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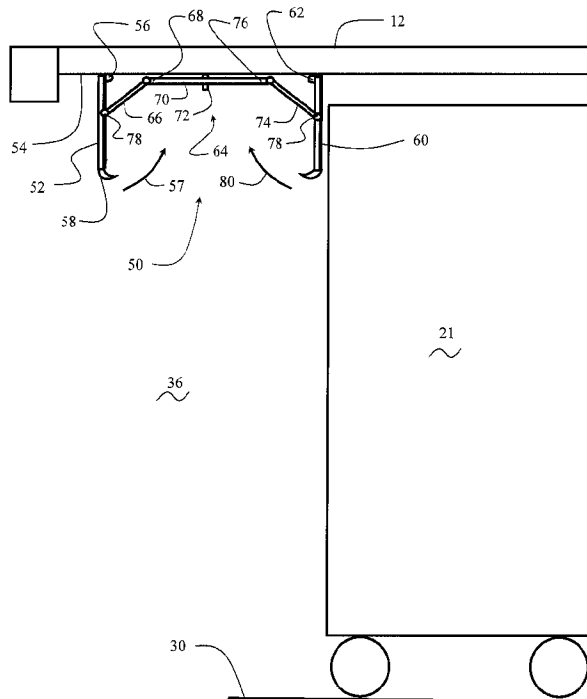
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(54) Titre : PLAQUE PERMETTANT DE RANGER UN CHARIOT DANS UN PLACARD

(54) Title: CART STOWAGE PLACARD ENABLING PLATE



(57) Abrégé/Abstract:

A retractable placard system for galley cart storage bays is provided. The placard system includes an outer plate and a placard. The outer plate is mounted with a hinge to a surface of a cart storage bay and is adapted to depend substantially vertically from the surface in a first position and to rotate in a first direction upon contact by a first edge of a half size cart. The placard is mounted to the outer plate. The placard is visible in the bay with the outer plate in the first position and retracted with the outer plate rotated in the first direction to a second position.

ABSTRACT

A retractable placard system for galley cart storage bays is provided. The placard system includes an outer plate and a placard. The outer plate is mounted with a hinge to a surface of a cart storage bay and is adapted to depend
5 substantially vertically from the surface in a first position and to rotate in a first direction upon contact by a first edge of a half size cart. The placard is mounted to the outer plate. The placard is visible in the bay with the outer plate in the first position and retracted with the outer plate rotated in the first direction to a second position.

CART STOWAGE PLACARD ENABLING PLATE

BACKGROUND INFORMATION

Field

- 5 Embodiments of the disclosure relate generally to storage of galley carts and more particularly to a rotatable placard plate retractably positioned to indicate a missing half size cart in an interior galley storage location.

Background

- Galley carts are employed in commercial aircraft for food and beverage
10 service during flights. Galley carts are typically available in a full size cart having a defined height, width and depth or a half size cart having substantially the same height and width as the full size cart but half the depth. For storage during takeoff, landing or turbulent flight conditions, the aircraft galley has one or more bays, typically under a galley work counter, each having a height to receive the carts and a
15 width wide enough to receive two or more carts. The galley may employ two or more bays with differing cart capacity. To assure that proper cart storage is achieved placards identifying the capacity, number or weight of the complement of galley carts to be stored in the bay are employed. The placards are visible when the bay is not filled with the full complement of carts. For bays with a width for three or more carts,
20 placards mounted on the walls of the bay may be obscured by carts loaded against the wall. The interior cart locations (not located adjacent a bay wall) may therefore not have visible placarding.

SUMMARY

- Exemplary embodiments provide a retractable placard system for galley cart
25 storage bays which employs an outer plate mounted with a hinge to a surface of a

cart storage bay. The outer plate is adapted to depend substantially vertically from the surface in a first position and to rotate in a first direction upon contact by a first edge of a half size cart. A placard is mounted to the outer plate and is visible in the bay with the outer plate in the first position and retracted with the outer plate rotated
5 in the first direction to a second position.

The embodiments provide a method for displaying and retracting a placard in a galley cart storage bay by suspending an outer rotatable plate carrying a placard in a first position from an upper surface over a central storage position. The outer rotatable plate is then rotated in a first direction responsive to contact by a first edge
10 of a galley cart allowing insertion of the cart under the rotated plate.

More particularly, in one embodiment there is provided a retractable placard system comprising a rotatable outer plate mounted with a hinge to an upper surface of a cart storage bay, the rotatable outer plate extending downward vertically from the upper surface in a first position and rotated in a first direction upon contact by a
15 first edge of a half size cart, The system further includes a placard mounted to the rotatable outer plate, the placard visible in the cart storage bay with the rotatable outer plate in the first position and retracted with the rotatable outer plate rotated in the first direction to a second position. The system further includes a sensor for detecting proximity of the half size cart and for detecting when the half size cart is
20 removed from the cart storage bay, the sensor comprising a rotatable inner plate mounted with a second hinge to the upper surface of the cart storage bay, the rotatable inner plate extending downward vertically from the upper surface with the rotatable outer plate in the first position and rotated in a second direction upon contact by a second edge of the half size cart. The system further includes a linkage
25 responsive to the sensor. The linkage comprises a first compression/tension arm connected to an edge of the rotatable outer plate, a rotating arm connected at a first end thereof to the first compression/tension arm and mounted to a pivot on the upper surface of the cart storage bay, and a second compression/tension arm connected

to an edge of the rotatable inner plate and further connected to a second end of the rotating arm.

In another embodiment there is provided an aircraft galley comprising a cart storage bay having a top surface, a left wall, a right wall and a rear wall and having
5 a left storage position adjacent the left wall, a right storage position adjacent the right wall and a central storage position intermediate the left and right storage positions, each of the left, right, and central storage positions adapted to accommodate one full size galley cart or two half size galley carts. The aircraft galley further comprises a rotatable outer plate mounted with a first hinge to the top surface of the cart storage
10 bay, the rotatable outer plate adapted to depend substantially vertically in a first position from the top surface in the central storage position and to rotate in a first direction upon contact by a first edge of a half size cart. The aircraft galley further includes a placard mounted to the rotatable outer plate, the placard visible in the central storage position with the rotatable outer plate in the first position and retracted
15 with the rotatable outer plate rotated in the first direction to a second position. The aircraft galley further includes a sensor for detecting proximity of the half size cart and for detecting when the half size cart is removed from the cart storage bay wherein the sensor comprises a rotatable inner plate mounted with a second hinge to the top surface of the cart storage bay, the rotatable inner plate is adapted to extend
20 downward substantially vertically from the top surface in the first position and to rotate in a second direction upon contact by a second edge of the half size cart. The aircraft galley further includes a linkage responsive to the sensor for rotating the rotatable outer plate from the first position in the first direction to the second position. The linkage comprises a first compression/tension arm connected to an edge of the
25 rotatable outer plate, a rotating arm connected at a first end thereof to the first compression/tension arm and mounted to a pivot on the top surface of the cart storage bay, and a second compression/tension arm connected to an edge of the rotatable inner plate and further connected to a second end of the rotating arm.

In another embodiment there is provided a method for displaying and retracting a placard in a cart storage bay. The method involves suspending an outer rotatable plate carrying the placard, the outer rotatable plate mounted with a first hinge to an upper surface of the cart storage bay, the outer rotatable plate extending downward substantially vertically from the upper surface in a first position over a central storage position in the cart storage bay, the placard mounted to the outer rotatable plate, the placard visible in the cart storage bay with the outer rotatable plate in the first position and retracted with the outer rotatable plate rotated in a first direction to a second position. The method further involves rotating the outer rotatable plate in the first direction upon contact by a first edge of the galley cart, with a linkage responsive to contact by the first edge of the galley cart allowing insertion of the galley cart under the rotated outer rotatable plate. The linkage comprises a first compression/tension arm connected to an edge of the outer rotatable plate, a rotating arm connected at a first end thereof to the first compression/tension arm and mounted to a pivot on the upper surface of the cart storage bay. The method further involves causing a sensor to detect proximity of a half size cart and to detect when the half size cart is removed from the cart storage bay, the sensor comprising a rotatable inner plate mounted with a second hinge to the upper surface of the cart storage bay. A second compression/tension arm is connected to an edge of the rotatable inner plate and is further connected to a second end of the rotating arm. The rotatable inner plate extends downward substantially vertically from the upper surface with the outer rotatable plate in the first position and rotated in a second direction upon contact by a second edge of the half size cart.

In another embodiment there is provided a method for displaying and retracting a placard in a cart storage bay of an aircraft galley. The method involves providing a cart storage bay having a top surface, a left wall, a right wall and a rear wall and having a left storage position adjacent the left wall, a right storage position adjacent the right wall and a central storage position in the cart storage bay intermediate the left and right storage positions, each of the left, right, and central storage positions adapted to accommodate one full size galley cart or two half size

galley carts. The method further involves suspending an outer rotatable plate carrying the placard, the outer rotatable plate mounted with a first hinge to the top surface of the cart storage bay, the outer rotatable plate extending downward substantially vertically from top surface in a first position over the central storage position, the placard mounted to the outer rotatable plate, the placard visible in the cart storage bay with the outer rotatable plate in the first position and retracted with the outer rotatable plate rotated in a first direction to a second position. The method further involves rotating the outer rotatable plate in the first direction upon contact by a first edge of a galley cart, with a linkage responsive to contact by the first edge of the galley cart allowing insertion of the galley cart under the rotated outer rotatable plate, the linkage comprising a first compression/tension arm connected to an edge of the outer rotatable plate, a rotating arm connected at a first end thereof to the first compression/tension arm and mounted to a pivot on the top surface of the cart storage bay. The method further comprises causing a sensor to detect proximity of a half size cart and to detect when a half size cart is removed from the cart storage bay, the sensor comprising a rotatable inner plate mounted with a second hinge to the top surface of the cart storage bay. A second compression/tension arm is connected to an edge of the rotatable inner plate and is further connected to a second end of the rotating arm. The rotatable inner plate extends downward substantially vertically from the top surface with the outer rotatable plate in the first position and rotated in a second direction upon contact by a second edge of the half size cart.

BRIEF DESCRIPTION OF THE DRAWINGS

The features, functions, and advantages that have been discussed can be achieved independently in various embodiments or may be combined in yet other embodiments further details of which can be seen with reference to the following
5 description and drawings.

FIG. 1A is an exemplary galley layout providing storage bays for 7 galley cart widths;

FIG. 1B is an exemplary galley layout providing storage bays for 5 galley cart widths;

10 FIG. 2A is a representation of a full size galley cart;

FIG. 2B is a representation of a half size galley cart;

FIG. 3 is a representation of a storage configuration of combined full size and half size carts in a three cart width galley bay;

15 FIG. 4A is a representation of the three cart width bay in a first fully loaded configuration;

FIG. 4B is a representation of the three cart width bay of FIG. 4A in a partially loaded configuration;

FIG. 5A is a representation of the three cart width bay in a second partially loaded configuration;

5 FIG 5B is a representation of the three cart width bay of FIG. 5A in a fully loaded configuration;

FIG. 6A is a representation of the three cart width bay in a third partially loaded configuration;

10 FIG. 6B is a representation of the three cart width bay in a fourth partially loaded configuration;

FIG. 7 is a side view of an exemplary embodiment of the rotatable placard plate assembly;

FIG. 8 is a pictorial representation of the exemplary embodiment;

15 FIG. 9A is a side view of the exemplary embodiment demonstrating commencement of retraction during the initial stage of insertion of a cart;

FIG. 9B is a side view of the exemplary embodiment during the fully retracted stage during of insertion of a cart;

20 FIG. 10A is a side view of the exemplary embodiment demonstrating commencement of retraction during the initial stage of withdrawal of a half size cart from a rear position;

FIG. 10B is a side view of the exemplary embodiment during the fully retracted stage during of withdrawal of the half size cart;

FIG. 11. Is aside view of the exemplary embodiment with two carts inserted;

FIG. 12A is a top view of the actuation mechanism of the rotatable placard plate assembly in the unrotated position corresponding to FIG. 8;

FIG. 12B is a top view of the actuation mechanism of the rotatable placard plate assembly in the partially rotated position corresponding to FIG. 9;

5 FIG. 12C is a top view of the actuation mechanism of the rotatable placard plate assembly in the fully rotated position corresponding to FIGs. 10 or 11; and,

FIG. 13 is a flow chart demonstrating a method for employing the embodiments disclosed herein.

DETAILED DESCRIPTION

10 The embodiments herein provide a means for placarding galley cart bays which is identifiable for all partial loading conditions of the bay. More specifically, the embodiments described herein provide a placard system for a central cart positions in a galley bay which is retractable to allow insertion or removal of either fully size or half size carts but remains in an extended position if no cart or a single half cart is
 15 inserted in the position. A rotatable plate supports a placard indicative of the galley capacity, number or weight of galley cart storage within an aircraft galley compartment and provides visibility to the cabin flight crew until final cart placement within the compartment. In function the placard is mechanically placed in a position visible to the cabin flight crew such that when a galley cart storage bay position
 20 which is not adjacent a wall of the bay is empty or contains a half size cart the placard remains visible. At the insertion of the final capacity galley cart the placard mechanical retracts from obstructing the cart placement within the storage area and from view of the cabin flight crew.

Referring to the drawings, FIG. 1A shows an exemplary configuration for a
 25 galley 10 having a work counter 12, wall bins 14, coffee makers 16 and three storage bays 18a, 18b and 18c for galley carts 20. Storage bays 18a and 18c are

configured with a two cart width while storage bay **18b** is configured with a three cart width allowing storage of seven full size carts or up to **14** half size carts with any mixture of full and half size carts desired. FIG. **1B** shows a second exemplary configuration for a galley **11** with two storage bays **19a** and **19b** of two and three cart widths respectively for storage of **5** full size carts **20** or up to **10** half size carts **21**.
 5 Alternative embodiments with bays of up to four cart widths may be employed and galleys employing only a single bay of three or four cart widths are also common.

FIG. **2A** is a representation of a full size cart **20** having a height **22**, width **24** and depth **26**. FIG. **2B** is a representation of a half size cart **21** showing a common
 10 height **22** and width **24** with the full size cart but a half depth **28** (wheels of the carts have not been shown for simplicity). FIG. **3** shows an exemplary three cart width bay **30** in which a full size cart **20** is stored in a left storage position **32** adjacent a left wall **34**, two half size carts **21a** and **21b** are stored in central storage position **36** and two half size carts **21c** and **21d** are stored in a right storage position **38** adjacent a
 15 right wall **40** of the bay **30**.

FIG. **4A** shows the bay **30** fully loaded with half size carts **21a** and **21b** in the left storage position **32**, a full size cart **20** in the central storage position **36** and two half size carts **21c** and **21d** in the right storage position **38**. With the full size cart **20** removed from the central storage position **36** and the outer half size carts **21a** and
 20 **21c** removed from the left and right storage positions **32**, **38**, respectively, as seen in FIG. **4B** for a first partially filled condition of the bay, placards **42** placed on the left wall **34**, right wall **40**, and rear wall **44** are visible indicating that carts are missing from the bay. As seen in FIG. **5A** for a second partially filled condition of the bay, if the full size cart **20** is reloaded in the central storage position **36** and the half size
 25 cart **21c** is reloaded in the right storage position **38**, the placards on the rear wall **44** and right wall **40** are covered. However, this is acceptable since both the central storage position and right storage position are full. The empty half cart position in the left storage area is still indicated by the visible placard **42** on the left wall **34**. Loading of the half size cart **21a** into the left storage position obscures the placard

on the left wall but, again, the position is full and this is an acceptable condition. If either the right storage position or the left storage position were occupied by a full size cart the placards on the walls would be obscured. However, this is also an acceptable condition since the storage position would be full.

5 As seen in FIG. 6A for a third partially filled configuration, the central storage location is filled with a full size cart **20** obscuring the placard on the rear wall **44**. This is acceptable since that position is full. The right and left storage positions each contain a half size cart **21b** and **21d**. The placards on the left wall **34** and right wall **40** are visible so this is an acceptable condition. In FIG. 6B for a fourth partially filled
10 configuration loading of a full size cart **20** in the left storage position and two half size carts **21c** and **21d** in the right storage position obscures the placards on the left and right walls **34** and **40** respectively, which is acceptable since those positions are filled. However, loading of one half size cart **21a** in the central storage position obscures the placard on the rear wall **44** while an unfilled portion of the central
15 storage position is present. This prevents viewing of any placard by the crew however the bay is not yet completely filled. This is not an acceptable condition.

An exemplary embodiment of the retractable placard system which remedies this condition is shown in FIG. 7. The bay **30** under work counter **12** is shown with one half size cart **21** for reference. The retractable placard system **50** employs an
20 outer plate **52** which is attached to an upper surface **54** of the bay **30**, which for the embodiment shown is a lower surface of the work counter **12** in the galley. With the central storage position **36** in the bay **30** empty or with one half size cart loaded, the outer plate **52** depends substantially vertically downward in the central storage position and a placard **55** is displayed on the outer plate as seen in FIG. 8. The outer
25 plate **52** is mounted to the surface **54** with a hinge **56** allowing the outer plate to rotate in a first direction represented by arrow **57** in FIG. 7 for insertion of a cart into the central storage position **36**. If a half size cart is inserted, upon passing beyond the retractable placard system **50**, the outer plate **52** rotates down into position displaying the placard. Upon insertion of a second half size cart or a full size cart

filling the central storage position, as will be described with respect to FIG. 11 subsequently, a lower edge **58** of the outer plate **52** rests on a top surface of the cart and remains in a retracted or second position with the placard hidden from view.

Returning to FIG. 7, to facilitate easy removal of a half size cart **21** from the rear space in the central storage position **36**, an inner plate **60** is mounted to the surface **54** in the bay **30** with a hinge **62** as a cart removal sensor. The outer plate **52** and inner plate **60** are connected with a linkage **64**. A first compression/tension arm **66** attached to the outer plate **52** extends to a first end **68** of a rotating arm **70**. The rotating arm **70** is mounted to the surface **54** with a pivot **72**. A second compression/tension arm **74** attached to the inner plate **60** extends to a second end **76** of the rotating arm **70**. Connection of the compression/tension arms **66** and **74** to the outer and inner plates **52** and **60** and the rotating arm **70** is accomplished with universal joints **78**. Withdrawing the half size cart **21** from the rear position contacts the inner plate as the sensor and causes the inner plate **60** to rotate in a second direction, represented by arrow **80**, which is transmitted through the linkage **64** to rotate the outer plate in the first direction **57** as will be described in greater detail subsequently. While described herein as a rotating mechanical linkage, in alternative embodiments the cart removal sensor may employ electrical or optical sensing of position of a cart and the linkage may comprise an electromechanical rotation mechanism responsive to the sensor for rotating the outer plate **52**. The cart removal sensor is any suitable sensor that detects proximity of the half size cart being removed from the cart storage bay.

For insertion of a half size cart **21**, as seen in FIG. 9A an inner upper edge **82** of the cart **21** contacts the outer plate **52** causing the outer plate **52** to rotate in the first direction **57**. The linkage **64** causes a complimentary rotation by the inner plate **60** in the second direction **80**. As seen in FIG. 9B, when the outer plate **52** has rotated sufficiently for the cart **21** to pass under the plate, the inner plate **60** has been rotated sufficiently for the cart **21** to pass. Both the outer plate **52** and inner plate **60** have a curved foot **84** on the lower edge **58** to accommodate sliding

interaction with a top surface **86** of the cart **21**. The cart **21** may be pushed to the rear of the central storage position **36** and as an outer upper edge **88** of the cart **21** clears the foot **84** of the inner plate **60**, both the inner plate **60** and outer plate **52** will rotate downwardly to the initial position shown in FIG. 7. Weight of the inner and outer plates **60**, **52** may be employed to cause the downward rotation by gravity. However, spring assists in the linkage to urge the plates positively in a downward direction may be used.

For removal of the half size cart **21** from the rear of the central storage position **36**, as seen in FIG. 10A the outer upper edge **88** of the cart **21** contacts the inner plate **60** as the removal sensor detecting the proximity of the cart **21** for removal and causes the inner plate **60** to rotate in the second direction **80**. The linkage **64** causes a complimentary rotation by the outer plate **52** in the first direction **57**. As seen in FIG. 10B, when the inner plate **60** has rotated sufficiently for the cart **21** to pass under the inner plate **60**, the outer plate **52** has been rotated sufficiently for the cart **21** to pass. As the inner upper edge **82** of the cart **21** clears the foot **84** of the outer plate **52**, both the inner plate **60** and outer plate **52** will rotate downwardly to the initial position shown in FIG. 7.

With a first cart **21a** installed in the central storage position **36** of the bay **30**, a second cart **21b** may be installed with a process rotating the outer and inner plates **52**, **60** similar to that described with respect to FIGs A and 9B. As shown in FIG. 11 the rotated outer plate **52** and inner plate **60** will be maintained in the rotated position by the presence of the second cart **21b** thereby maintaining the retracted position of the placard **55** attached to the outer plate **52**.

Operation of the linkage **64** to obtain complimentary rotation of the outer plate **52** and inner plate **60** is seen in FIGs. 12A – 12C. For the embodiment shown in the drawings, the compression/tension arm **66** is attached with universal joint **78** to an edge **90** of the outer plate **52**, substantially perpendicular to the hinge **56** (as seen in FIG. 7), at approximately a midpoint **92** as best seen in FIGs. 12B and 12C.

Similarly, Compression/tension arm **74** is attached to an edge **94** of the inner plate **60** with a universal joint **78** at approximately a midpoint **96**. The extended or unrotated position of the inner and outer plates **52**, **60** is shown in FIG. **12A** corresponding to the position shown in FIGs. **7** and **8**. Upon contact by a cart **20** or **21** with either the outer plate **52** or inner plate **60**, rotation of the plate **52** or **60** causes compression of the respective arm **66** or **74** which is transmitted to the rotating arm **70** causing rotation about the pivot **72**. The rotating arm **70** then causes tension in the opposite arm **74** or **66** inducing complimentary rotation of the inner plate **60** or outer plate **52**. The partially rotated position corresponding to FIGs. **9A** and **10A** is shown in FIG. **12B** while the fully rotated position of FIGs. **9B**, **10B** and **11** is shown in FIG. **12C**.

As seen in FIG. **13**, the embodiment disclosed herein may be constructed to provide a retractable placard system **50** by rotatably suspending an outer plate **52** from a surface **54** of a cart storage bay, step **1302**. Receiving a half size galley cart **21** in the bay **30** and contacting the outer plate **52** with a first edge **82** of the cart **21**, step **1304**. Rotating the outer plate **52** in a first direction **57** responsive to contact with the first edge **82** to allow insertion of the galley cart **21**, step **1306**. In the exemplary embodiment, the rotation of the outer plate **52** compresses a first compression/tension arm **66** connected to an edge **90** of the outer plate **52**, step **1308**. A rotating arm **70** connected at a first end **68** to the first compression/tension arm **66** and mounted to a pivot **72** on the surface **54** of the bay **30** is rotated, step **1310**, placing tension on a second compression/tension arm **74** connected to a second end **76** of the rotating arm **70** and further connected to an edge **94** of the inner plate **60** to rotate the inner plate **60** in a second direction **80**, step **1312**. The cart **21** is then moved to a rear location in the central storage position **36**, step **1314**, and the outer plate **52** is rotated back to the first position for viewing of the placard **55**, step **1316**.

For removal of the cart **21**, the half size cart **21** is moved from the rear location and proximity of the galley cart **21** is sensed with a sensor, step **1318**, which

for the embodiments disclosed is accomplished by contacting a second edge **88** of the cart **21** with the inner plate **60** to rotate in the second direction **80**. The outer plate **52** is then rotated in the first direction **57** with a linkage **64** responsive to the sensor, which for the embodiment disclosed is accomplished by compressing the second compression/tension arm **74**, step **1320**. The rotating arm **70** is rotated, step, **1322** and tension is exerted on the first compression/tension arm **66** to rotate the outer plate **52** in the first direction **57**, step **1324**, allowing removal of the galley cart **21** under the rotated plates **52**, **60**.

When a second half size cart **21b** is inserted into the central storage position **36**, the outer plate **52** is rotated in the first direction **57** responsive to contact by a first edge **82** of the second galley cart **21b** allowing insertion of the second galley cart **21b** under the rotated outer plate **52**, step **1326**. The outer plate **52** is maintained in a second position with the placard **55** retracted from view with both carts **21a**, **21b** inserted in the central storage position **36**. Steps **1308** to **1312** are accomplished in the exemplary embodiments to also rotate the inner plate **60** for clearance of the second galley cart **21b**. The inner plate **60** is maintained in a second position with the placard **55** retracted from view, step **1328**, with both carts **21a**, **21b** inserted in the central storage position **36**.

Having now described various embodiments of the disclosure in detail, those skilled in the art will recognize modifications and substitutions to the specific embodiments disclosed herein. Such modifications are within the scope and intent of the present disclosure as defined in the following claims.

EMBODIMENTS IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A retractable placard system comprising:

5 a rotatable outer plate mounted with a hinge to an upper surface of a cart storage bay, said rotatable outer plate extending downward vertically from the upper surface in a first position and rotated in a first direction upon contact by a first edge of a half size cart;

10 a placard mounted to said rotatable outer plate, said placard visible in the cart storage bay with the rotatable outer plate in the first position and retracted with the rotatable outer plate rotated in the first direction to a second position;

15 a sensor for detecting proximity of the half size cart and for detecting when the half size cart is removed from the cart storage bay, said sensor comprising a rotatable inner plate mounted with a second hinge to the upper surface of the cart storage bay, said rotatable inner plate extending downward vertically from the upper surface with the rotatable outer plate in
20 the first position and rotated in a second direction upon contact by a second edge of the half size cart; and

a linkage responsive to the sensor, said linkage comprising:

25 a first compression/tension arm connected to an edge of the rotatable outer plate;

 a rotating arm connected at a first end thereof to the first compression/tension arm and mounted to a pivot on the upper surface
30 of the cart storage bay; and

a second compression/tension arm connected to an edge of the rotatable inner plate and further connected to a second end of the rotating arm.

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2. The retractable placard system as defined in claim 1 wherein:

the compression/tension first arm is connected to the edge of the rotatable outer plate with a first universal joint, the rotating arm is connected to the first arm with a second universal joint;

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the second end of the rotating arm is connected to the second compression/tension arm with a third universal joint; and

the second compression/tension arm is connected to the edge of the rotatable inner plate with a fourth universal joint.

15

3. An aircraft galley comprising:

a cart storage bay having a top surface, a left wall, a right wall and a rear wall and having a left storage position adjacent the left wall, a right storage position adjacent the right wall and a central storage position intermediate the left and right storage positions, each of the left, right, and central storage positions adapted to accommodate one full size galley cart or two half size galley carts;

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a rotatable outer plate mounted with a first hinge to the top surface of the cart storage bay, said rotatable outer plate adapted to depend substantially vertically in a first position from the top surface in the central storage

position and to rotate in a first direction upon contact by a first edge of a half size cart;

5 a placard mounted to said rotatable outer plate, said placard visible in the central storage position with the rotatable outer plate in the first position and retracted with the rotatable outer plate rotated in the first direction to a second position;

10 a sensor for detecting proximity of the half size cart and for detecting when the half size cart is removed from the cart storage bay wherein the sensor comprises a rotatable inner plate mounted with a second hinge to the top surface of the cart storage bay, said rotatable inner plate is adapted to extend downward substantially vertically from the top surface in the first position and to rotate in a second direction upon contact by a second edge
15 of the half size cart; and

a linkage responsive to the sensor for rotating the rotatable outer plate from the first position in the first direction to the second position wherein the linkage comprises:

20 a first compression/tension arm connected to an edge of the rotatable outer plate;

25 a rotating arm connected at a first end thereof to the first compression/tension arm and mounted to a pivot on the top surface of the cart storage bay; and

30 a second compression/tension arm connected to an edge of the rotatable inner plate and further connected to a second end of the rotating arm.

4. The aircraft galley as defined in claim 3 wherein:

the first compression/tension arm is connected to the edge of the rotatable outer plate with a first universal joint, the rotating arm is connected to the first arm with a second universal joint;

the second end of the rotating arm is connected to the second compression/tension arm with a third universal joint; and

the second compression/tension arm is connected to the edge of the rotatable inner plate with a fourth universal joint.

5. A method for displaying and retracting a placard in a cart storage bay comprising:

suspending an outer rotatable plate carrying the placard, said outer rotatable plate mounted with a first hinge to an upper surface of the cart storage bay, said outer rotatable plate extending downward substantially vertically from the upper surface in a first position over a central storage position in the cart storage bay, the placard mounted to said outer rotatable plate, said placard visible in the cart storage bay with the outer rotatable plate in the first position and retracted with the outer rotatable plate rotated in a first direction to a second position;

rotating the outer rotatable plate in the first direction upon contact by a first edge of a galley cart, with a linkage responsive to contact by the first edge of the galley cart allowing insertion of the galley cart under the rotated outer rotatable plate, the linkage comprising a first compression/tension arm connected to an edge of the outer rotatable plate, a rotating arm connected

at a first end thereof to the first compression/tension arm and mounted to a pivot on the upper surface of the cart storage bay; and

causing a sensor to detect proximity of a half size cart and to detect when the half size cart is removed from the cart storage bay, said sensor comprising a rotatable inner plate mounted with a second hinge to the upper surface of the cart storage bay, wherein a second compression/tension arm is connected to an edge of the rotatable inner plate and is further connected to a second end of the rotating arm, said rotatable inner plate extending downward substantially vertically from the upper surface with the outer rotatable plate in the first position and rotated in a second direction upon contact by a second edge of the half size cart.

6. The method for displaying and retracting a placard in a cart storage bay as defined in claim 5 wherein the galley cart is a half size cart and further comprising:

moving the half size cart to a rear location in the central storage position; and

rotating the outer rotatable plate back to the first position for viewing of the placard.

7. The method for displaying and retracting a placard in a cart storage bay as defined in claim 6 further comprising:

moving the half size cart from the rear location;

sensing a change in position of the half size cart with the sensor; and

rotating the outer rotatable plate in the first direction with the linkage responsive to the sensor detecting removal of the half size cart under the rotated outer rotatable plate.

- 5 **8.** The method for displaying and retracting a placard in a cart storage bay as defined in claim **6** further comprising:

10 rotating the outer rotatable plate in the first direction responsive to contact by a first edge of a second half size cart allowing insertion of the second half size cart under the rotated outer rotatable plate; and

maintaining the outer rotatable plate in a second position with the placard retracted from view.

- 15 **9.** The method for displaying and retracting a placard in a cart storage bay as defined in claim **7** wherein the step of sensing a change in position of the half-size cart comprises:

20 suspending the inner rotatable plate in a first position from the upper surface over the central storage position as the sensor;

rotating the inner rotatable plate in the second direction responsive to contact by the second edge of the half size cart; and

25 rotating the outer rotatable plate in the first direction with the linkage responsive to rotation of the inner rotatable plate allowing removal of the half size cart under the rotated inner and outer rotatable plates.

- 30 **10.** The method for displaying and retracting a placard in a cart storage bay as defined in claim **9** wherein the step of rotating the outer rotatable plate in the first

direction responsive to contact by the first edge of the half size cart further comprises:

5 exerting a compression force on the first compression/tension arm connected to an edge of the outer rotatable plate;

rotating the rotating arm connected at the first end thereof to the first compression/tension arm and mounted to the pivot on the upper surface of the cart storage bay; and

10 exerting a tension force on the second compression/tension arm connected to the second end of the rotating arm and further connected to the edge of the inner rotatable plate to rotate the inner rotatable plate in the second direction.

15 **11.** The method for displaying and retracting a placard in a cart storage bay as defined in claim **10** wherein the step of rotating the outer rotatable plate in the first direction with the linkage comprises:

20 applying a compression force to the second compression/tension arm;

rotating the rotating arm; and

25 exerting a tension force on the first compression/tension arm to rotate the outer rotatable plate in the first direction.

30 **12.** The method for displaying and retracting a placard in a cart storage bay as defined in claim **8** wherein the step of rotating the outer rotatable plate in the first direction responsive to contact by the first edge of the second half size cart further comprises:

applying a compression force to the first compression/tension arm connected to the edge of the outer rotatable plate;

5 rotating the rotating arm connected at the first end thereof to the first compression/tension arm and mounted to the pivot on the upper surface of the cart storage bay; and

10 exerting a tension force on the second compression/tension arm connected to the second end of the rotating arm and further connected to the edge of the inner rotatable plate to rotate the inner rotatable plate in the second direction allowing insertion of the second half size cart under both the rotated inner and outer rotatable plates.

15 **13.** A method for displaying and retracting a placard in a cart storage bay of an aircraft galley comprising:

20 providing a cart storage bay having a top surface, a left wall, a right wall and a rear wall and having a left storage position adjacent the left wall, a right storage position adjacent the right wall and a central storage position in the cart storage bay intermediate the left and right storage positions, each of the left, right, and central storage positions adapted to accommodate one full size galley cart or two half size galley carts;

25 suspending an outer rotatable plate carrying the placard, said outer rotatable plate mounted with a first hinge to the top surface of the cart storage bay, said outer rotatable plate extending downward substantially vertically from the top surface in a first position over the central storage position, the placard mounted to said outer rotatable plate, said placard
30 visible in the cart storage bay with the outer rotatable plate in the first

position and retracted with the outer rotatable plate rotated in a first direction to a second position;

5 rotating the outer rotatable plate in the first direction upon contact by a first edge of a galley cart, with a linkage responsive to contact by the first edge of the galley cart allowing insertion of the galley cart under the rotated outer rotatable plate, the linkage comprising a first compression/tension arm connected to an edge of the outer rotatable plate, a rotating arm connected at a first end thereof to the first compression/tension arm and mounted to a pivot on the top surface of the cart storage bay; and

10 causing a sensor to detect proximity of a half size cart and to detect when the half size cart is removed from the cart storage bay, said sensor comprising a rotatable inner plate mounted with a second hinge to the top surface of the cart storage bay, wherein a second compression/tension arm is connected to an edge of the rotatable inner plate and is further connected to a second end of the rotating arm, said rotatable inner plate extending downward substantially vertically from the top surface with the outer rotatable plate in the first position and rotated in a second direction upon contact by a second edge of the half size cart.

14. The method as defined in claim 13 wherein the galley cart is a half size cart and further comprising:

25 moving the half size cart to a rear location in the central storage position; and

rotating the outer rotatable plate back to the first position for viewing of the placard.

15. The method as defined in claim **14** further comprising:

moving the half size cart from the rear location;

5 sensing a change in position of the half size cart with the sensor; and

rotating the outer rotatable plate in the first direction with the linkage responsive to the sensor detecting removal of the half size cart under the rotated outer rotatable plate.

10

16. The method as defined in claim **14** further comprising:

rotating the outer rotatable plate in the first direction responsive to contact by a first edge of a second half size cart allowing insertion of the second half size cart under the rotated outer rotatable plate; and

15

maintaining the outer rotatable plate in the second position with the placard retracted from view.

20 **17.** The method as defined in claim **15** wherein the step of sensing the change in position of the half size cart comprises:

suspending the inner rotatable plate in a first position from the top surface over the central storage position as the sensor;

25

rotating the inner rotatable plate in the second direction responsive to contact by the second edge of the half size cart; and

rotating the outer rotatable plate in the first direction with the linkage responsive to rotation of the inner rotatable plate allowing removal of the half size cart under the rotated inner and outer rotatable plates.

- 5 **18.** The method as defined in claim **17** wherein the step of rotating the outer rotatable plate in the first direction responsive to contact by the first edge of the half size cart further comprises:

10 applying a compression force to the first compression/tension arm connected to an edge of the outer rotatable plate;

rotating the rotating arm connected at the first end thereof to the first compression/tension arm and mounted to the pivot on the top surface of the cart storage bay; and

15 exerting a tension force on the second compression/tension arm connected to the second end of the rotating arm and further connected to the edge of the inner rotatable plate to rotate the inner rotatable plate in the second direction.

- 20 **19.** The method as defined in claim **18** wherein the step of rotating the outer rotatable plate in the first direction with the linkage comprises:

25 applying a compression force to the second compression/tension arm;

rotating the rotating arm; and

30 exerting a tension force on the first compression/tension arm to rotate the outer rotatable plate in the first direction.

20. The method as defined in claim **16** wherein the step of rotating the outer rotatable plate in the first direction responsive to contact by the first edge of the second half size cart further comprises:

5 applying a compression force to the first compression/tension arm connected to the edge of the outer rotatable plate;

 rotating the rotating arm connected at the first end thereof to the first compression/tension arm and mounted to the pivot on the top surface of
10 the cart storage bay; and

 exerting a tension force on the second compression/tension arm connected to the second end of the rotating arm and further connected to the edge of the inner rotatable plate to rotate the inner rotatable plate in the second
15 direction allowing insertion of the second half size cart under both the rotated inner and outer rotatable plates.

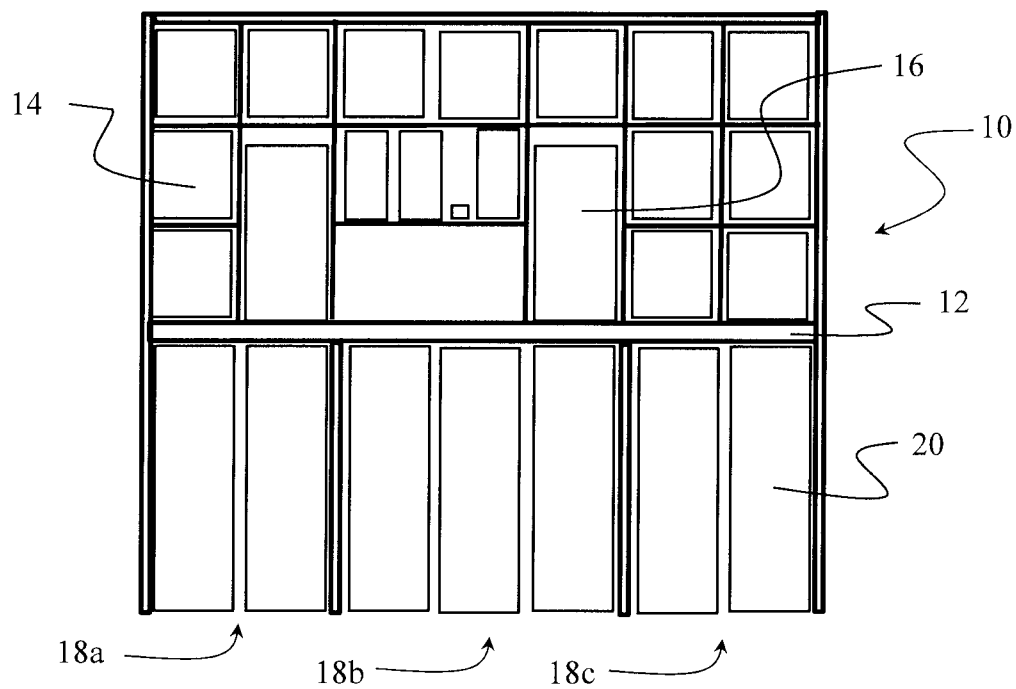


FIG. 1A

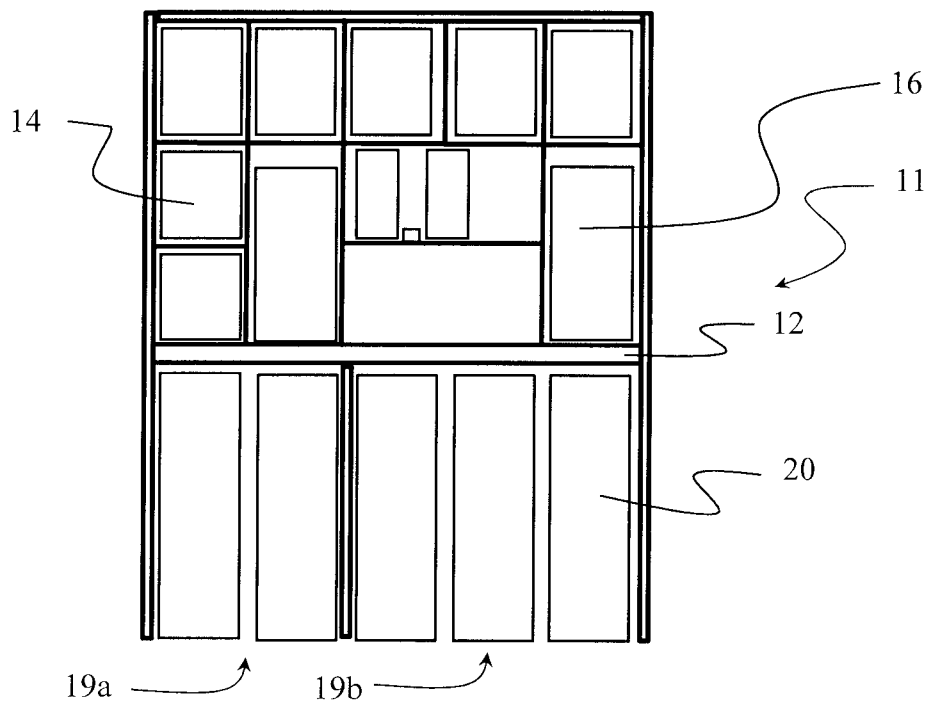


FIG. 1B

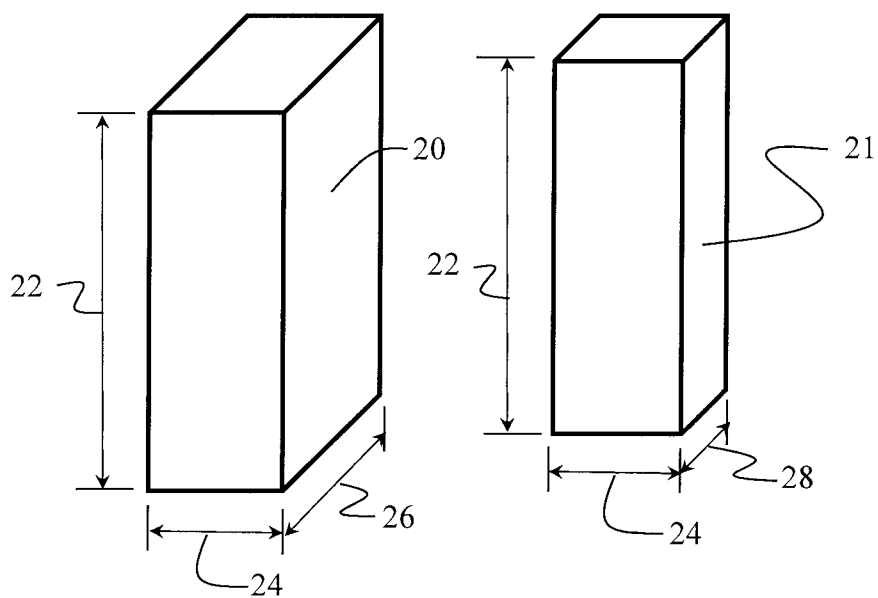


FIG. 2A

FIG. 2B

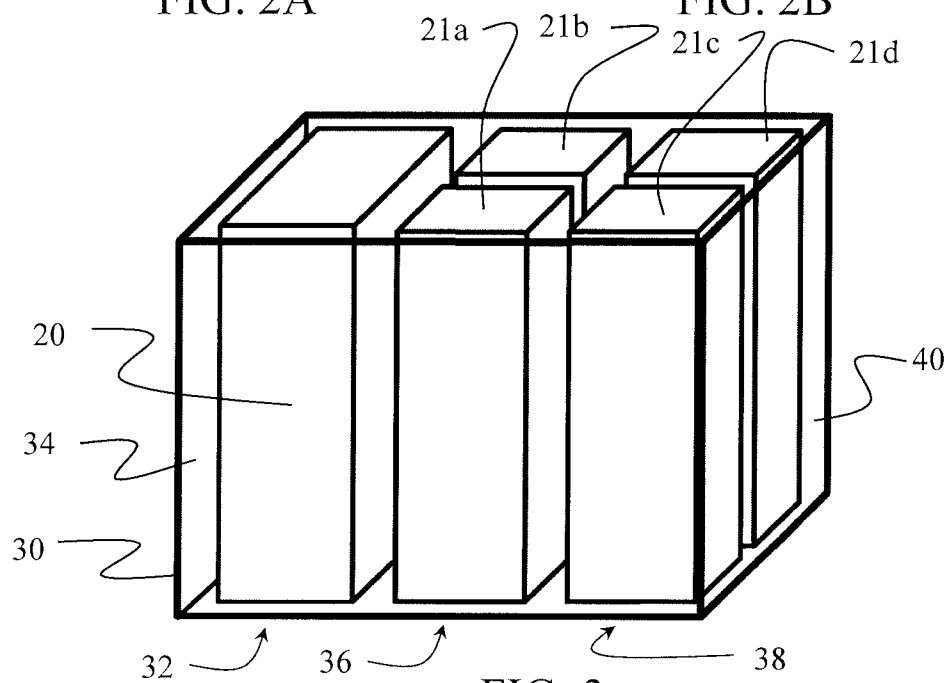


FIG. 3

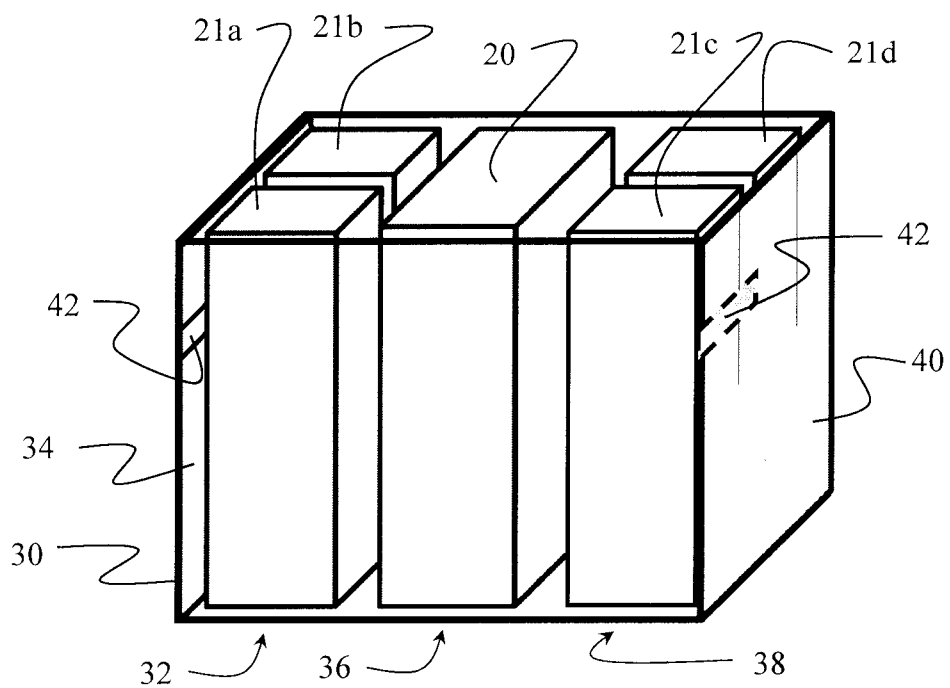


FIG. 4A

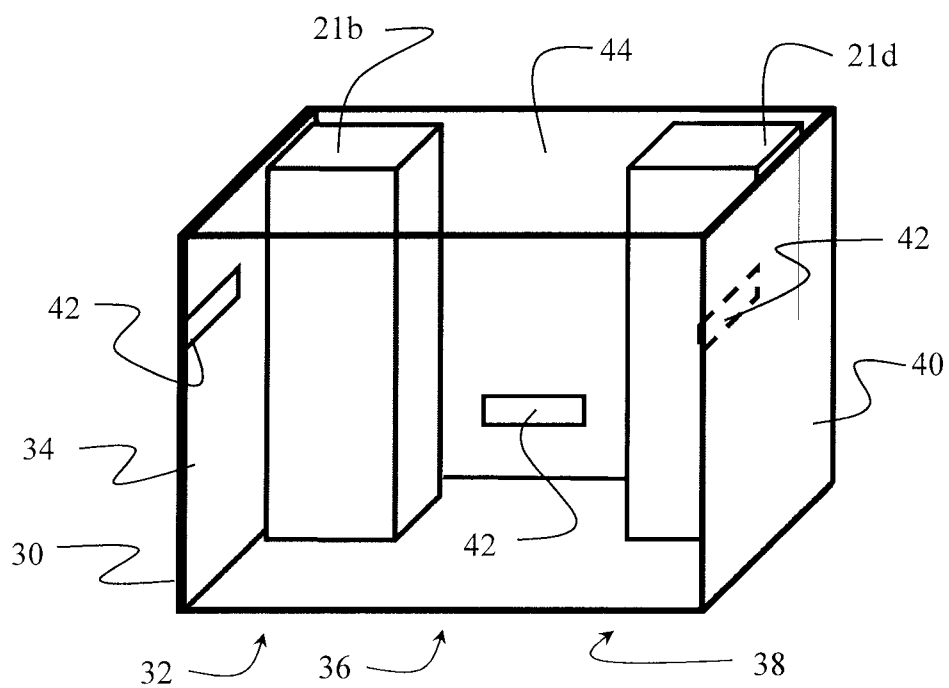


FIG. 4B

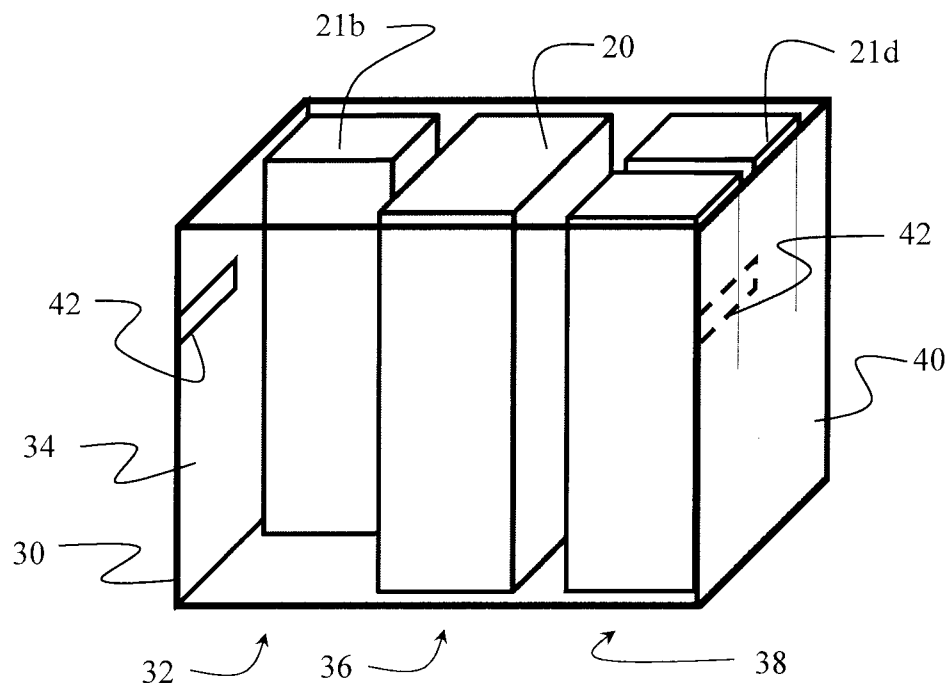


FIG. 5A

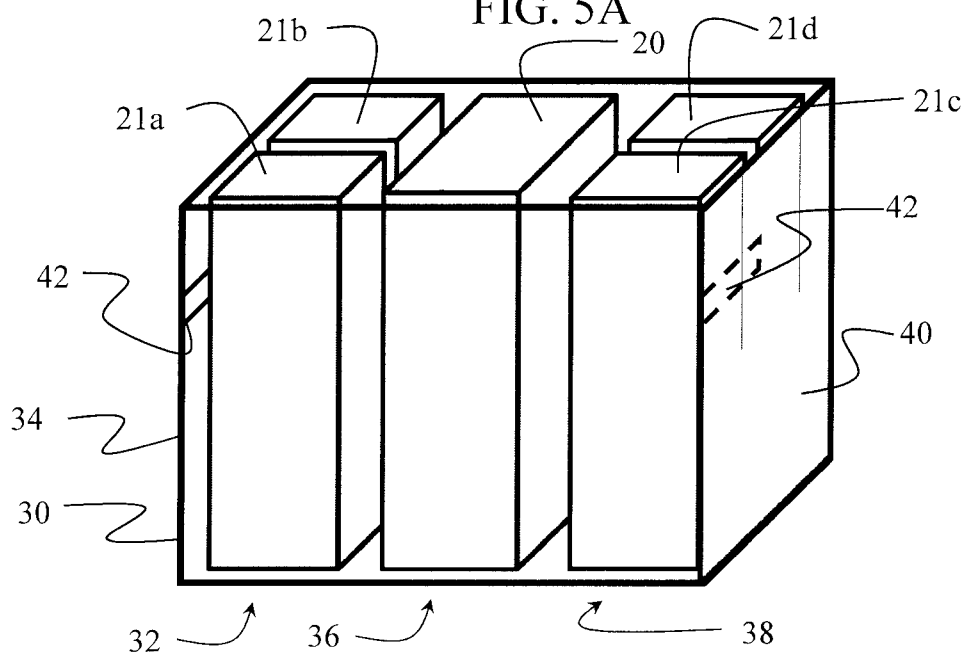


FIG. 5B

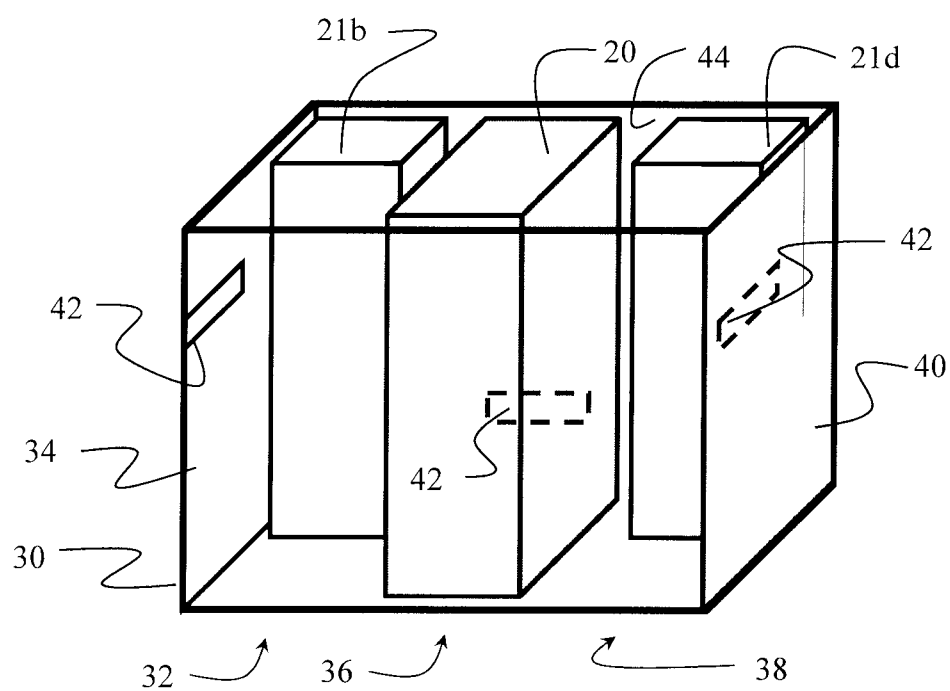


FIG. 6A

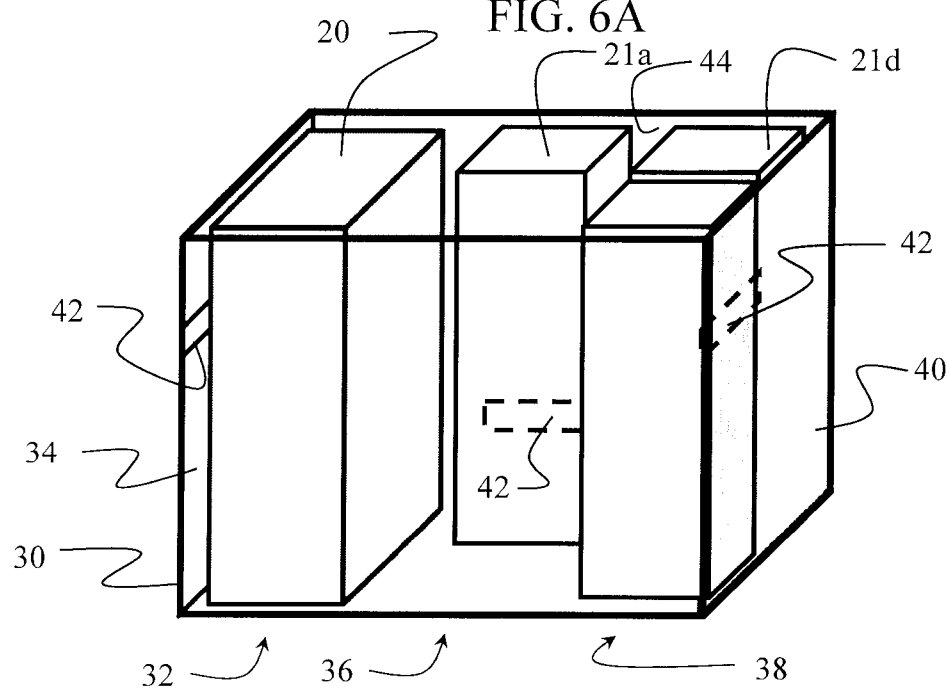


FIG. 6B

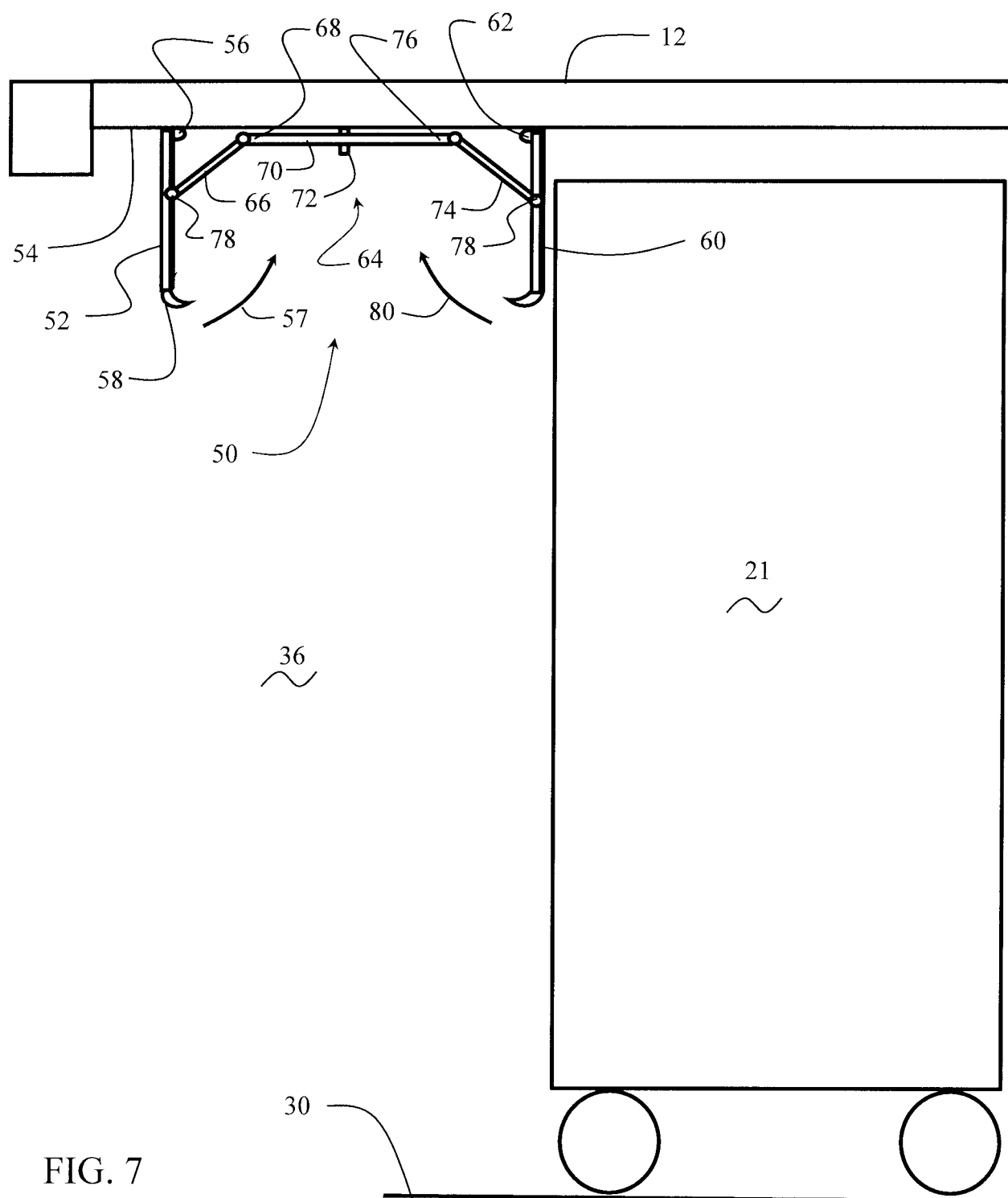


FIG. 7

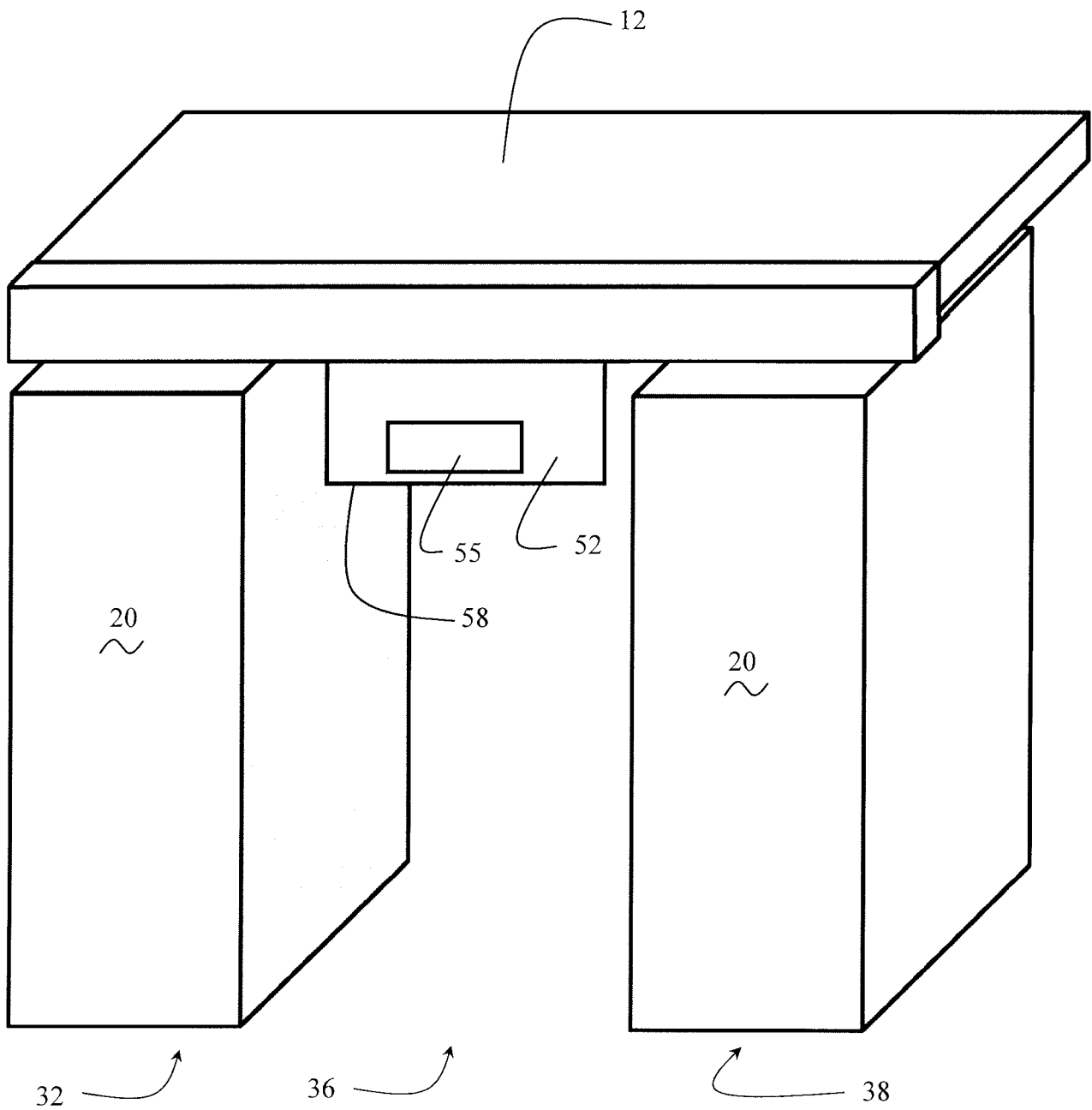


FIG. 8

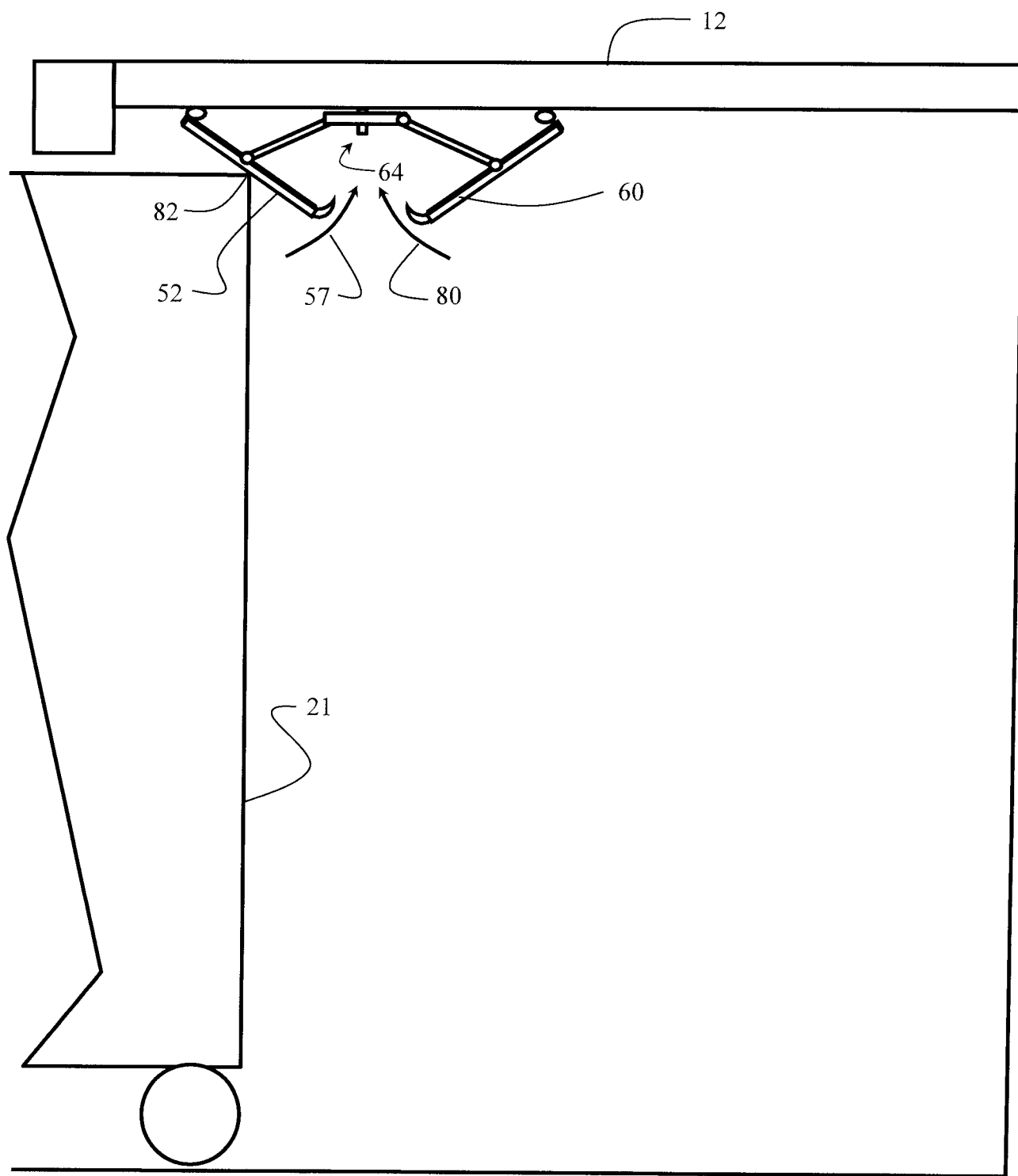


FIG. 9A

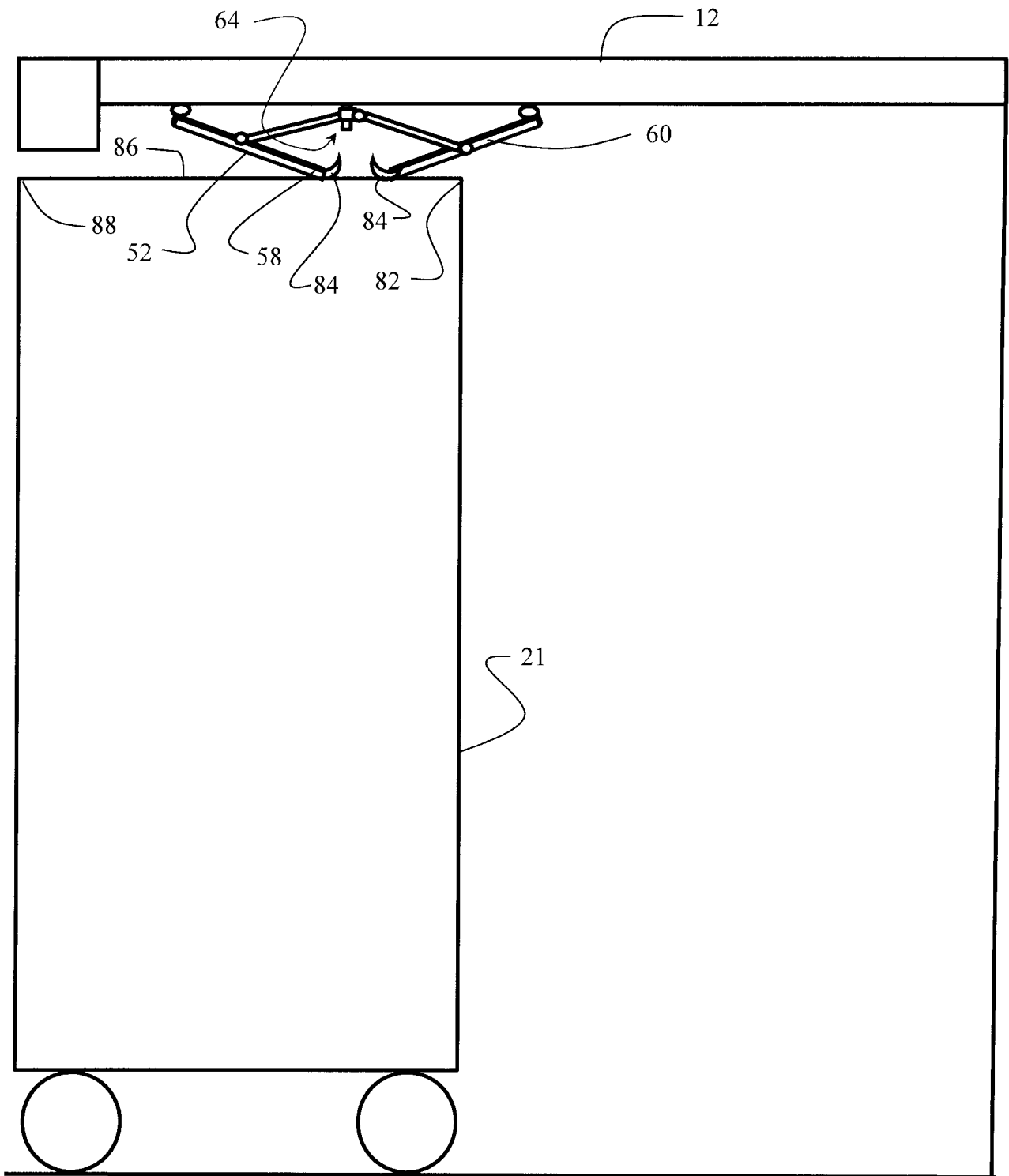


FIG. 9B

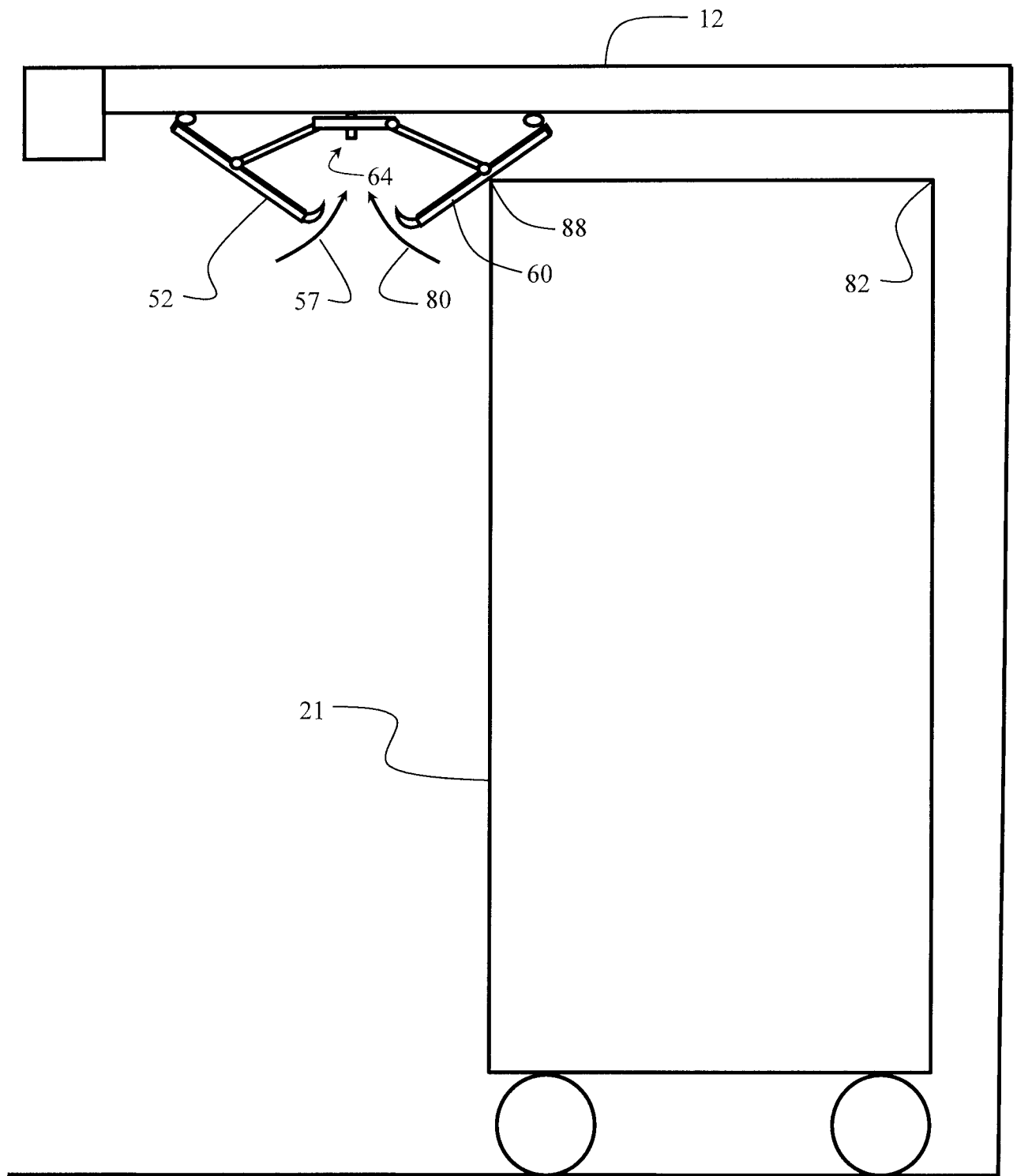


FIG. 10A

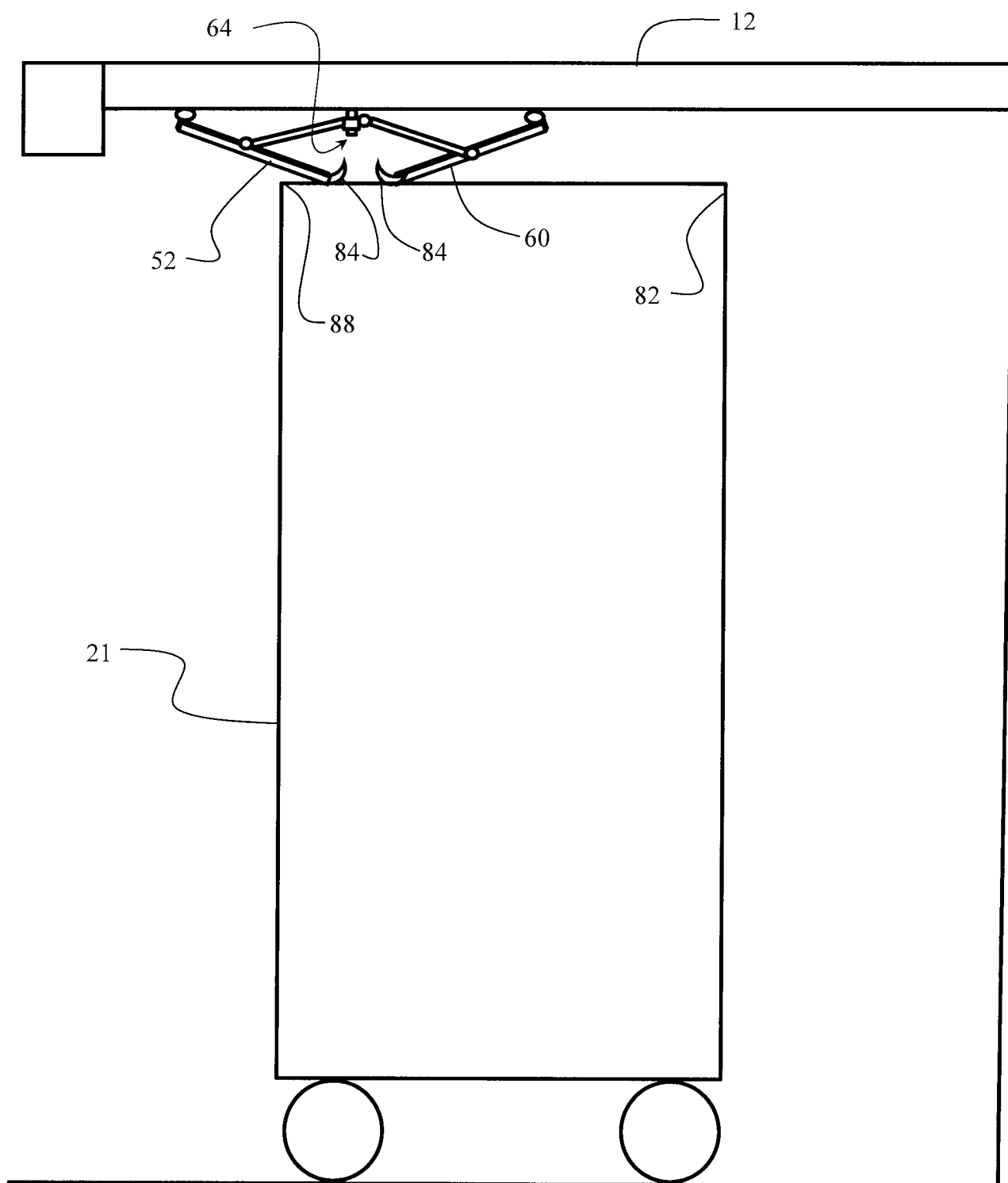


FIG. 10B

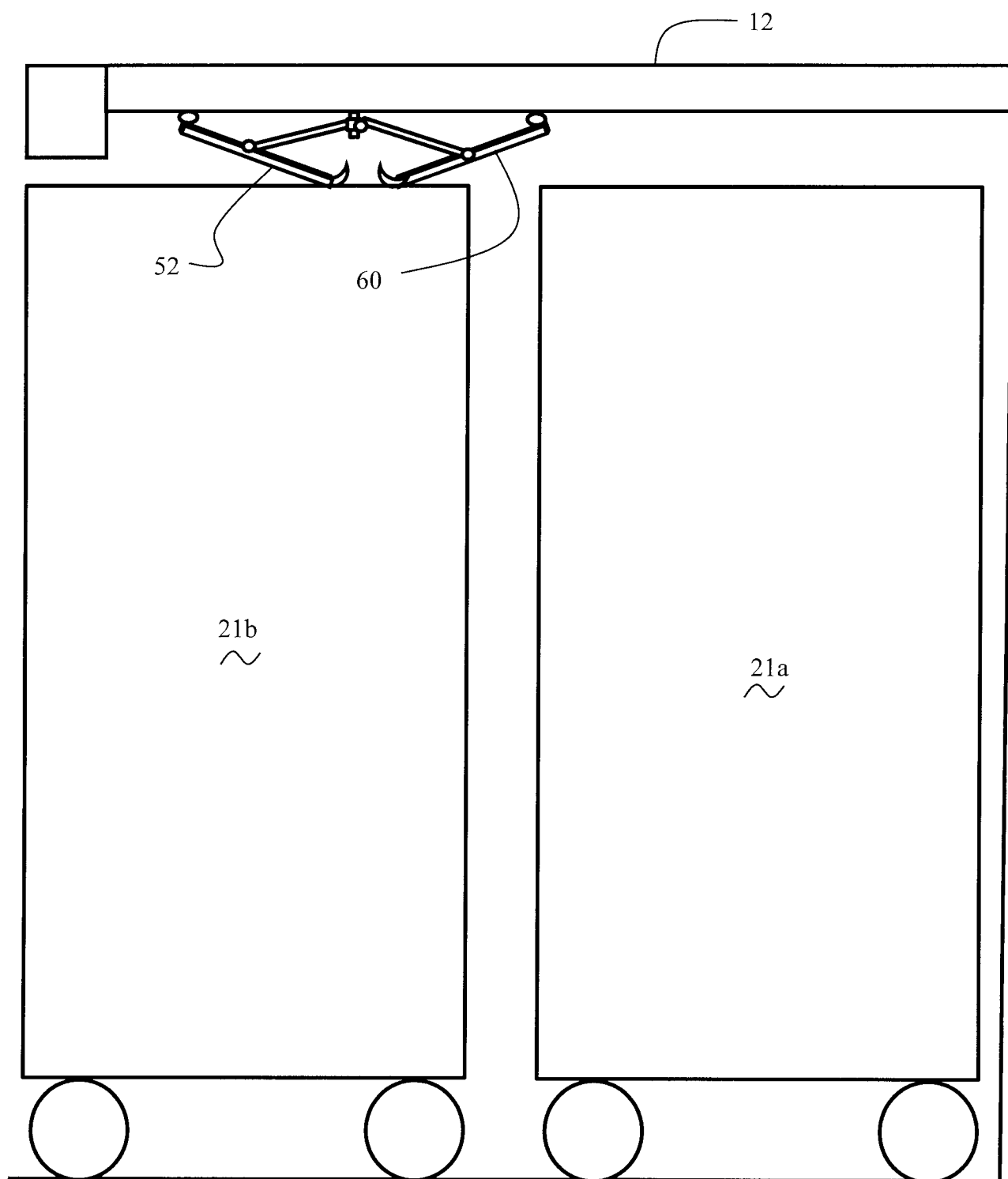


FIG. 11

FIG. 12A

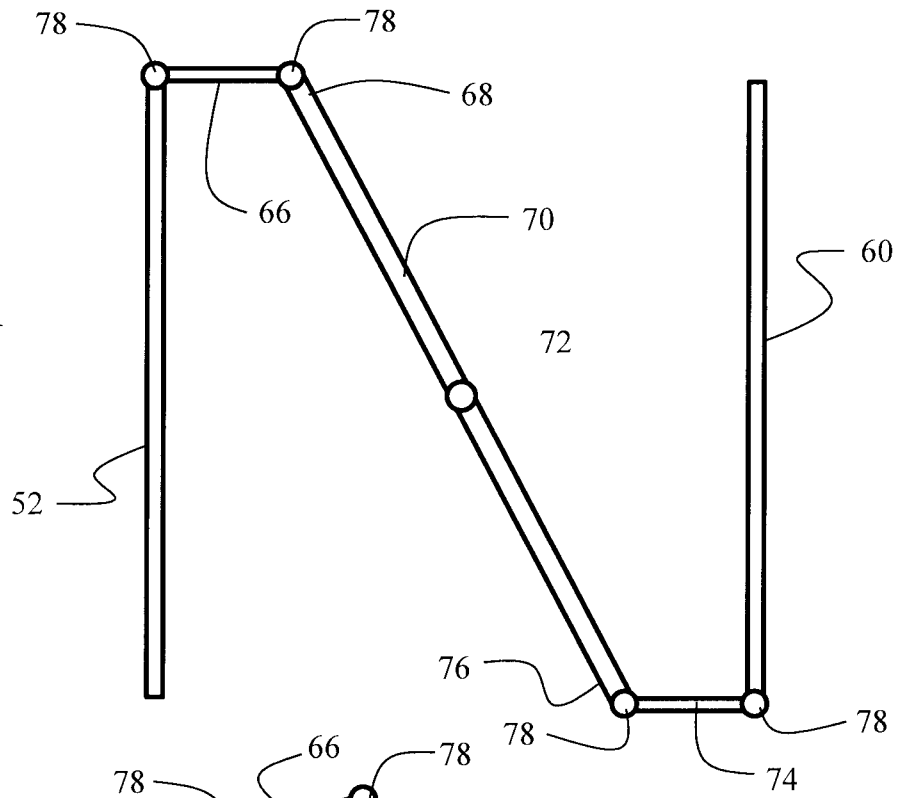


FIG. 12B

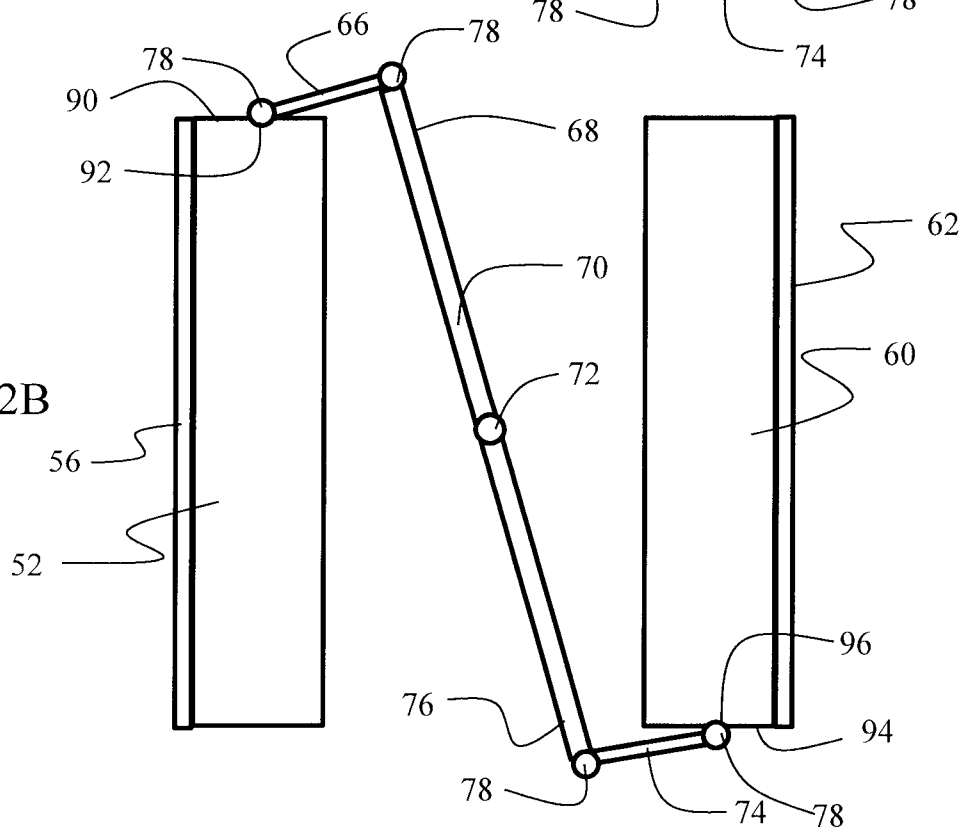
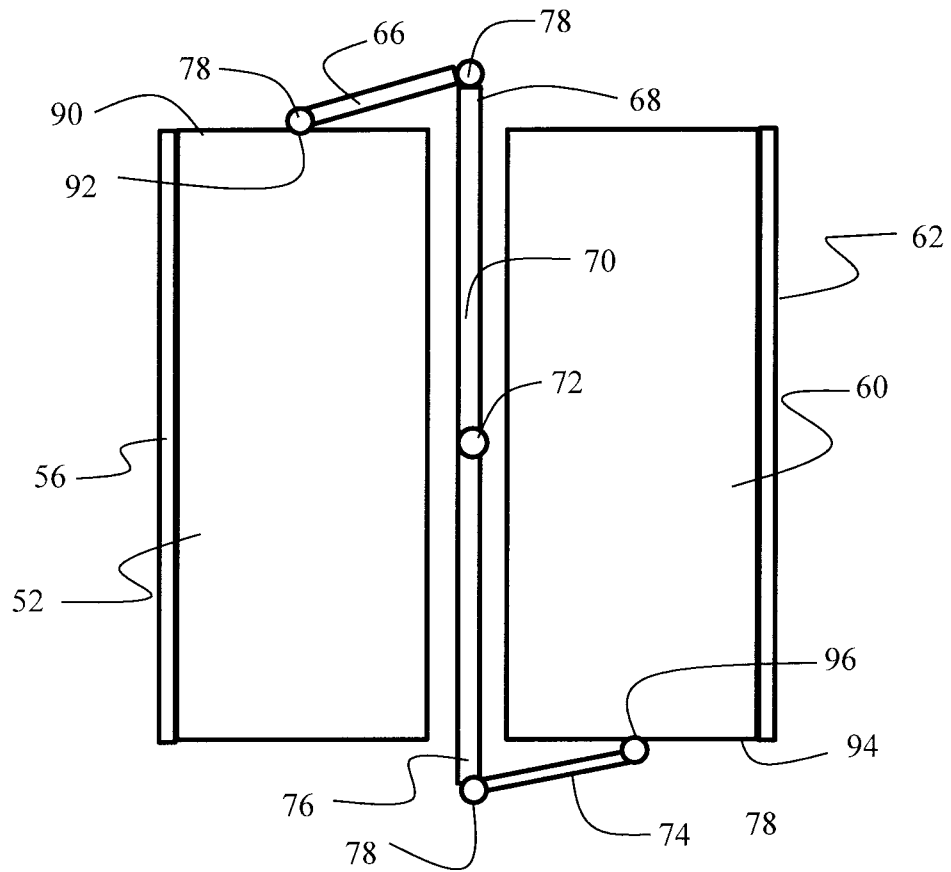


FIG. 12C



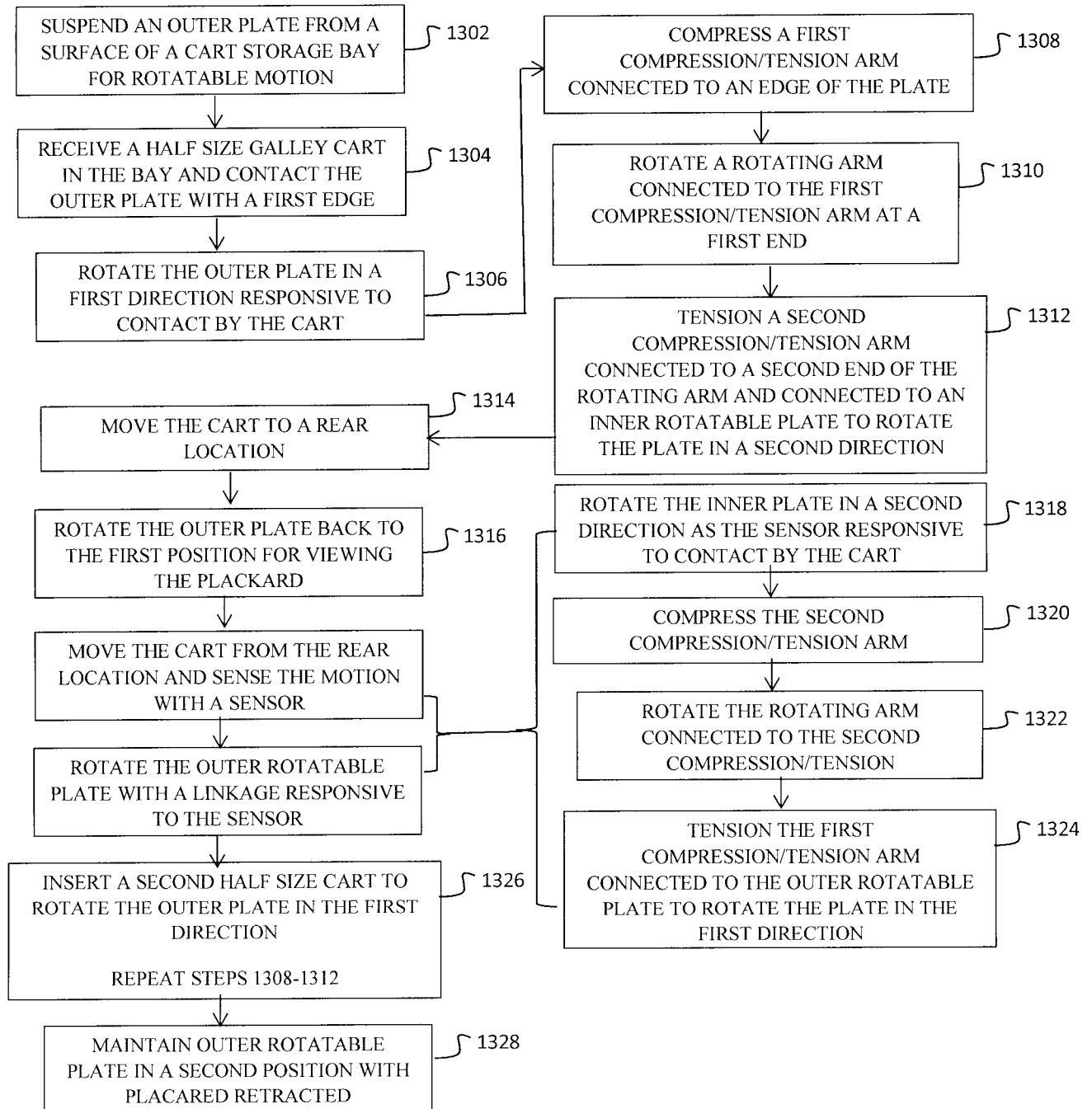


FIG. 13

