



(22) Date de dépôt/Filing Date: 2011/07/25

(41) Mise à la disp. pub./Open to Public Insp.: 2013/01/25

(45) Date de délivrance/Issue Date: 2013/06/04

(51) Cl.Int./Int.Cl. *E02D 29/12* (2006.01),
B65D 90/10 (2006.01), *E02D 29/14* (2006.01)

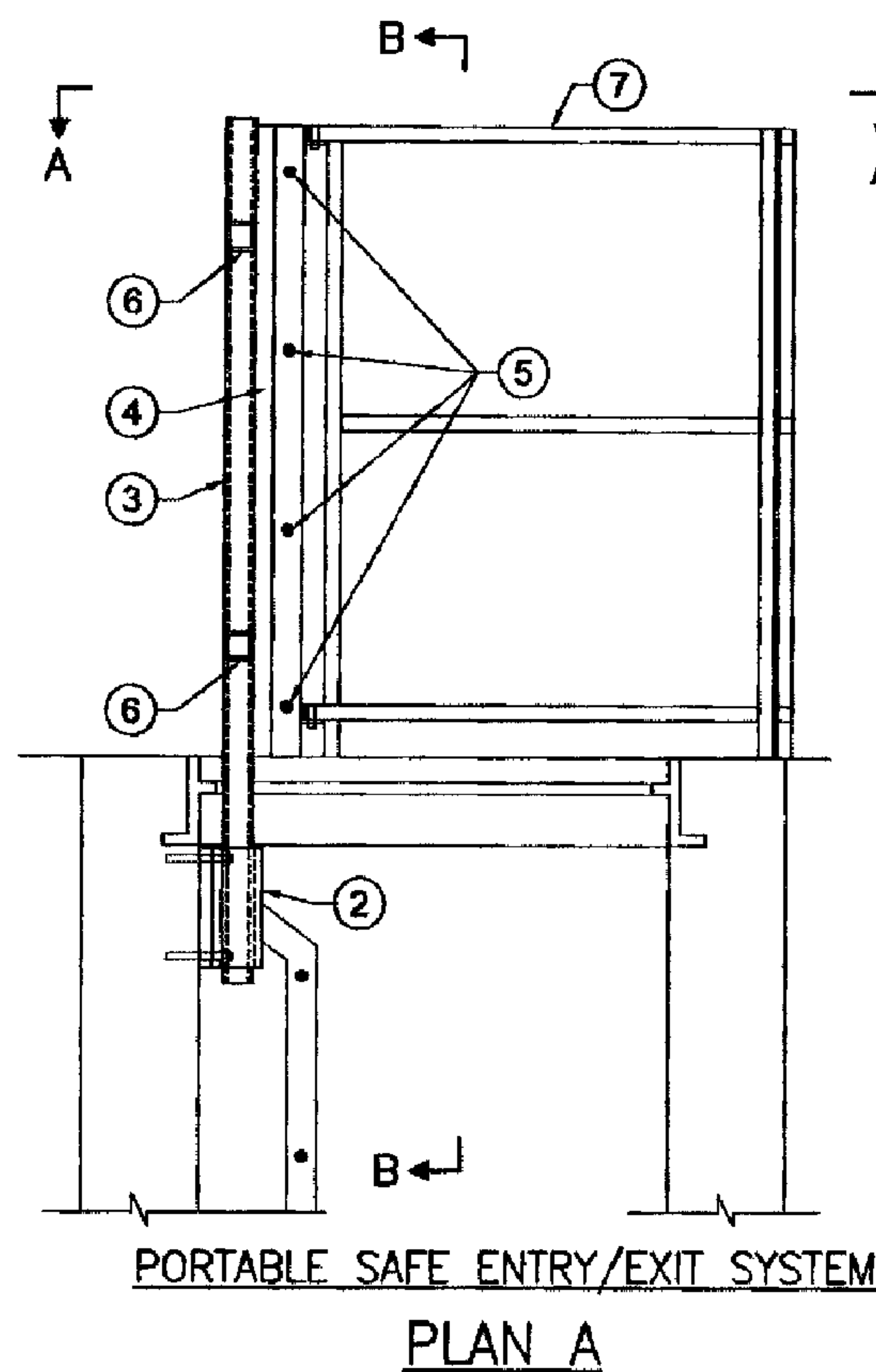
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(54) Title: PORTABLE MANHOLE, VAULT, OR MAN-WAY SAFE ENTRY/EXIT SYSTEM



(57) Abrégé/Abstract:

A portable safe entry/exit system for a manhole or underground vault that allows the user to mount and dismount a ladder or steps below the surface in a safe manner. This safety system has a hollow receiver sleeve cast into the frame of the access cover and/or



(57) **Abrégé(suite)/Abstract(continued):**

a hollow retrofit receiver sleeve mounted to the vertical surface of the access hole just below the cover frame it also has a portable device consisting of a main post member that has attached to it two elongated vertical rails which have a plurality of horizontal rungs between them so as when the access cover is removed the main post member can be inserted into the hollow receiver sleeve allowing the horizontal rungs of this present invention to be used as an extension of the ladder rungs or wall mounted steps below.

PORTABLE MANHOLE, VAULT, OR MAN-WAY SAFE ENTRY/EXIT SYSTEM

ABSTRACT

A portable safe entry/exit system for a manhole or underground vault that allows the user to mount and dismount a ladder or steps below the surface in a safe manner. This safety system has a hollow receiver sleeve cast into the frame of the access cover and/or a hollow retrofit receiver sleeve mounted to the vertical surface of the access hole just below the cover frame it also has a portable device consisting of a main post member that has attached to it two elongated vertical rails which have a plurality of horizontal rungs between them so as when the access cover is removed the main post member can be inserted into the hollow receiver sleeve allowing the horizontal rungs of this present invention to be used as an extension of the ladder rungs or wall mounted steps below.

PORTABLE MANHOLE, VAULT, OR MAN-WAY SAFE ENTRY/EXIT SYSTEM

FIELD OF THE INVENTION

The present invention relates to the extension of wall mounted manhole steps or ladder way systems for underground raises, manholes, vaults, or any access hole below the surface of a walk area.

BACKGROUND OF THE INVENTION

Most underground manholes, vaults, man ways or underground raises, with access holes have wall mounted steps or ladder way systems mounted below the surface of the access hole so that the entrance can be covered with a man-way or access (lid, cover, grate, grill or hatch). The fact that the top of the ladder or wall mounted steps are below the surface entrance makes it difficult and unsafe to mount and dismount the top step. Typically the man-way or access (lid, cover, grate, grill or hatch) has to be removed, and the user has to support themselves on the rim of the cover while crouching to reach the top rung of the ladder or wall mounted step. Such an entry is dangerous as the user could slip or fall while doing this maneuver causing an injury to the user. The danger is increased when the user is carrying tools, safety equipment or rescue equipment (e.g. oxygen bottle, harness, or gas monitor) in or out of a confined space.

Some prior art devices tried to address this problem, but still left some issue unresolved. In particular, US patent 3,598,200 (Thompson) and 4,546,855 (Lyons) both disclose a single rod device from inside a manhole where it is slidably retracted to the middle of the upper rungs of a manhole ladder. Thompson has added a support at the lower end of the rod to releasably engage a ladder rung to retain the rod in an extended position. This support may accidentally be dislodged during use by a relatively small upward movement of the rod, causing the rod to collapse.

The Lyons rod has an involved arrangement of brackets, plates, and pins that must be hand-activated by a lever mechanism to retain the rod in the extended position. The arrangement is cumbersome since it requires a two-handed operation to raise or

lower the rod. The number of parts in the Lyons' system makes it needlessly complex and expensive to produce. In any event, the rods of both patents obstruct the middle of each manhole ladder and consume what little space one had on the rungs of the ladder for foot and hand placement.

The location of the rod also requires the user to swivel about the post in order to mount and dismount the ladder, which is a potentially dangerous maneuver over an Open manhole. There is also the inconvenience of not being able to carry tools' etc since both hands must be used to hold the post during such maneuvering.

Also, the device in patent CA 2228729 (Lorentz) does overcome the limitations and disadvantages of the prior art devices but still has limitations and disadvantages; This device is extendable from inside the manhole which means the user has to bend over and reach into the manhole to gain access to the device, and then pull the device up into position. This device is attached to the handrails of the fixed wall mounted ladder-way, which creates an obstruction of your grasp of the handrails as you reach the top of the manhole, but this device is ideal for a round manhole man-way or access (lid, cover, grate, grill or hatch).

Also UK patent 2463551 whose device does resolve these limitations and disadvantages of prior art devices, but has limitations to man way or access lids that are hinged, this system cannot be used with a round manhole cover as a standard round cover has to be removed totally to gain access because it is not hinged. Also this device is not portable.

What is therefore desired is a novel device to facilitate safe entry and exit of a manhole above the manhole ladder or wall mounted steps, which overcomes the limitations and disadvantages of the prior art devices. Preferably, the device should provide secure hand placements that extend above the manhole, and does not obstruct the manhole wall mounted steps or ladder space. The device should be simple in design and be inexpensive to build and install.

The present invention is a novel device which overcomes all these limitations and disadvantages. Preferably, the device should have a plurality of horizontal rungs attached between two vertical rails that are attached to a main post member for stability that do not interfere with foot space of any wall mounted steps or ladder rungs. Nor should the device obstruct the handrails of a fixed wall mounted ladder below the surface of the access hole. The safety system should be simple in design and inexpensive to build and install, the plurality of rungs should be capable of quick and easy positioning with a simple means of sliding the main post member into a hollow receiver sleeve that would be cast into the frame of the access cover or into a hollow retro receiver sleeve mounted onto the surface of the access hole below the cover, this allows the safety device to be portable as it can be used on any access hole that has a receiver sleeve installed below the cover which would make the safety device less costly. Also this system should have a safety barrier that can fold up to make it compact for storage and portability, and when unfolded can be attached to the portable safe entry/exit device to help prevent a person falling into the access hole.

SUMMARY OF THE PRESENT INVENTION

The present invention has provided a portable safety system for a manhole or access hole with wall mounted steps, ladder, or ladder-way. The safety system having an access cover frame that has a receiver sleeve cast into the frame of the access cover and/or a hollow retro receiver sleeve mounted to the vertical surface of the access hole just below the access cover. Also included in this system would be a portable device which would include a main post member that has attached to it two elongated vertical rails which have a plurality of horizontal rungs attached between them so that when the manhole or access (lid, cover, grate, grill or hatch) is in a open position the main post member can be inserted into the receiver sleeve. This would allow the horizontal rungs of this present invention to be used as an extension of the ladder rungs or wall mounted steps below. Also this portable safe entry system includes a portable folding safety barrier that when unfolded can be attached to the vertical side rails of the

portable safety device to surround the opening of the access hole to help prevent any person from falling into the open hole below.

This invention has provided a safety device that has a main post member which preferably would be rectangular or square in shape, or if round in shape would contain a locking tab to prevent post member from turning when inserted into a hollow receiver sleeve of the same shape cast into the frame of the access cover or a hollow retro receiver sleeve mounted to the surface of a access hole just below the cover. Attached to this main post would be two elongated vertical rails which have a plurality of horizontal rungs attached between them, so that when the manhole or access (lid, cover, grate, grill or hatch) is removed the user is able to insert this safety device into the hollow receiver sleeve. By doing this it allows the user to grasp the horizontal rungs attached to the safety device upon mounting or dismounting the ladder or wall mounted steps below, without any obstruction or limitations of the opening to the access hole which would eliminate a person having to crouch down and place their hands on the ground while trying to reach the first step of the ladder below the access cover. This device can also provide protection to all sides of the access hole to help prevent anyone from falling into the opening of the hole.

This portable device would reduce the cost to a utility or contractor as they would not need to have a safety device for every access hole. They would only need a hollow receiver sleeve cast into the frame of the lid or a hollow retro receiver sleeve mounted in the hole below the surface.

Also, a rescue device or material winch can be mounted to the top of the post member of this safety device that would be designed to raise a person out of the access hole in an emergency or raise and lower materials into and out of the access hole without any obstructions.

BRIEF DESCRIPTION OF DRAWING AND NUMBERS

Embodiments of the invention will now be described by way of example only, with preference to the accompanying diagrams wherein.

Figure 1

Is a side view of the portable safe entry/exit device with the unfolded safety barrier attached to it, this view shows the portable device inserted into the receiver sleeve that is below the surface of the access hole allowing the user to grasp the rungs of the portable device while stepping onto or off the ladder or steps below the surface in a safe and ergonomic manner.

Figure 2

Is a top view of the portable safe entry/exit device with the unfolded safety barrier attached to it, this view shows the portable device inserted into the receiver sleeve that is below the surface of the access hole allowing the user to grasp the rungs of the portable device while stepping onto or off the ladder or steps below the surface in a safe and ergonomic manner.

Figure 3

Is a front view of the portable safe entry/exit device , this view shows the portable device inserted into the receiver sleeve that is below the surface of the access hole allowing the user to grasp the rungs of the portable device while stepping onto or off the ladder steps below in a safe and ergonomic manner.

Figure 4

Is a top view of the portable safe entry/exit device, this view shows the portable device inserted into the receiver sleeve that is below the surface of the access hole allowing the user to grasp the rungs of the portable device while stepping onto or off the ladder or steps below the surface in a safe and ergonomic manner.

Figures 5 and 6

Is a front view of a manhole or access cover frame and access hole with transparent view of the receiver sleeve cast into the frame of the cover also it shows a transparent front view of a hollow retrofit receiver sleeve mounted to the vertical surface of the access hole below the frame of the cover.

Figure 7

Is a side view of a manhole or access cover and access hole with a transparent view of a hollow retrofit receiver sleeve mounted to the vertical surface of the access hole below the frame of the cover.

Figure 8

Is a side view of a manhole or access cover and access hole with a transparent view of the receiver sleeve cast into the frame of the cover.

Figure 9

Is a top view of a manhole or access hole with cover removed with the hollow retrofit receiver sleeve mounted to the vertical surface of the access hole directly below the cover frame in line with the steps of the access hole.

Figure 10

Is a top view of a manhole or access hole with cover removed with receiver sleeve cast into the frame of the cover

Figures 11 and 12

Is a front view of the portable safe entry/exit device showing the main post member with a plurality of horizontal rungs attached between two vertical side rails it also shows a top view of the portable safe entry/exit device

Figures 13, 14 and 15

Is a front view side view and top view of the hollow retrofit receiver sleeve that can be mounted to the vertical surface of the access hole just below the frame of the cover to retrofit access holes that do not have receiver sleeves cast into the frame of the access cover.

Figures 16 and 17

Is a top view and side view of the portable fold up safety barrier in the unfolded position this barrier can be attached to the portable safe entry/exit device if needed.

DESCRIPTION OF PREFERRED EMBODIMENTS**Figure 1**

Is a side view of the portable safe entry/exit device showing the vertical side rails (4) and rungs (5) attached to the horizontal supports (6) which are attached to the main post member (3) when the main post member (3) is inserted into the manhole or access cover frame receiver sleeve (1) not shown in this view or into the hollow retrofit receiver sleeve (2) shown, that is below the surface of the access hole it allows the user to grasp the rungs (5) to mount or dismount the ladder or steps below the surface in a safe manner. Also it shows the unfolded safety barrier (7) attached to the portable safe

entry/exit device which helps to prevent anyone from falling into the opening while the access cover is removed.

Figure 2

Is a top view of the portable safe entry/exit device showing the vertical side rails (4) and rungs (5) attached to the horizontal supports (6) which are attached to the main post member (3) Also it shows the unfolded safety barrier (7) attached to the portable safe entry/exit device which helps to prevent anyone from falling into the opening while the access cover is removed.

Figure 3

Is a front view of the portable extension device showing the vertical side rails (4) and rungs (5) attached to the horizontal supports (6) which are attached to the main post member (3) when the main post member (3) is inserted into the manhole or access cover frame receiver sleeve (1) not shown or into the hollow retrofit receiver sleeve (2) shown mounted below the surface of the access hole it allows the user to grasp the rungs (5) to mount or dismount the ladder or steps below the surface in a safe manner.

Figure 4

Is a top view of the portable safe entry/exit device showing the vertical side rails (4) and rungs (5) attached to the horizontal supports (6) which are attached to the main post member (3) when the main post member (3) is inserted into the manhole or access cover frame receiver sleeve (1) not shown in this view or into the hollow retrofit receiver sleeve shown, that is below the surface of the access hole it allows the user to grasp the rungs (5) to mount or dismount the ladder or steps below the surface in a safe manner.

Figures 5 and 6

Is a front view of the manhole or access cover frame (1) with a transparent view of the receiver sleeve cast into the frame of the cover. Also, a view of the access hole below the frame and there is also a transparent view of the hollow retrofit receiver sleeve (2) which would be attached to the vertical surface of the access hole below the frame of the cover to retrofit manholes or access holes that do not have a receiver sleeve cast into the cover frame.

Figure 7

Is a view of the access hole below the frame it also shows a transparent side view of the hollow retrofit receiver sleeve (2) which would be attached to the vertical surface of the access hole below the frame of the cover to retrofit manholes or access holes that do not have a receiver sleeve cast into the cover frame.

Figure 8

Is a side view of the manhole or access cover frame (1) with a transparent view of the receiver sleeve cast into the frame of the cover.

Figure 9

Is a top view of a hollow retrofit receiver sleeve (2) attached to the vertical surface of the access hole directly below the cover frame in line with the steps of the access hole.

Figure 10

Is a top view of a manhole or access hole with the cover removed showing the receiver sleeve (1) cast into the frame of the cover.

Figures 11 and 12

Is a front view of the portable safe entry/exit device showing the vertical side rails (4) and rungs (5) attached to the horizontal supports (6) which are attached to the main post member (3) also it shows a top view of the portable safe entry/exit device showing the vertical side rails (4) and rungs (5) attached to the horizontal supports (6) which are attached to the main post member (3)

Figures 13, 14 and 15

Is a front view of the hollow retrofit receiver sleeve (2).
It also shows a side view of the hollow retrofit receiver sleeve (2).
And a top view of the hollow retrofit receiver sleeve (2).

Figures 16 and 17

Is a top view of the folding safety barrier (7) unfolded it also shows a side view of the safety barrier (7) unfolded

The whole description for this present invention is illustrative rather than a restrictive sense, and variations to the specific configurations described maybe apparent to a skilled person in adapting the present invention to other specific applications.

Such variations are intended to form part of the present invention in so far as they are within the spirit and scope of the claims below.

Example: The frame of the access cover with the receiver sleeve cast into it can be round, square, rectangular or triangular in shape.

Example: The hollow retro receiver sleeve need not be one continuous piece, but can be two rings that the post member slides into.

Example: The post member and the hollow receiver sleeve can be rectangular, round or square in shape; they can be any shape as long as the post member cannot spin.

Example: The post member can be solid, hollow, or open C channel shaped material.

Example: This system can have one or more post members for support depending on the size of the access hole.

Example: This safety system is not only for a manhole, under-ground vault, under-ground raise, or man-way, but can be used for any access lid, cover, grate, grill or hatch, that provides access to a ladder or steps mounted below the surface of the access lid, cover, grate, grill or hatch.

Example: The safety system can be manufactured from any variety of materials e.g. metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.

Example: The post member, if hollow, can be designed to slide onto a square, rectangular or round post cast into the frame of the lid, cover, grate, grill or hatch or mounted to the surface just below the lid, cover, grate, grill or hatch.

Example: The safety barrier can be manufactured from any variety of materials e.g. metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.

CLAIMS

1. A portable safe entry/exit system for use with any manhole, underground vault, underground raise or man way consisting of any shape capable of allowing a person to enter or exit a access hole by means of a wall mounted ladder, ladder way or wall mounted steps that are or is fixed to the inside surface below the access hole cover,
the portable safe entry/exit system consisting of a access cover frame that has a hollow receiver sleeve cast into the frame of the access cover and or a hollow retrofit receiver sleeve mounted to the vertical surface of the access hole just below the access cover in line with the back side of the wall mounted steps or ladder allowing a post member of this portable safe entry/exit system to be inserted for user to gain safe entry/exit of the access hole,
also the portable safe entry/exit system consisting of a plurality of rungs supported between two upright side rails which are attached to a plurality of horizontal strengthening bars which are attached to the main vertical centrally located post member also included in this system is a folding safety barrier which when unfolded can be attached to the portable safe entry/exit system.
2. A portable safe entry/exit system as claimed in Claim 1, wherein said system has a main vertical post member or members which are the main support for the portable safe entry/exit system.
3. A portable safe entry/exit system as claimed in Claim 2, wherein said post member is able to have a rescue device attached to the top of it for raising a person out of the access hole in a emergency or material handling device to raise or lower tools or materials into or out of the access hole.
4. A portable safe entry/exit system as claimed in Claim 2, wherein said post member has attached to it a plurality of horizontal strengthening bars.
5. A portable safe entry/exit system as claimed in Claim 4, wherein the plurality of horizontal strengthening bars have attached to them two elongated vertical side rails.

6. A portable safe entry/exit system as claimed in Claim 5, wherein the two elongated vertical side rails have attached between them a plurality of horizontal rungs for grasping upon entry/exit of access hole.
7. A portable safe entry/exit system as claimed in Claim 1, wherein said access cover frame would have a hollow receiver sleeve cast into it and the frame placed in such a position that when the access cover is removed the safe entry/exit system post member can be inserted into the hollow receiver sleeve in a way that the portable safe entry/exit system is in line with the wall mounted steps or ladder below.
8. A portable safe entry/exit system as claimed in Claim 1, wherein said hollow retrofit receiver sleeve would be attached to the vertical surface of the access hole in such a position that when the access cover is removed the safe entry/exit system post member can be inserted into the hollow retrofit receiver sleeve in a way that the portable safe entry/exit system is in line with the wall mounted steps or ladder below.
9. A portable safe entry/exit system as claimed in Claim 2, wherein said post member or post members can be made of metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.
10. A portable safe entry/exit system as claimed in Claim 4, wherein said horizontal strengthening bars can be made of metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.
11. A portable safe entry/exit system as claimed in Claim 5, wherein said elongated vertical side rails can be made of metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.
12. A portable safe entry/exit system as claimed in Claim 6, wherein said plurality of rungs can be made of metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.
13. A portable safe entry/exit system as claimed in Claim 7, wherein said hollow receiver sleeve which is cast into the cover frame can be made of metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.

14. A portable safe entry/exit system as claimed in Claim 8, wherein said hollow retrofit receiver sleeve can be made of metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.
15. A portable safe entry/exit system as claimed in Claim 1, wherein said system has a portable folding safety barrier that when unfolded can be attached to the portable safe entry/exit system.
16. A portable safe entry/exit system as claimed in Claim 15, wherein said portable folding safety barrier can be made of metal, alloys, fiberglass, plastic, or composites, stainless steel, steel, iron, cast iron or aluminum.

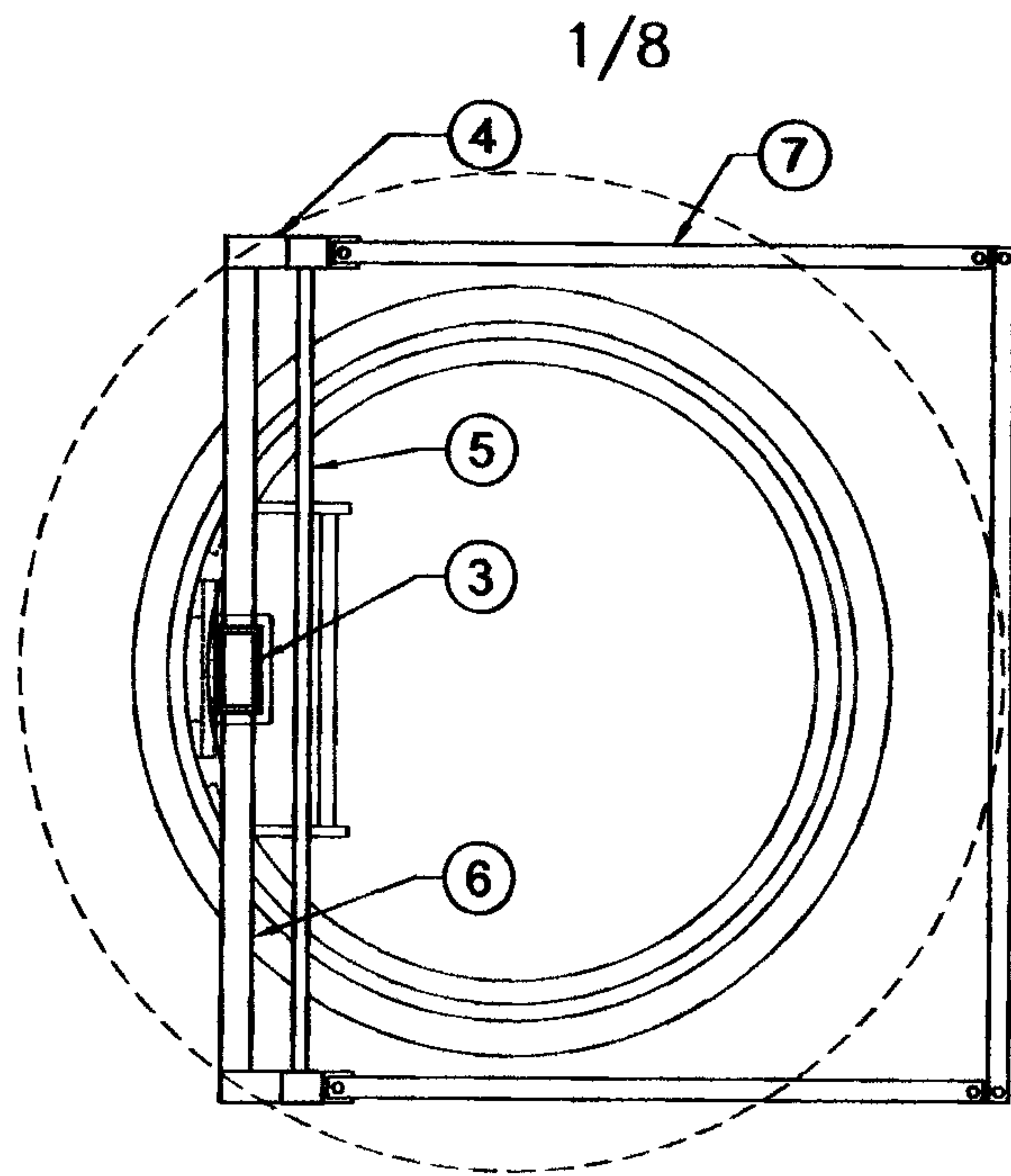


FIGURE 2

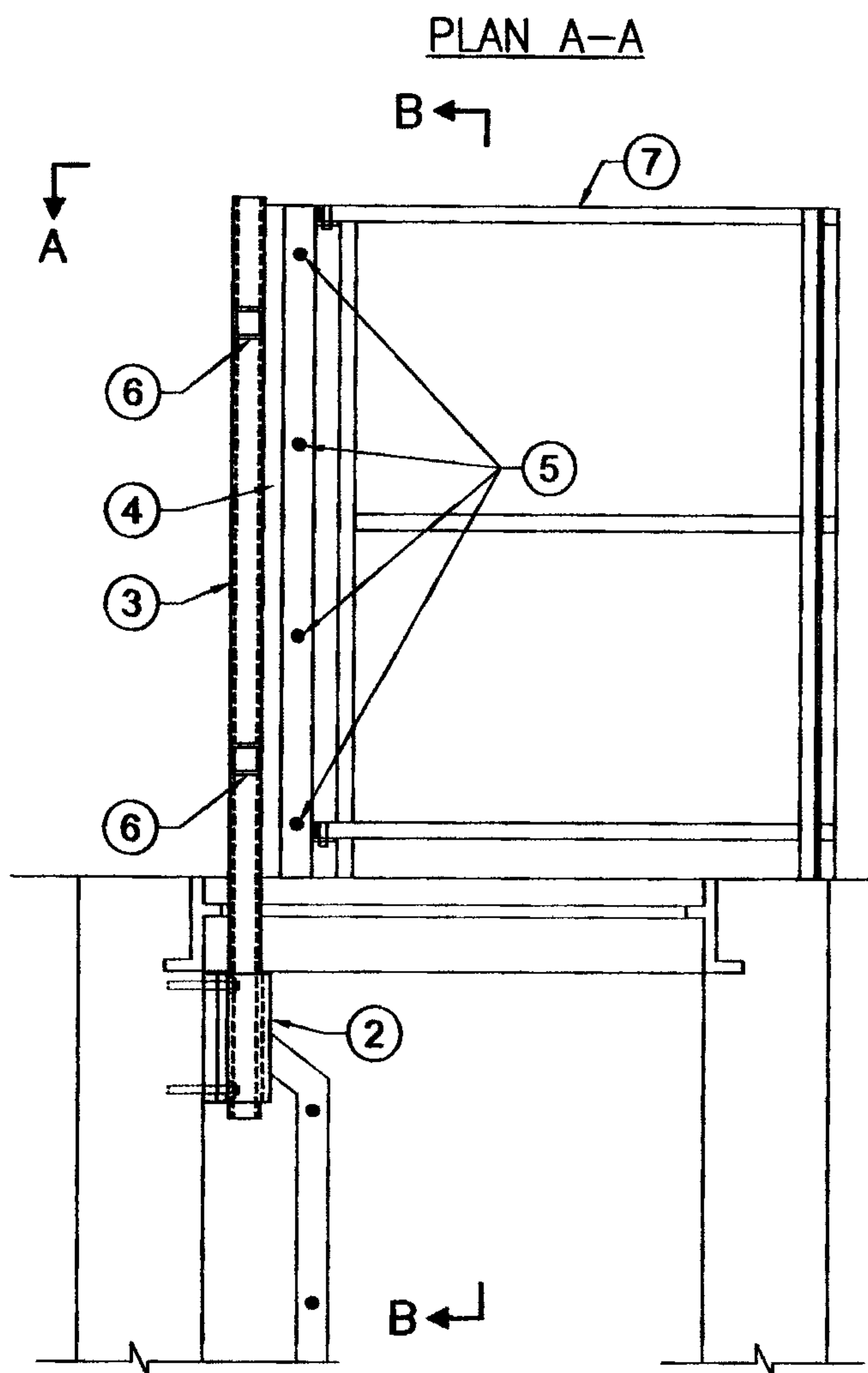


FIGURE 1

PORTABLE SAFE ENTRY/EXIT SYSTEM

PLAN A

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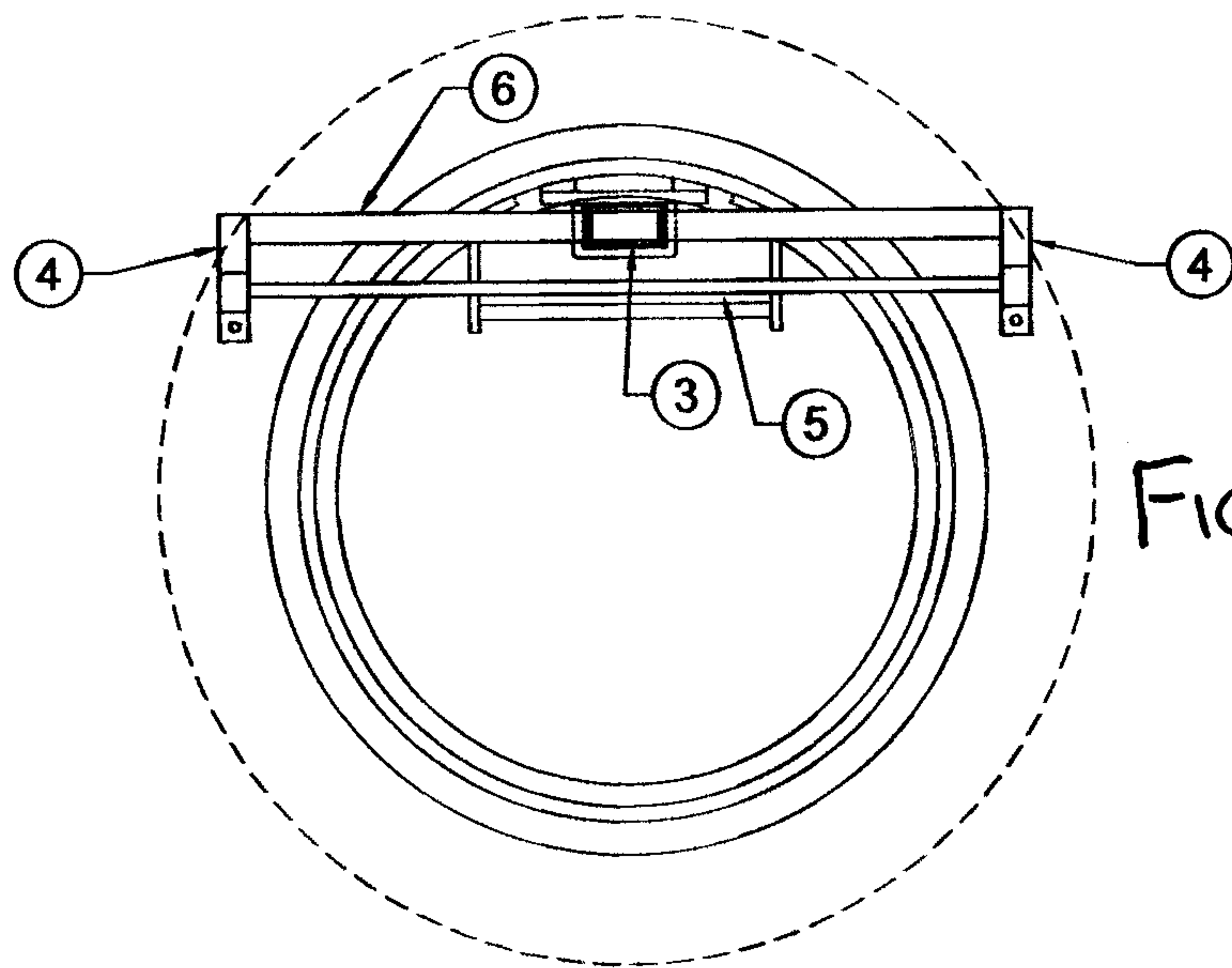


FIGURE 4

PLAN C-C

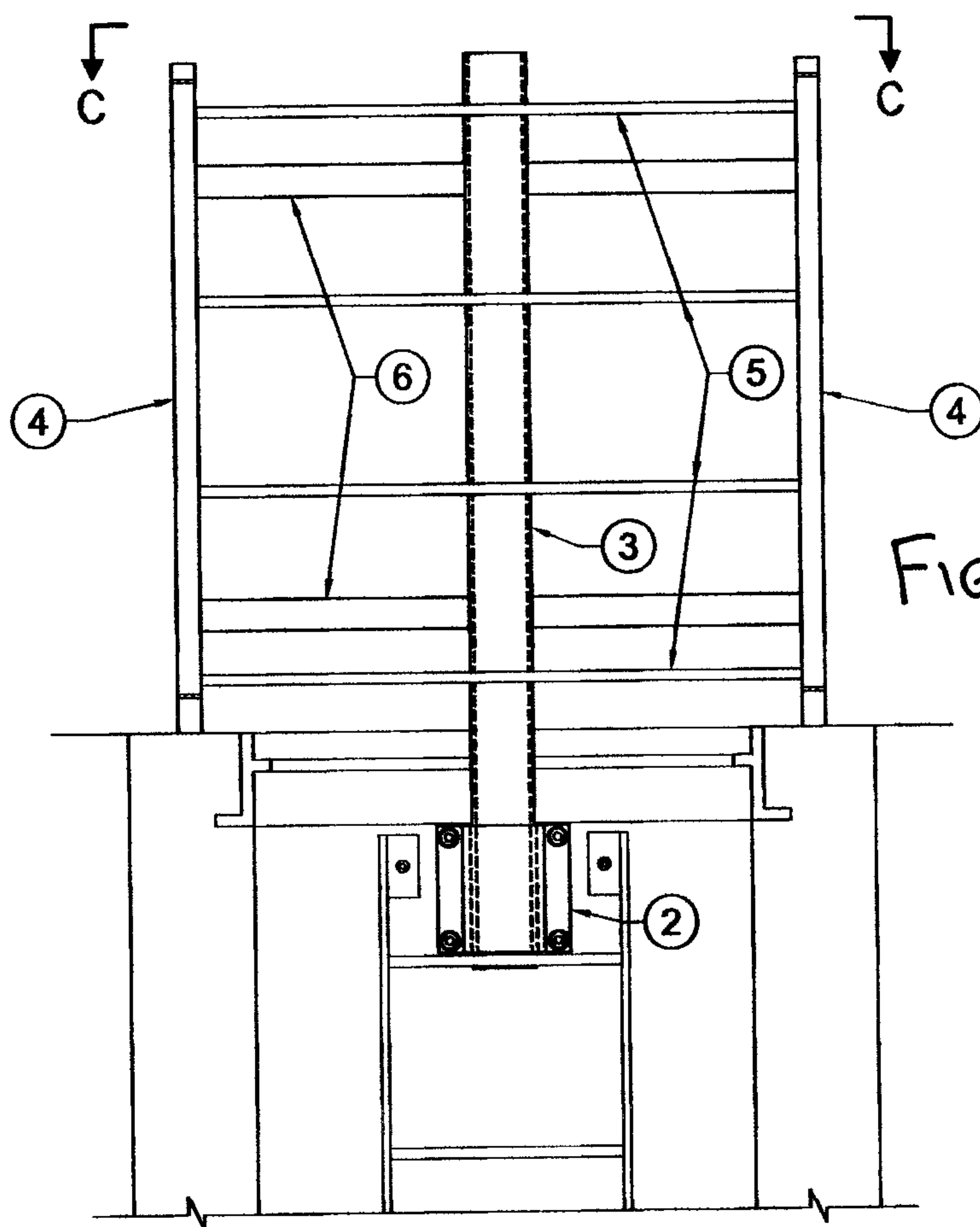
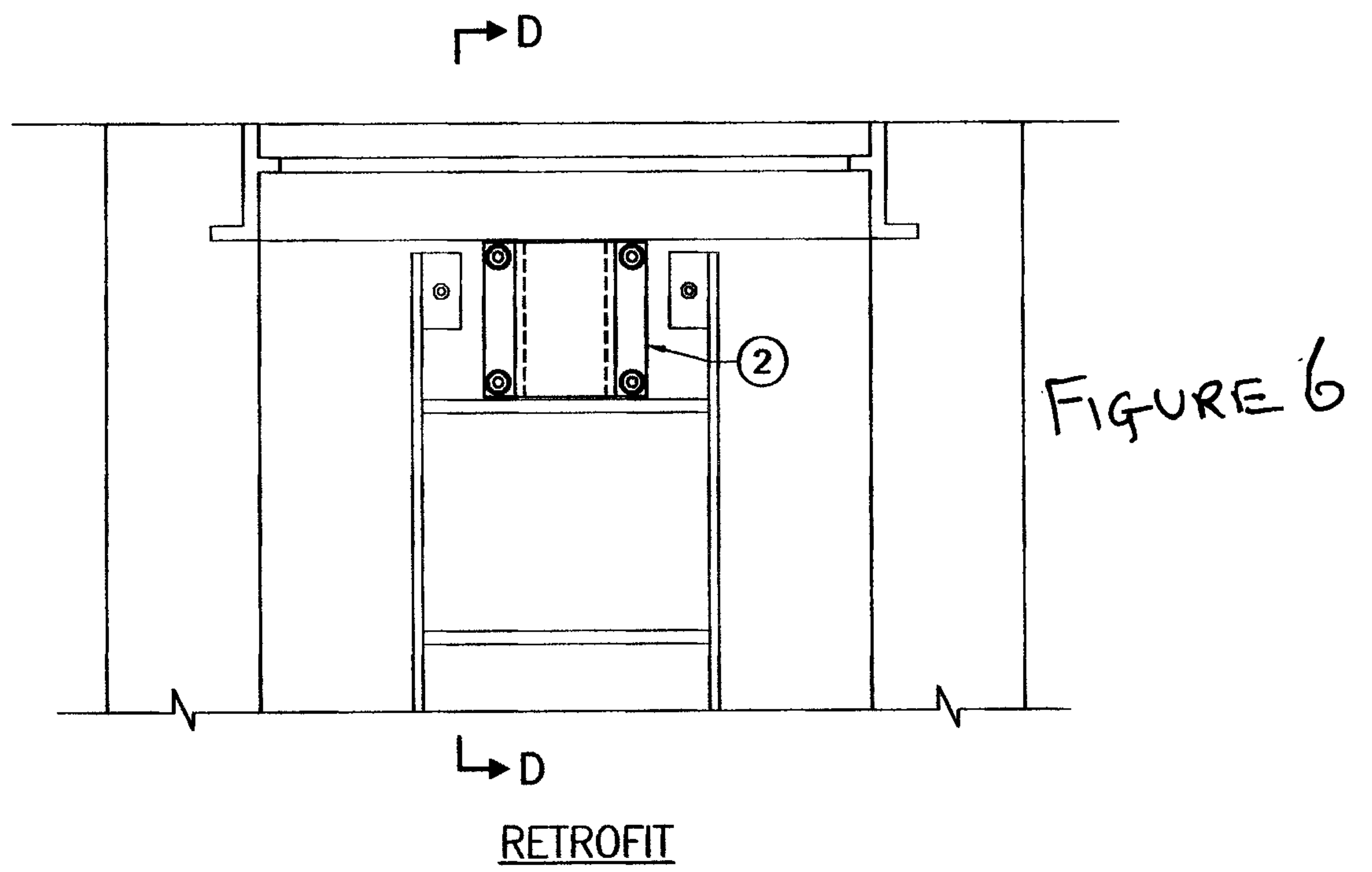
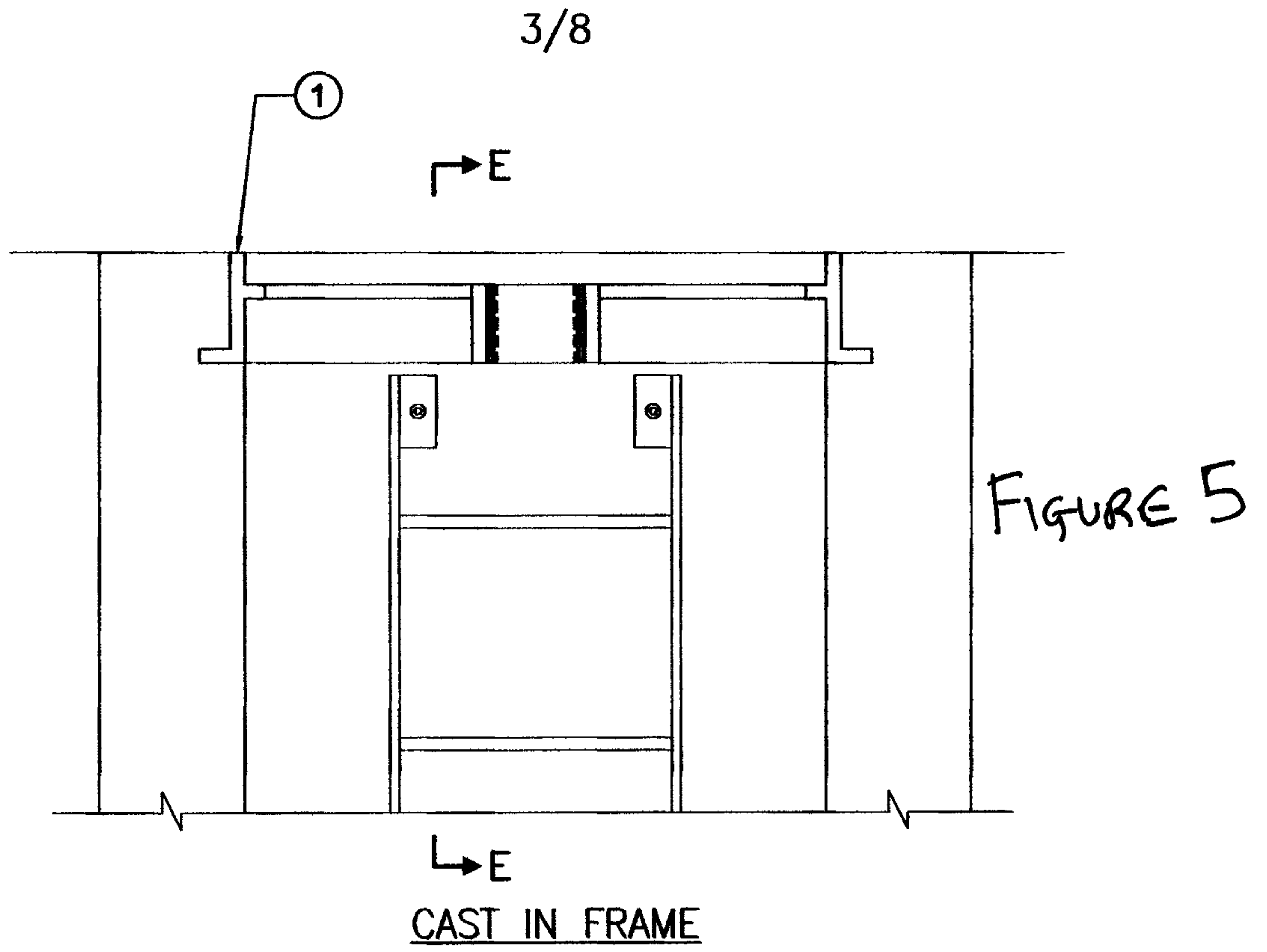


FIGURE 3

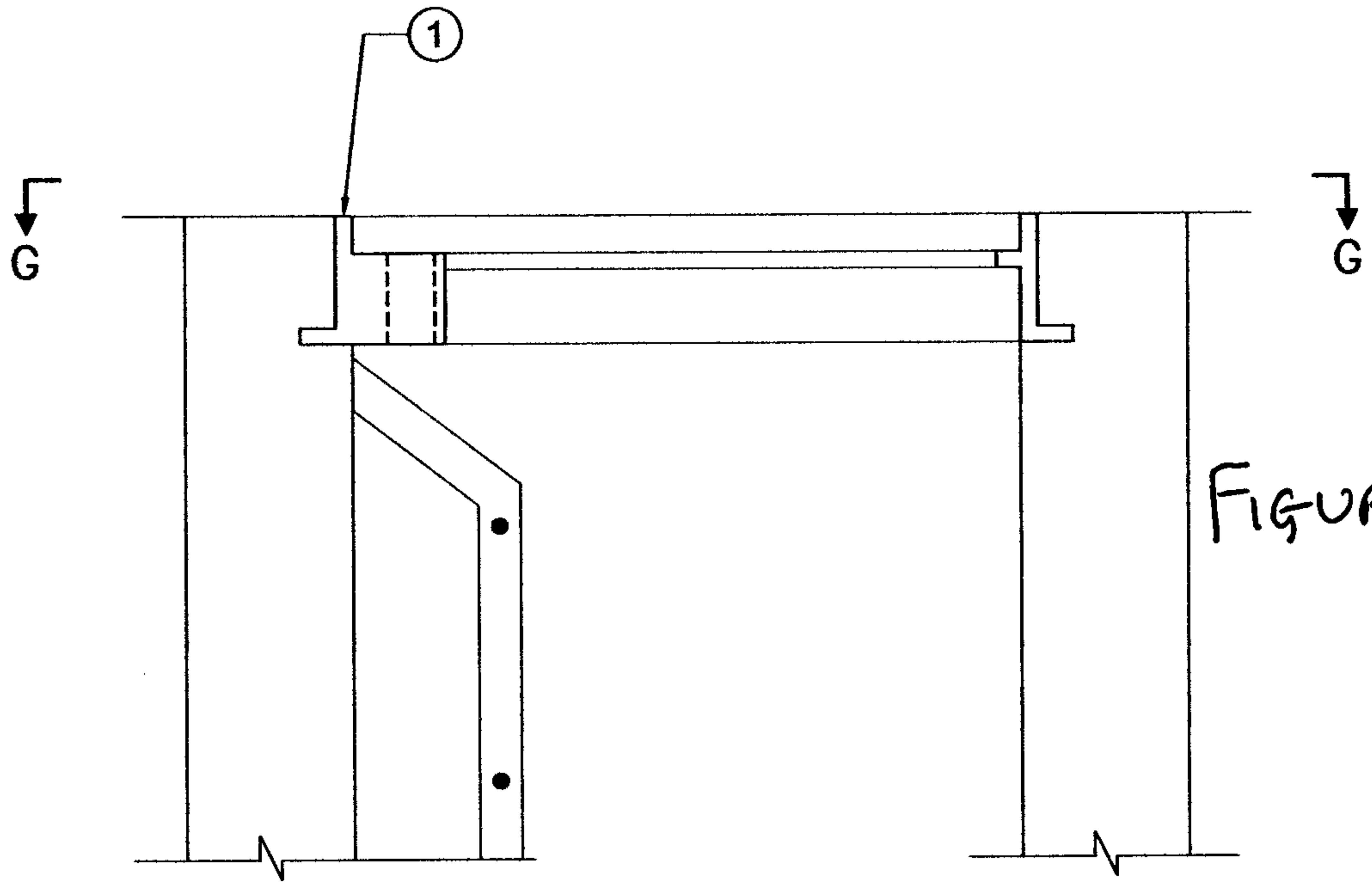
SECTION B-B

PLAN B



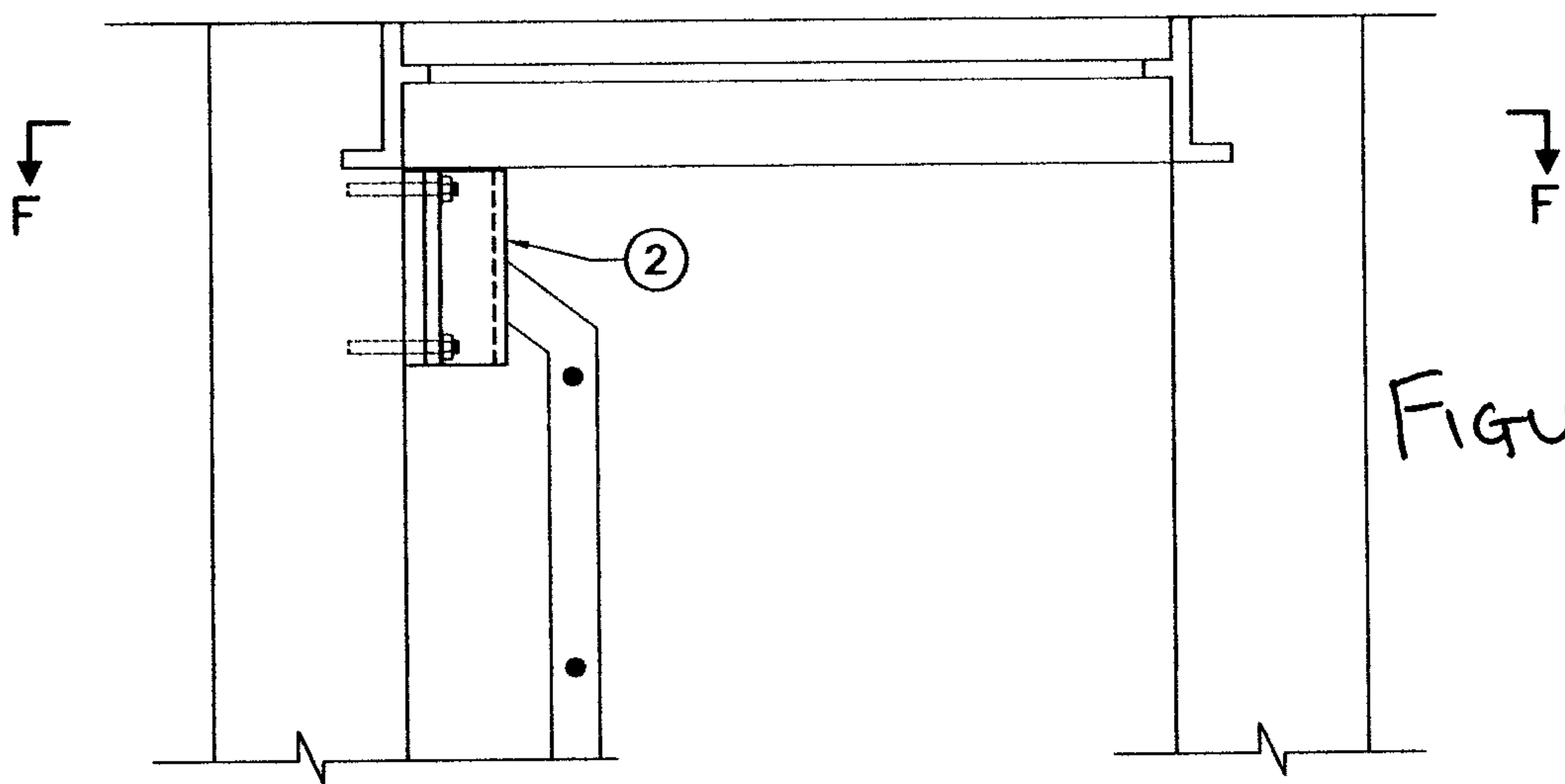
PLAN C

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SECTION E-E

FIGURE 8



SECTION D-D

FIGURE 7

PLAN D

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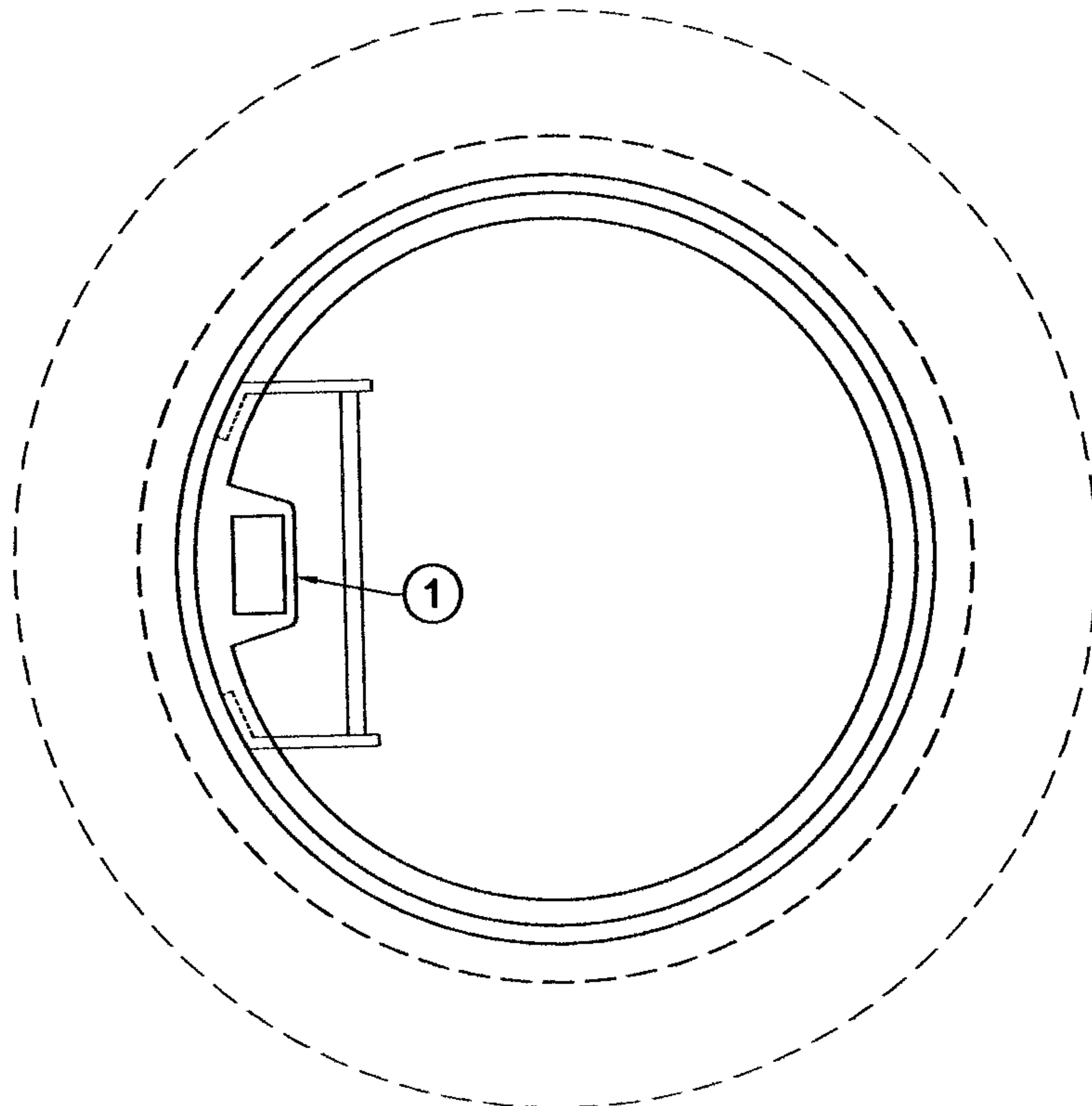


FIGURE 10

PLAN G-G

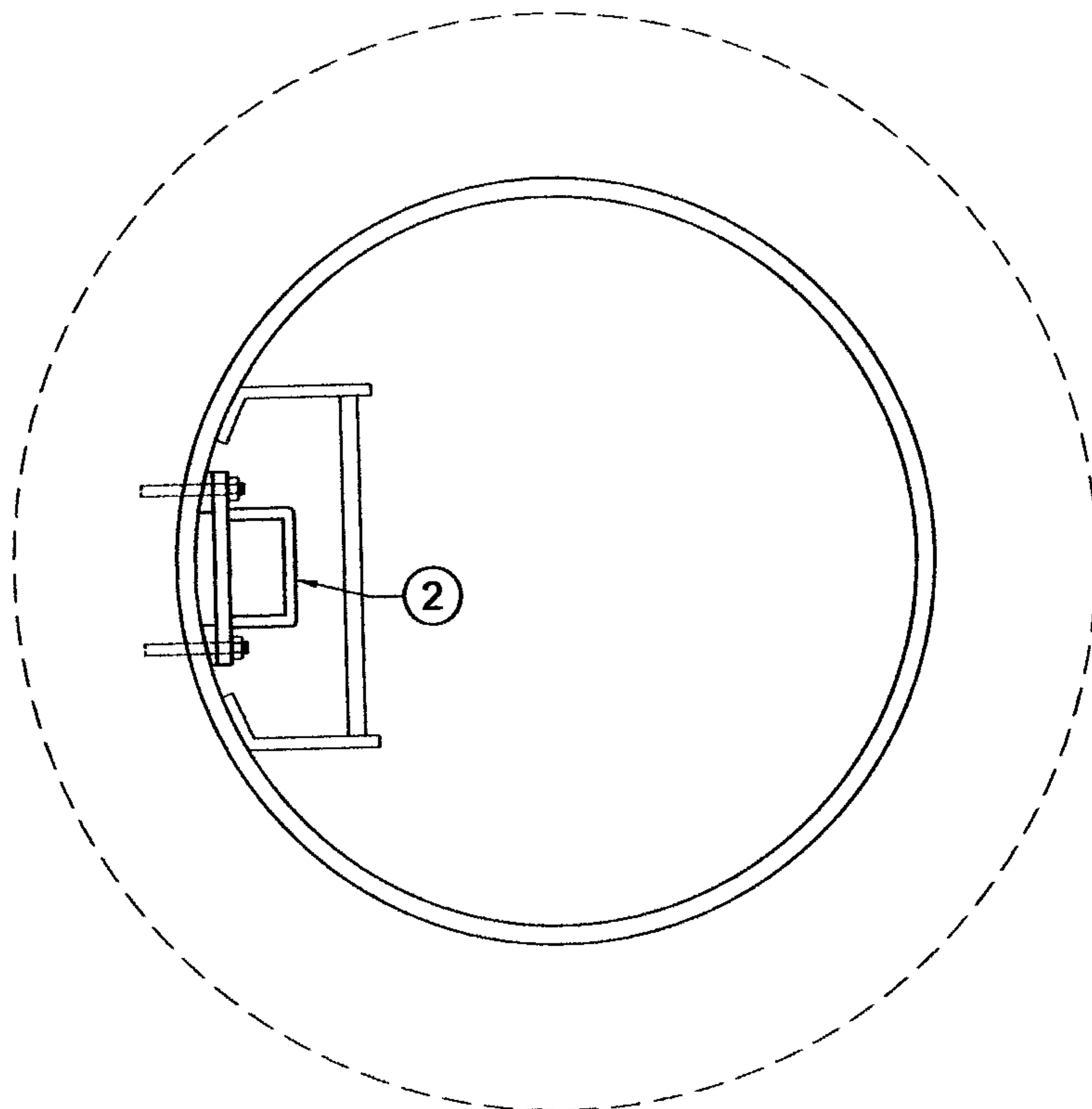
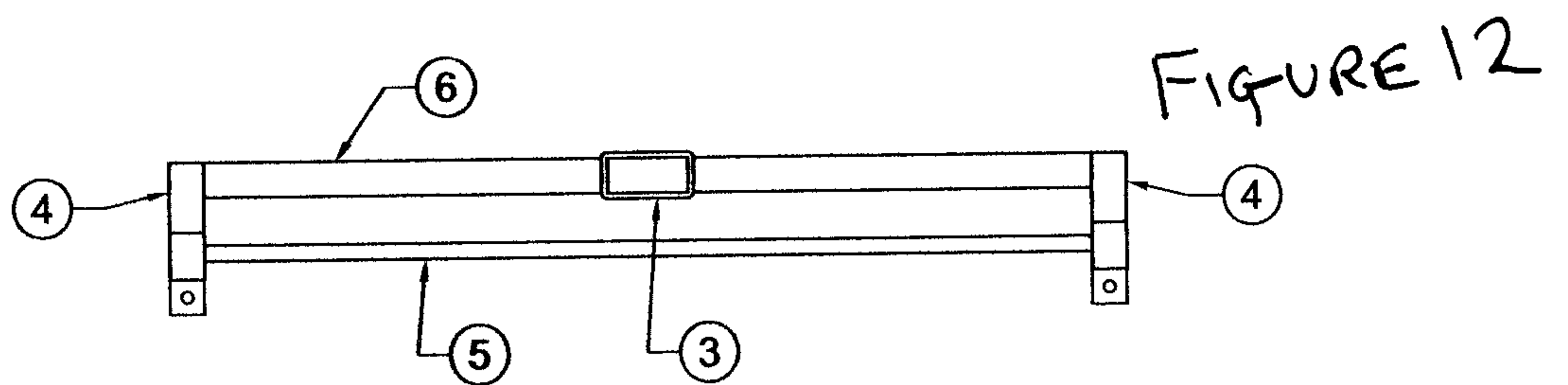
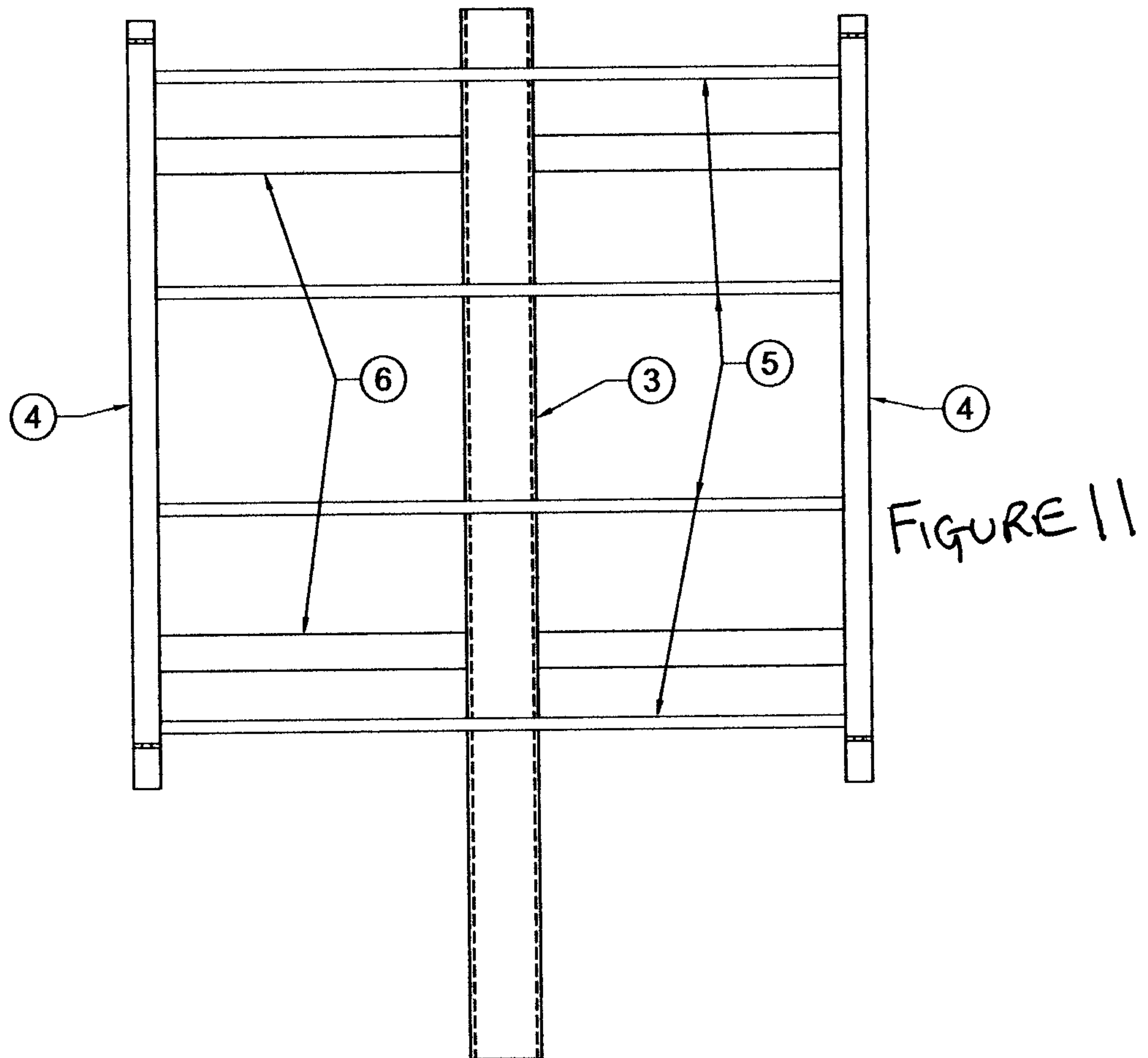


FIGURE 9

PLAN F-F

PLAN E

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PORTABLE SAFE ENTRY/EXIT DEVICE

PLAN F

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FIGURE 13

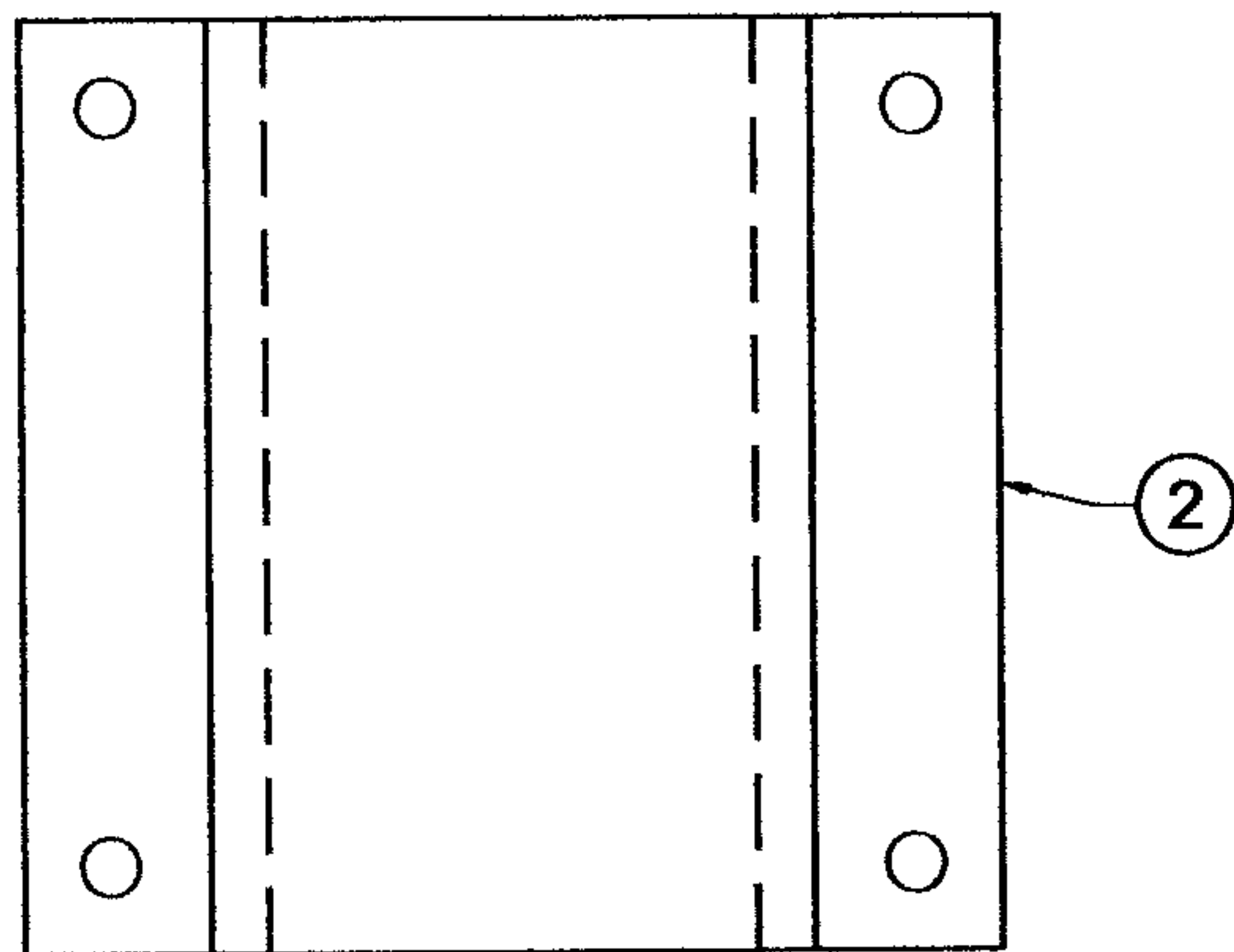


FIGURE 14

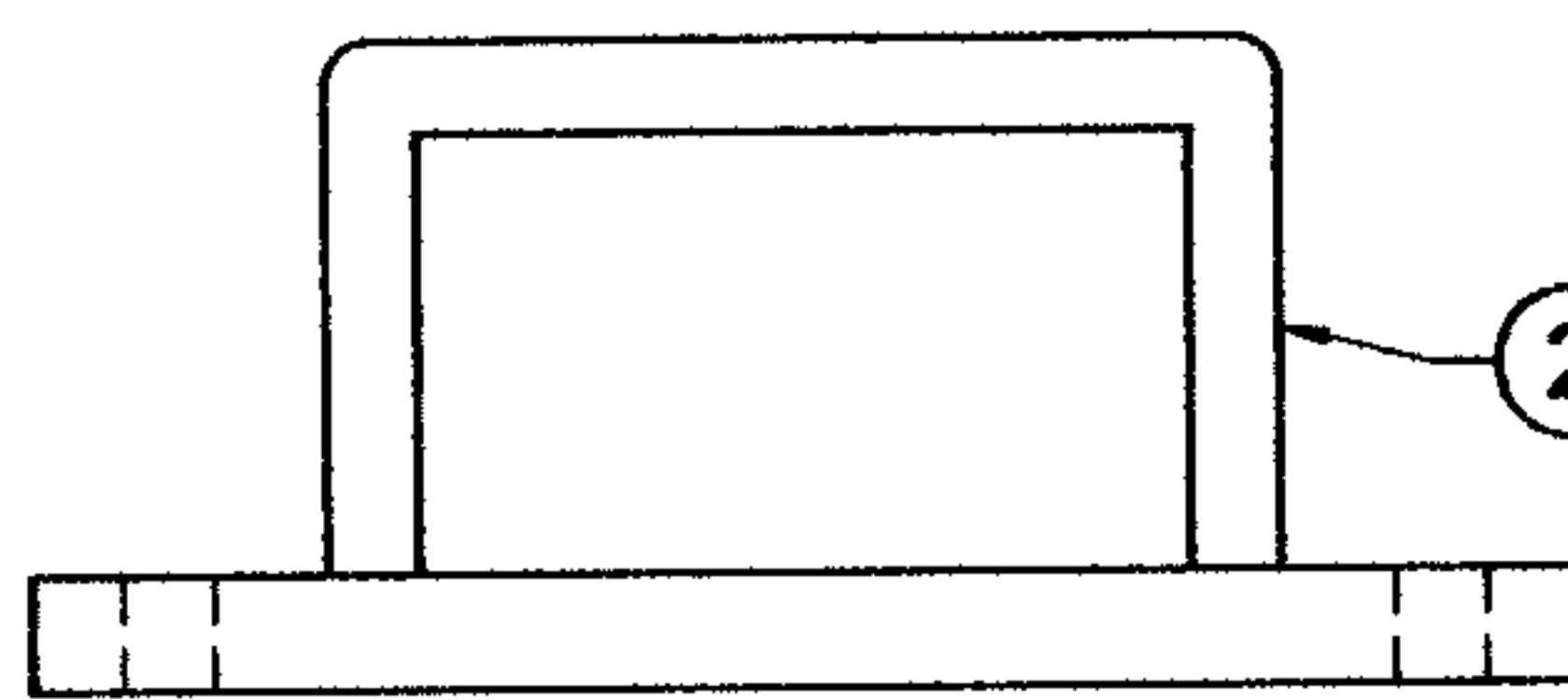
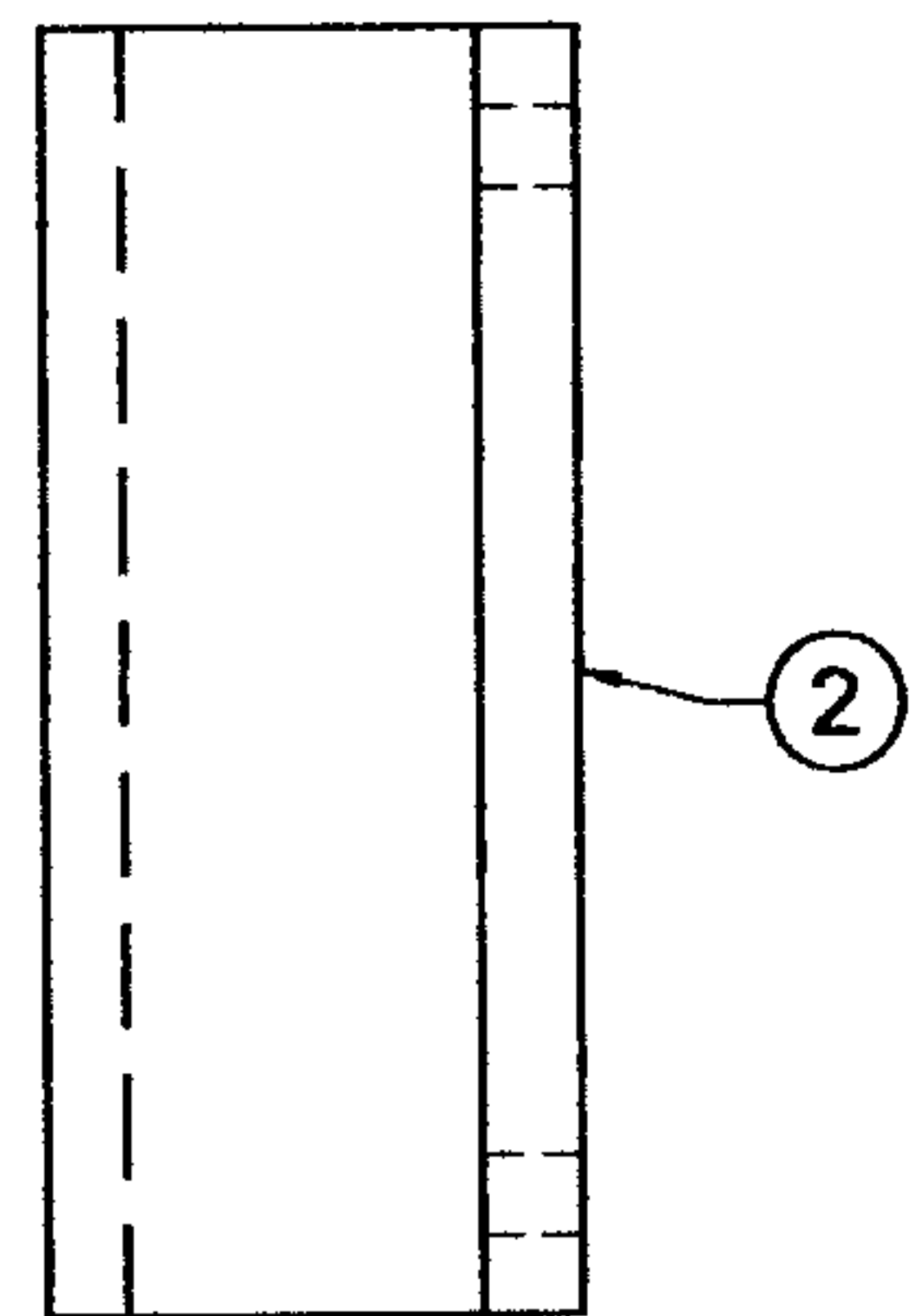


FIGURE 15

RETROFIT RECEIVER SLEEVE

PLAN G

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FIGURE 16

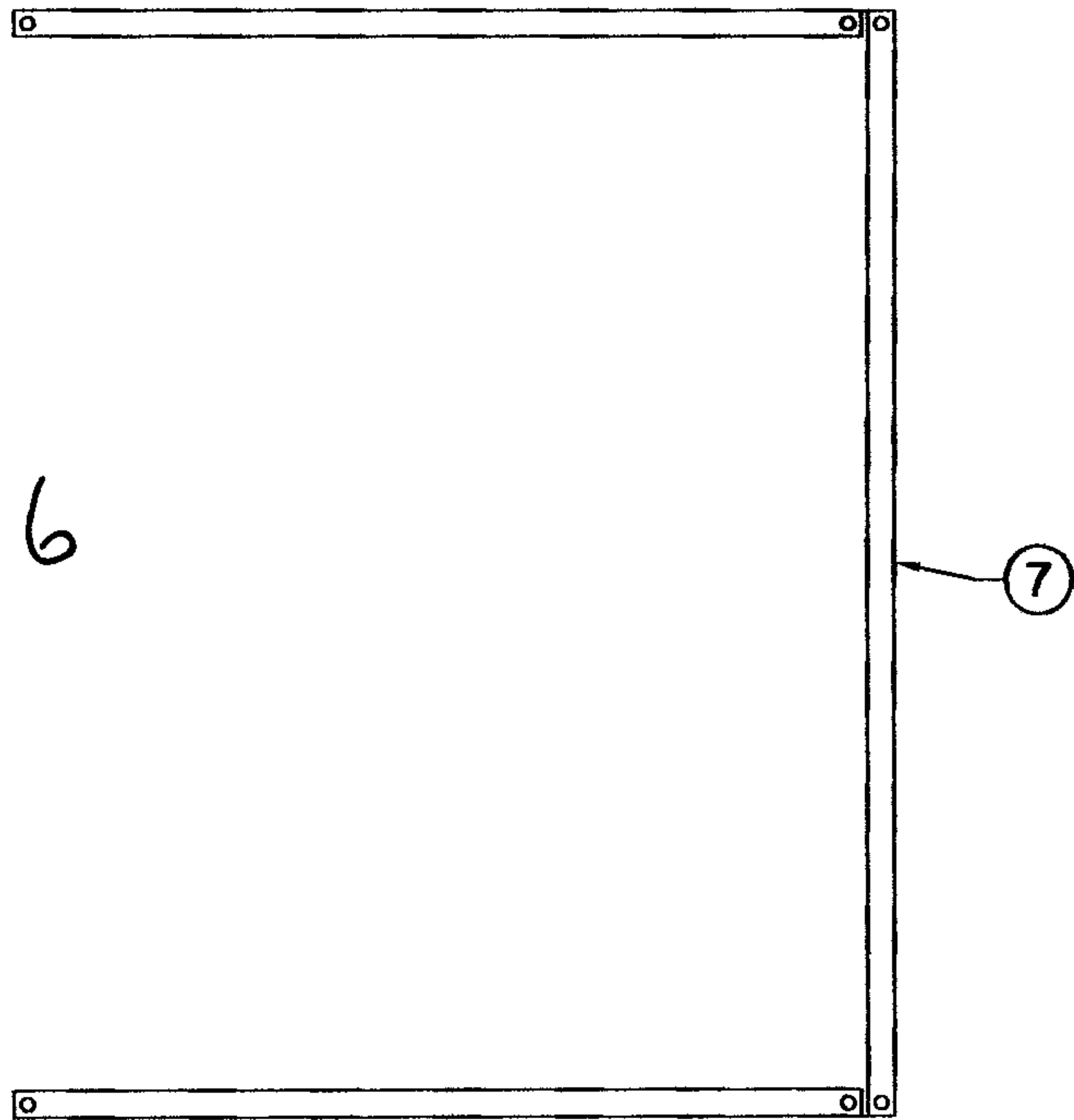
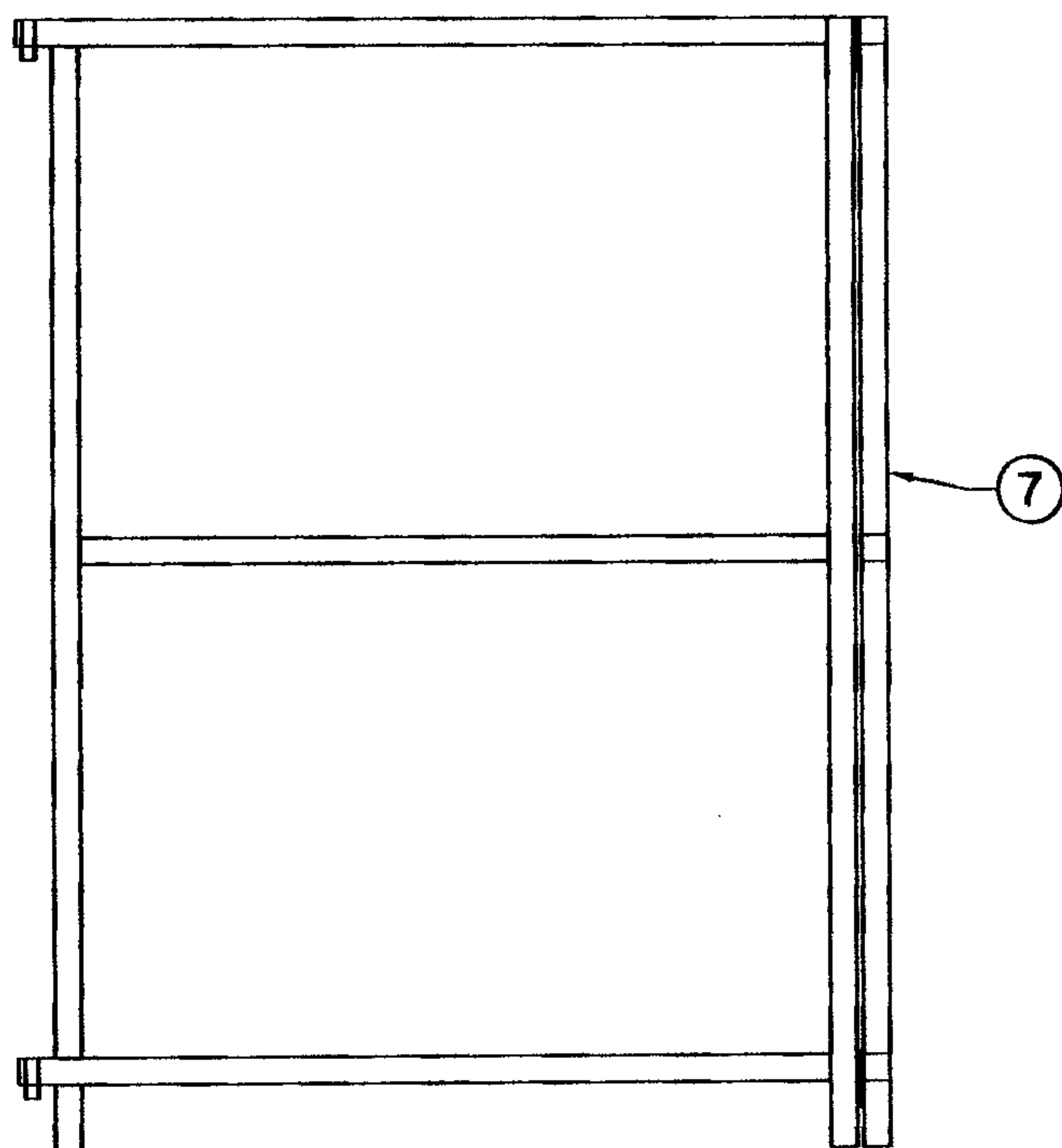
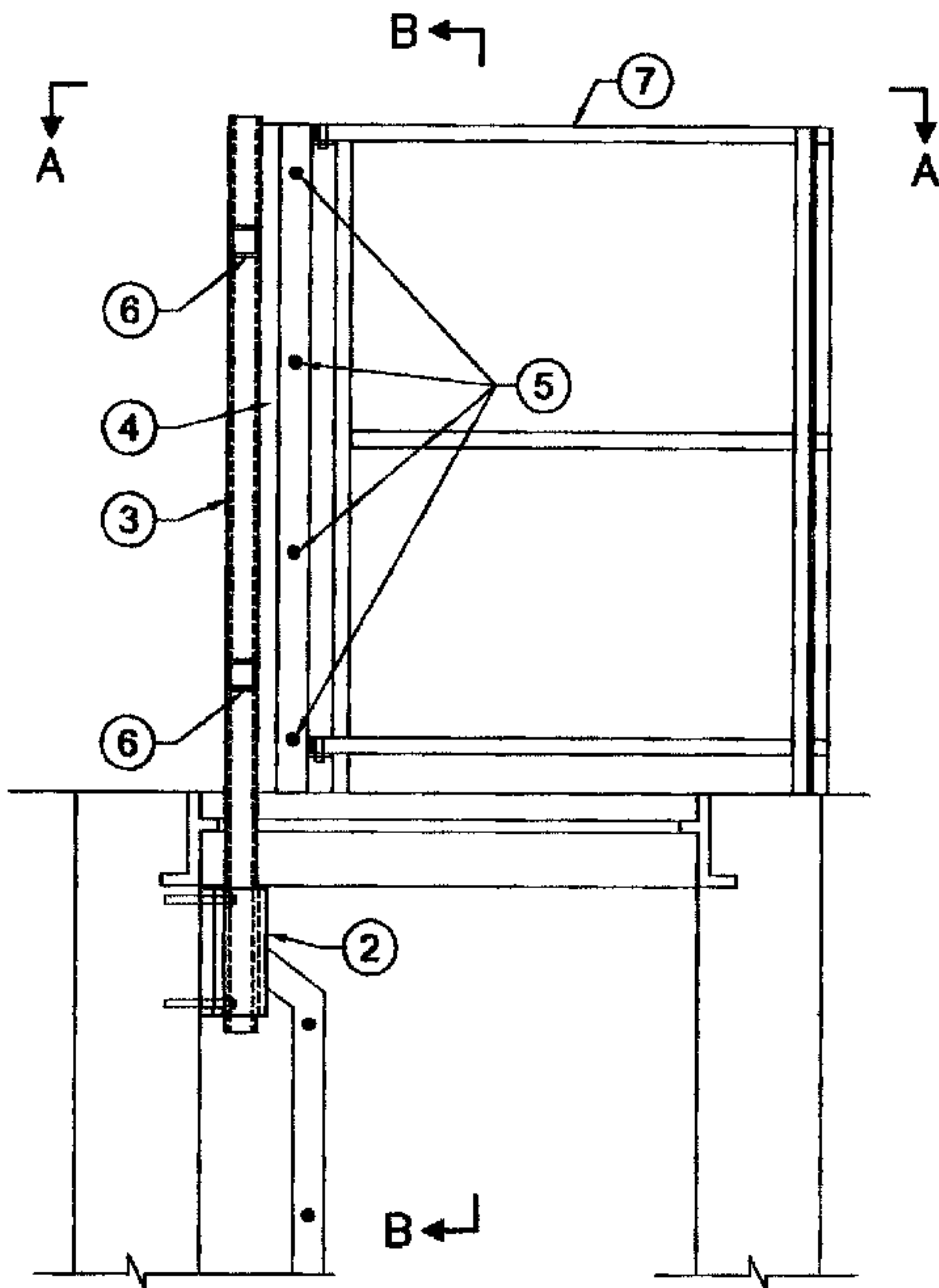


FIGURE 17



HINGED SAFETY BARRIER

PLAN H



PORTABLE SAFE ENTRY/EXIT SYSTEM

PLAN A