structure;

a plurality of adjustable fastening assemblies, each adjustable fastening assembly releasably attachable to the first elongated portion of one of the mounting arms in a plurality  
15 of configurations and at a plurality of locations along a length of the first elongated portion, the fastening assembly having a second support engagement surface configured to engage a second surface of the supporting structure, the fastening assembly further having a flange comprising spaced-apart portions forming a channel in the fastening assembly between the spaced-apart portions, the second support engagement surface situated on the adjustable  
20 fastening assembly outside the channel; and,

instructions for assembling the elongated guardrail supports, mounting arms and fastening assemblies into stanchions for a guardrail system supported on the supporting structure.

15. The kit according to claim 14, further comprising a plurality of rail brackets  
25 releasably securable to the guardrail supports.

16. The kit according to claim 15, wherein the instructions further describe how the rail brackets are secured to the guardrail supports and how the rail brackets support guardrails on the stanchions.

17. A reconfigurable stanchion for supporting a guardrail on a support surface, the  
30 reconfigurable stanchion comprising a substantially vertically oriented elongated guardrail support configured to support a guardrail, a mounting arm configured to reversibly receive

the guardrail support and an adjustable fastening assembly releasably attached to the mounting arm.

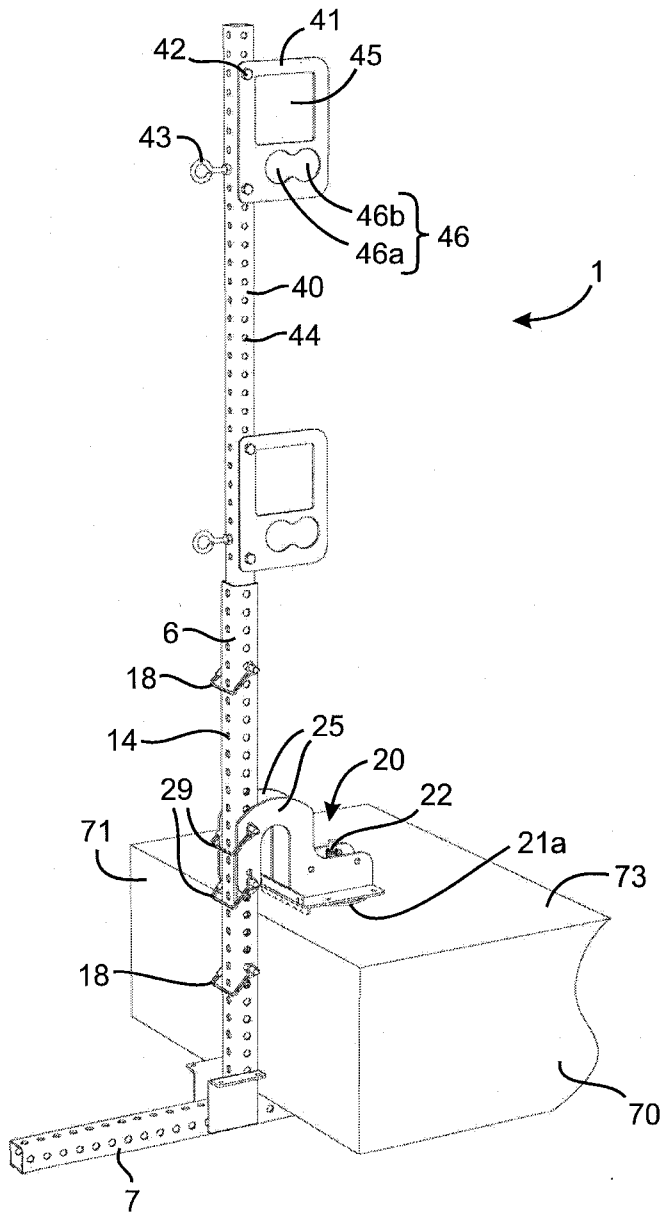


Fig. 1A

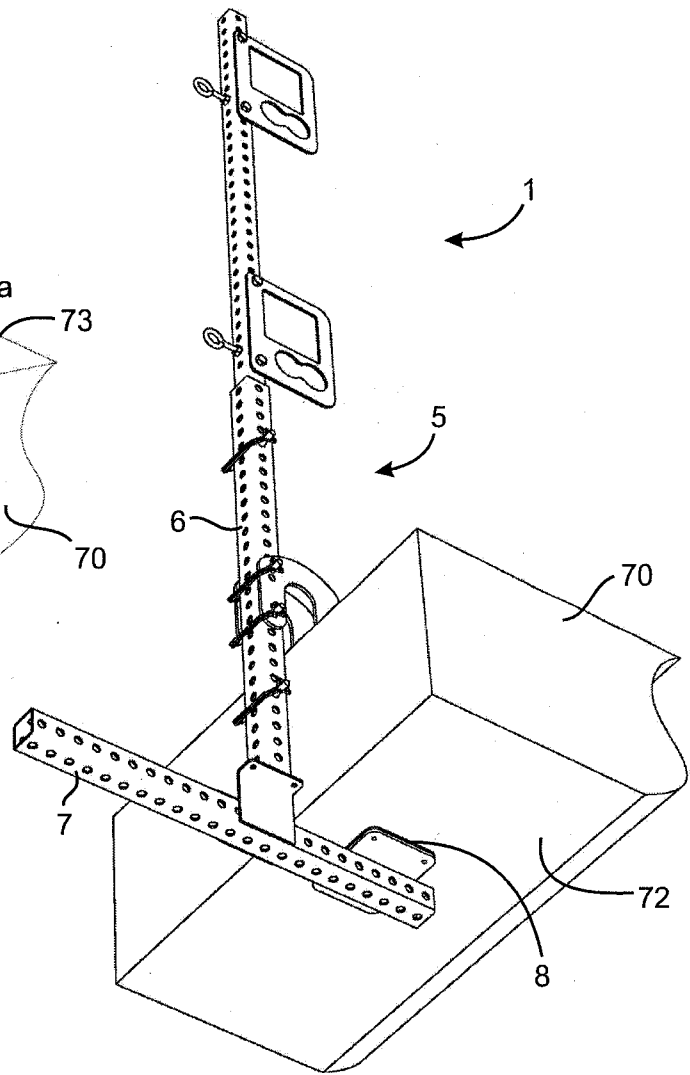


Fig. 1B

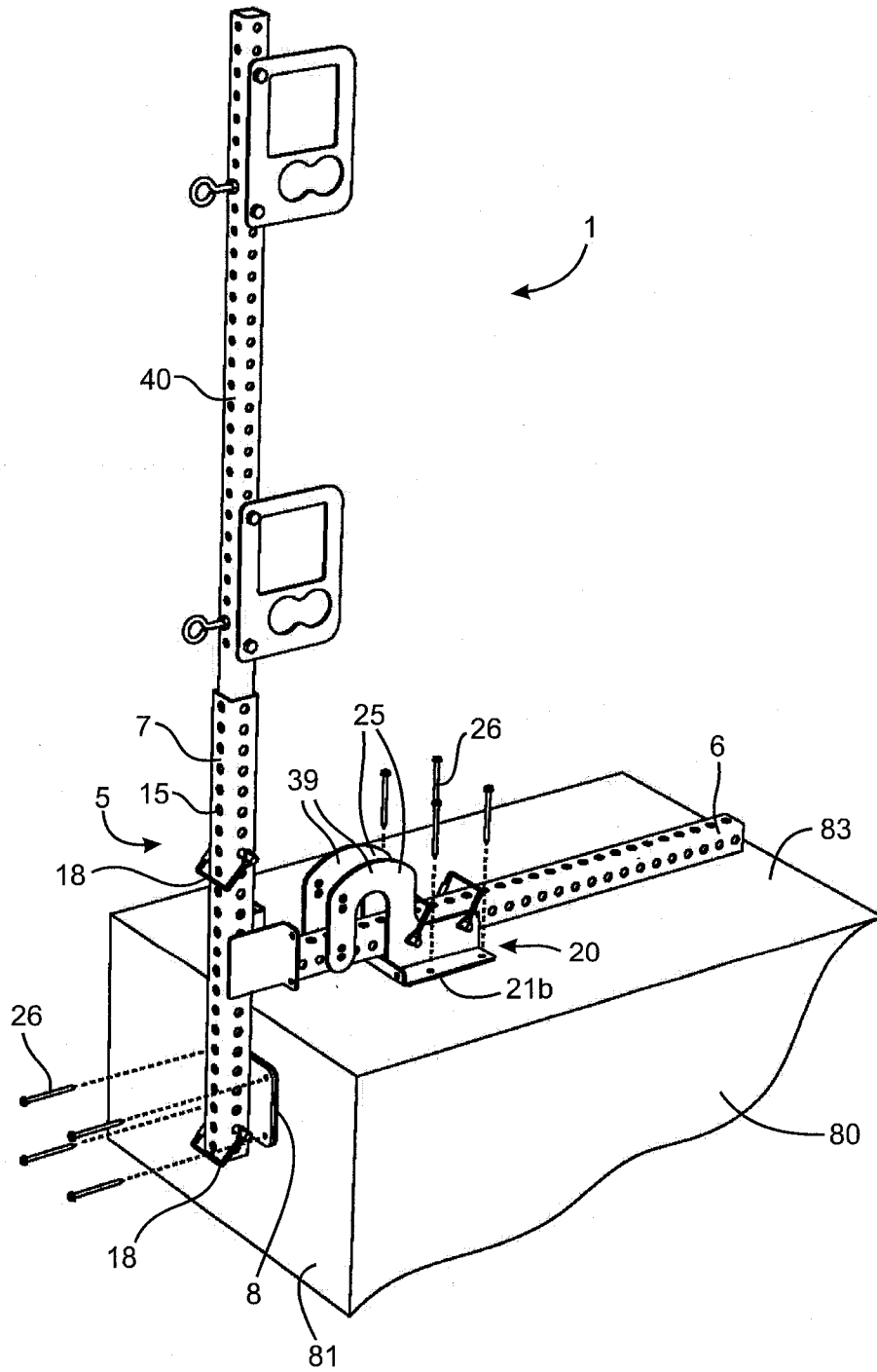


Fig. 2

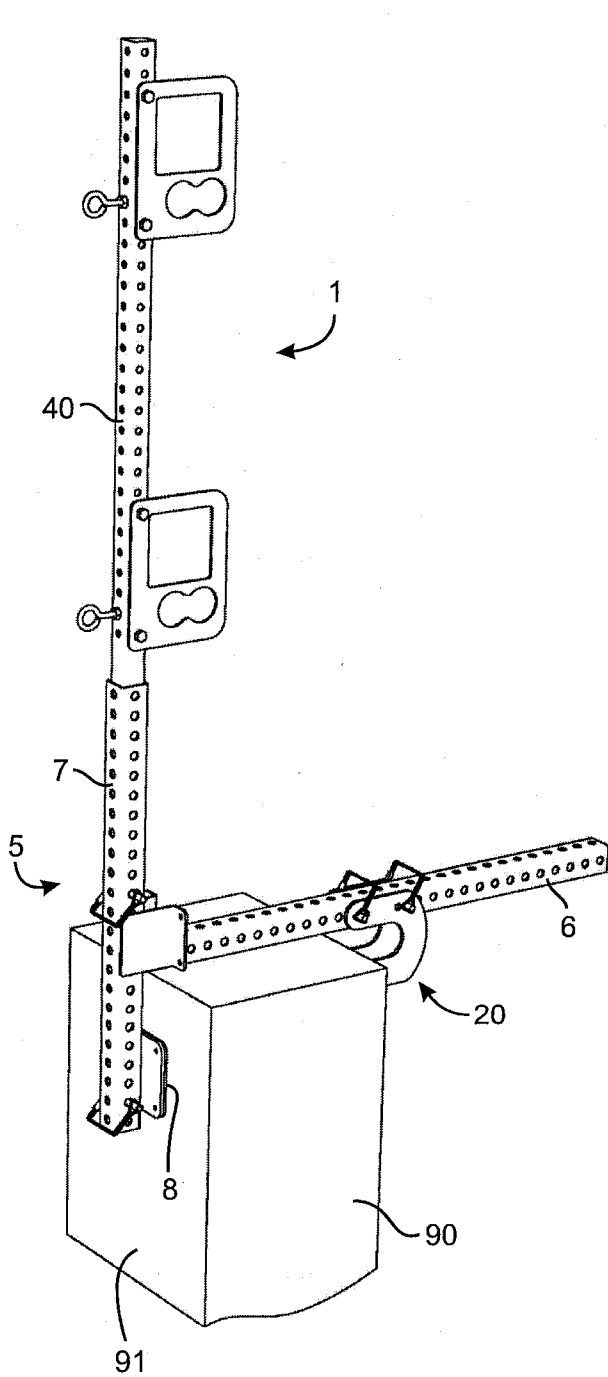


Fig. 3A

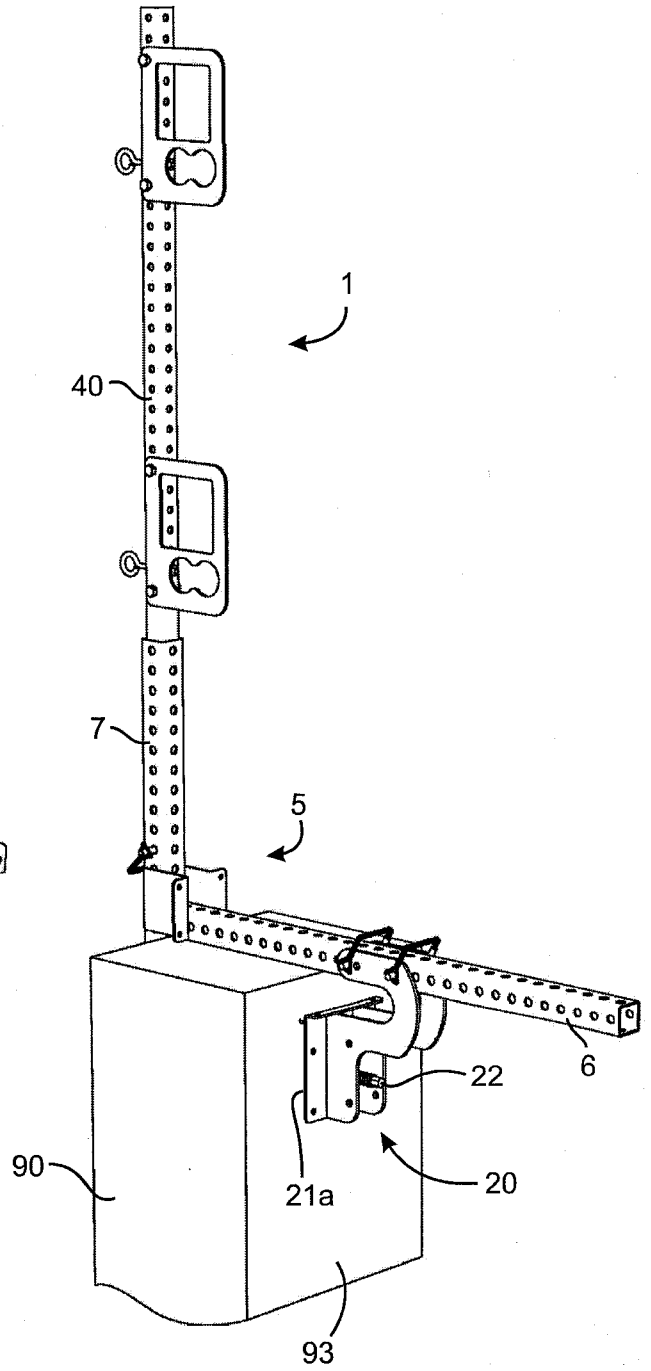


Fig. 3B

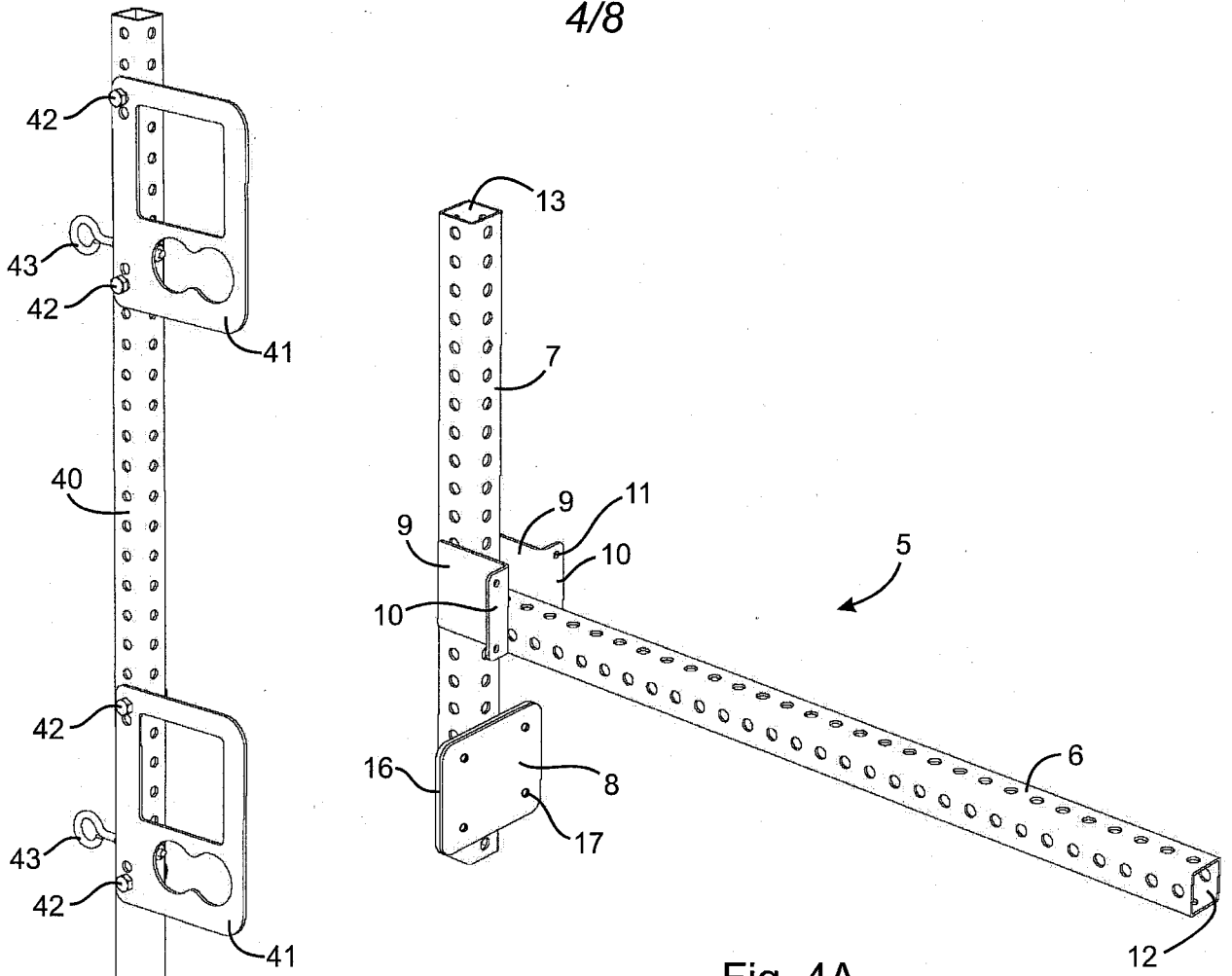


Fig. 4A

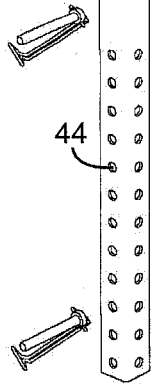


Fig. 4C

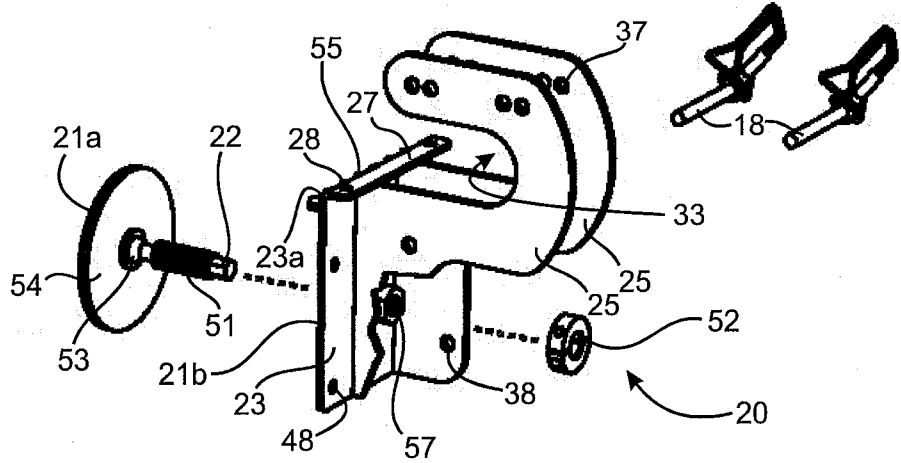


Fig. 4B

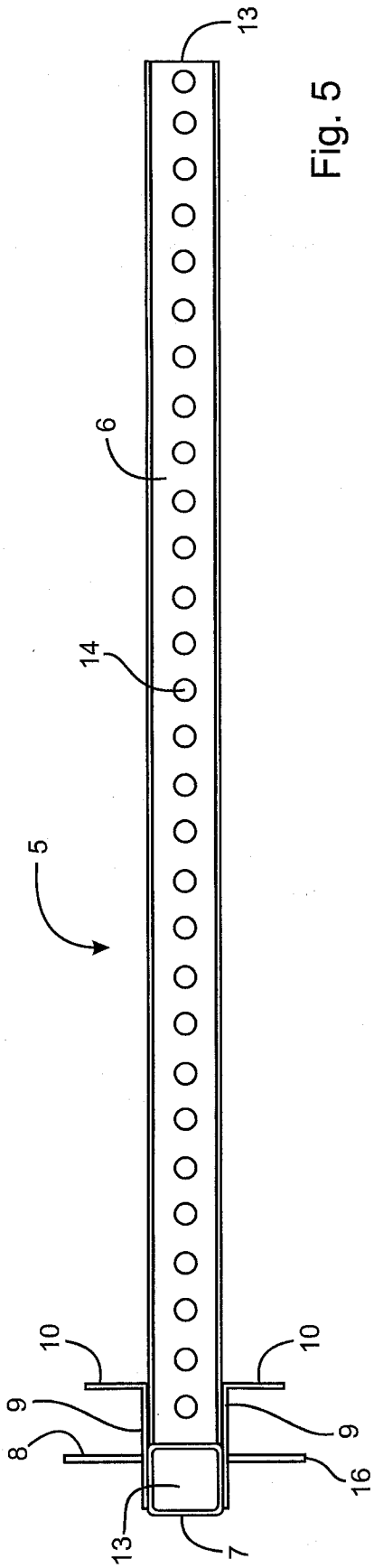


Fig. 5

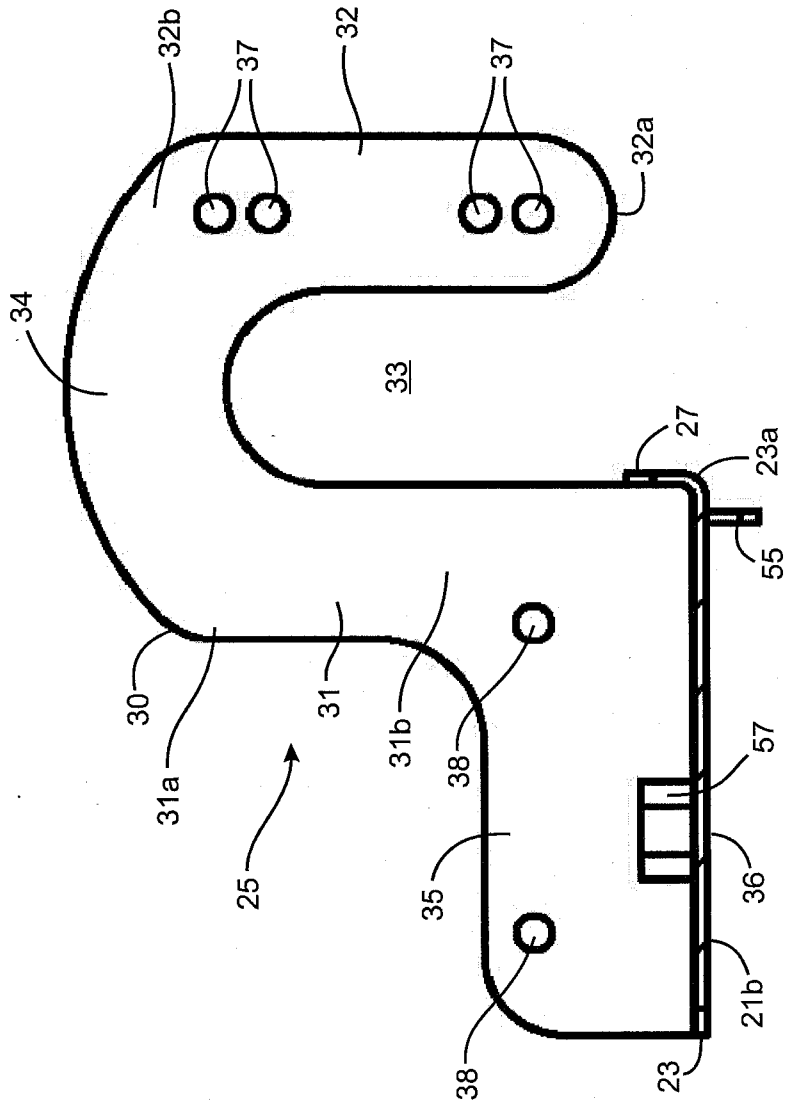


Fig. 6

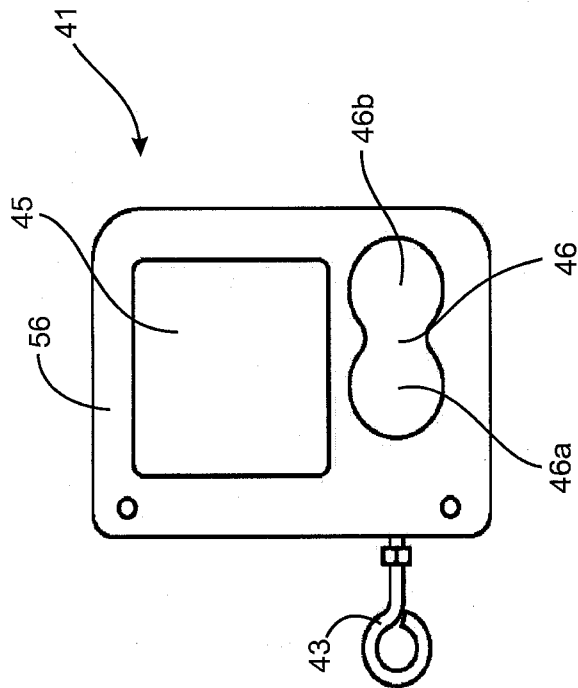


Fig. 7A

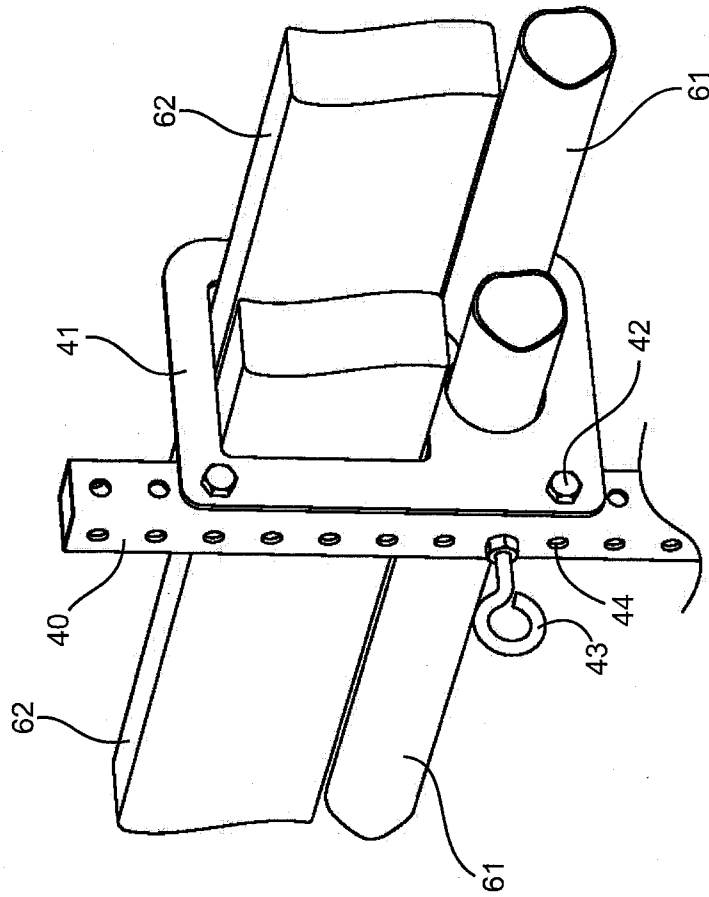


Fig. 7B

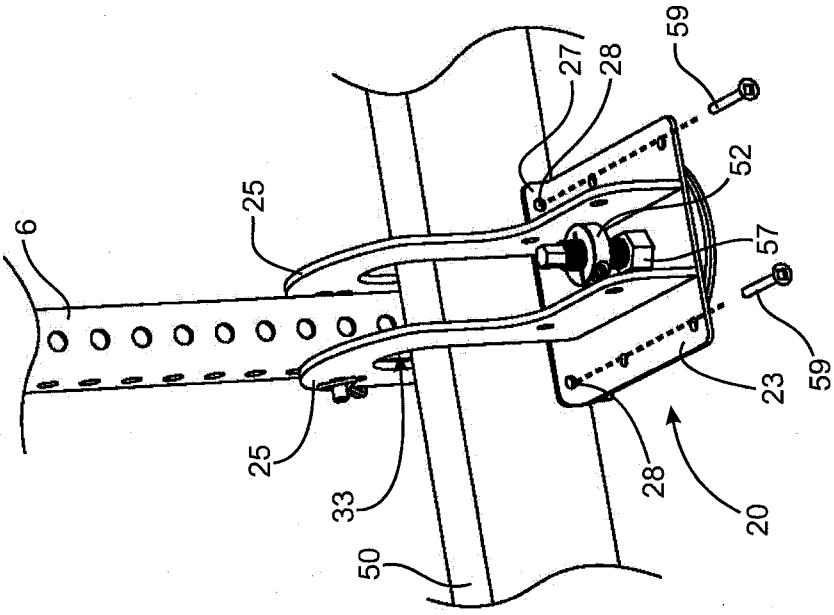


Fig. 8A

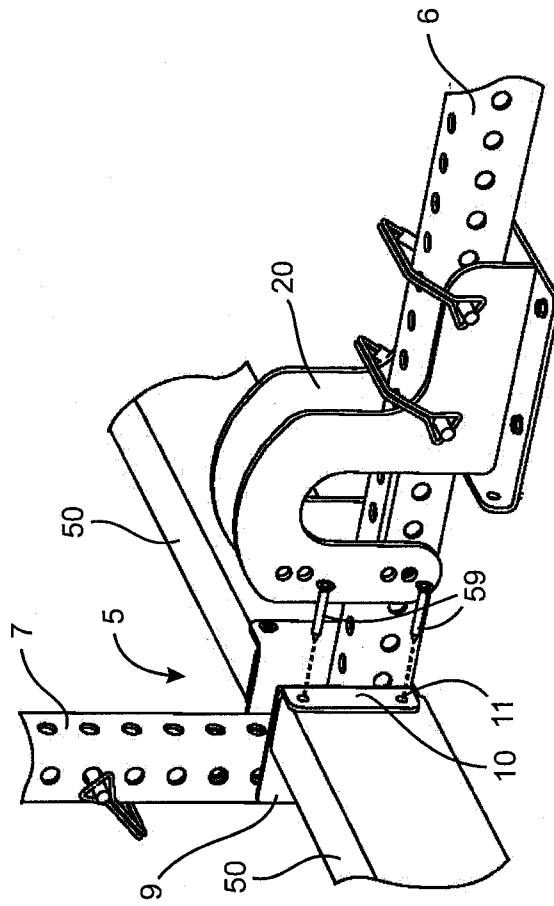


Fig. 8B

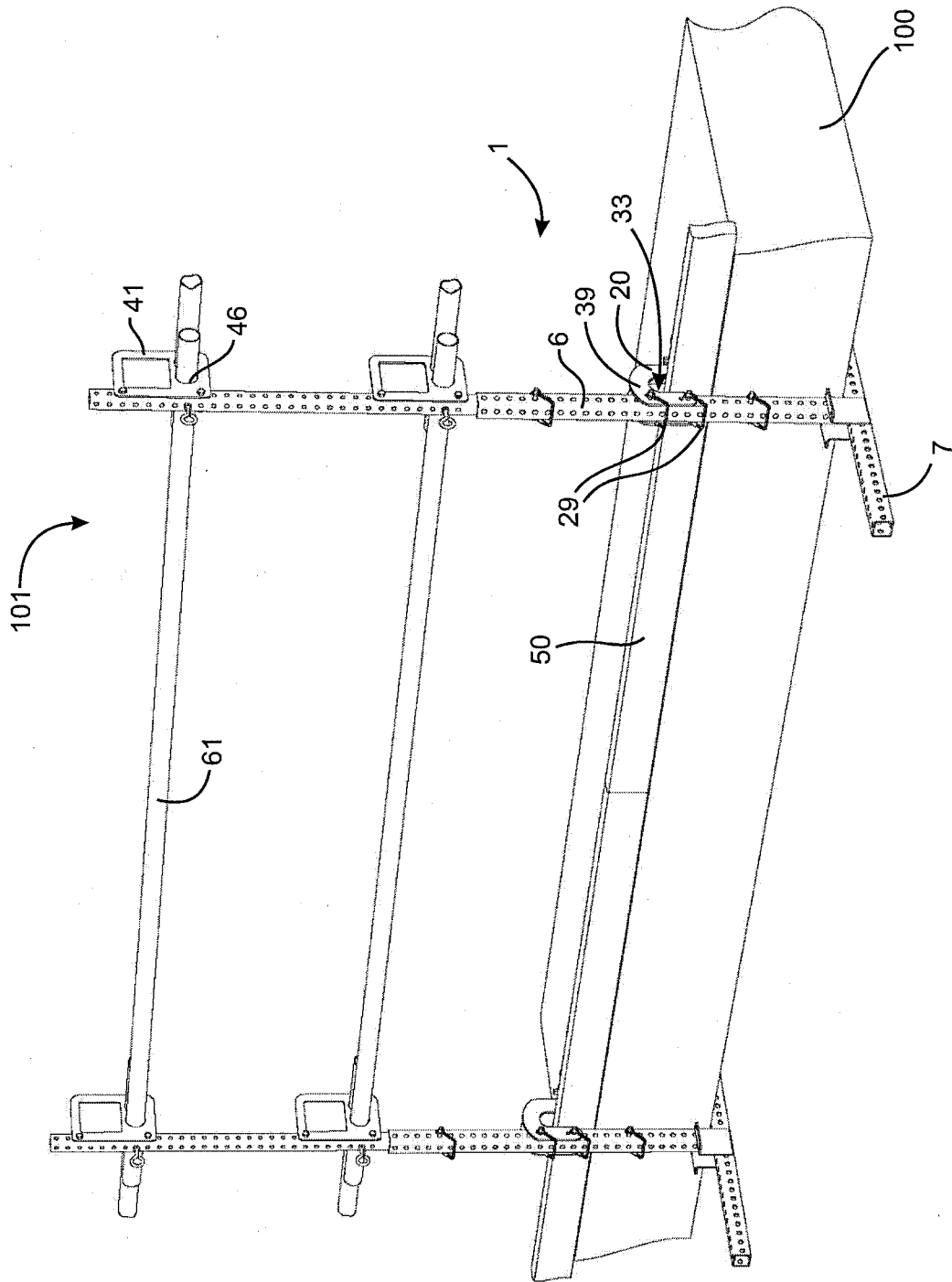
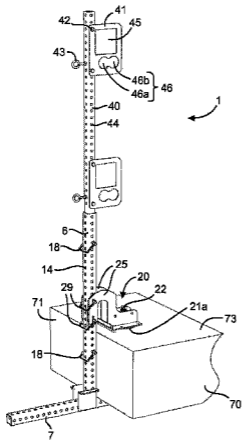
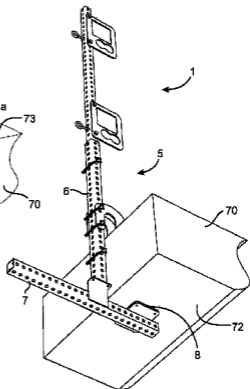


Fig. 9



A



B