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(54) **RAILCAR WITH AXLE ASSEMBLY**

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(57) **ABSTRACT**

A railcar is provided with an axle assembly including first and second axle devices that allow one axle device to move relative to the other axle device. In one embodiment, the first axle device is rigidly secured to the platform and the second axle device is pivotally secured to the platform. The second axle device includes terminal ends for supporting conventional hub and wheel assemblies. A plate extends from the axle device and pivotally attaches to the platform. In another embodiment, the present invention is used in connection with a mobile toilet system supported on the upper side of the platform. The platform is relatively rigid to accommodate for the hard plumbing connections of the mobile toilet system.

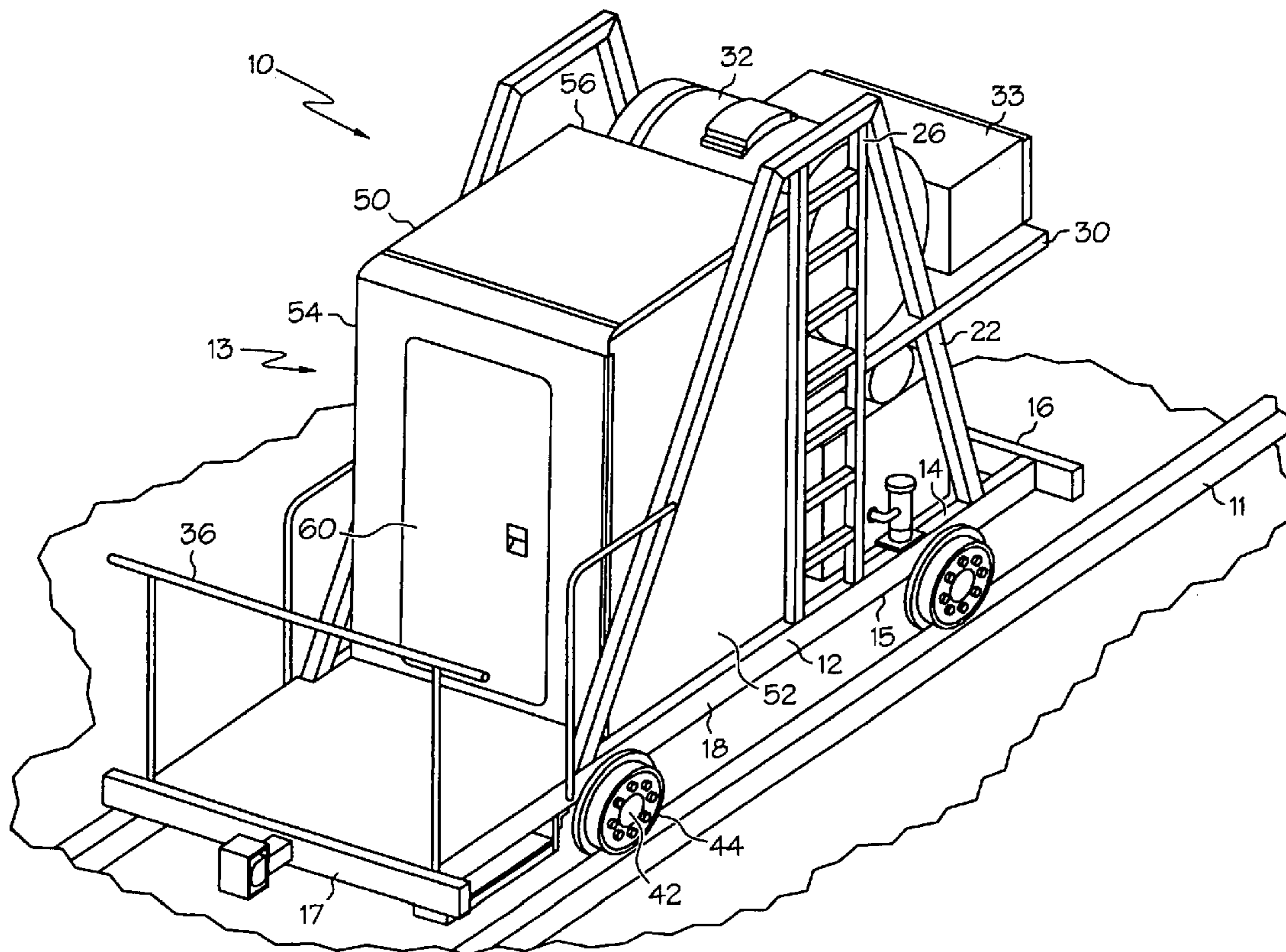
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Related U.S. Application Data

(60) Provisional application No. 60/533,032, filed on Dec. 29, 2003.



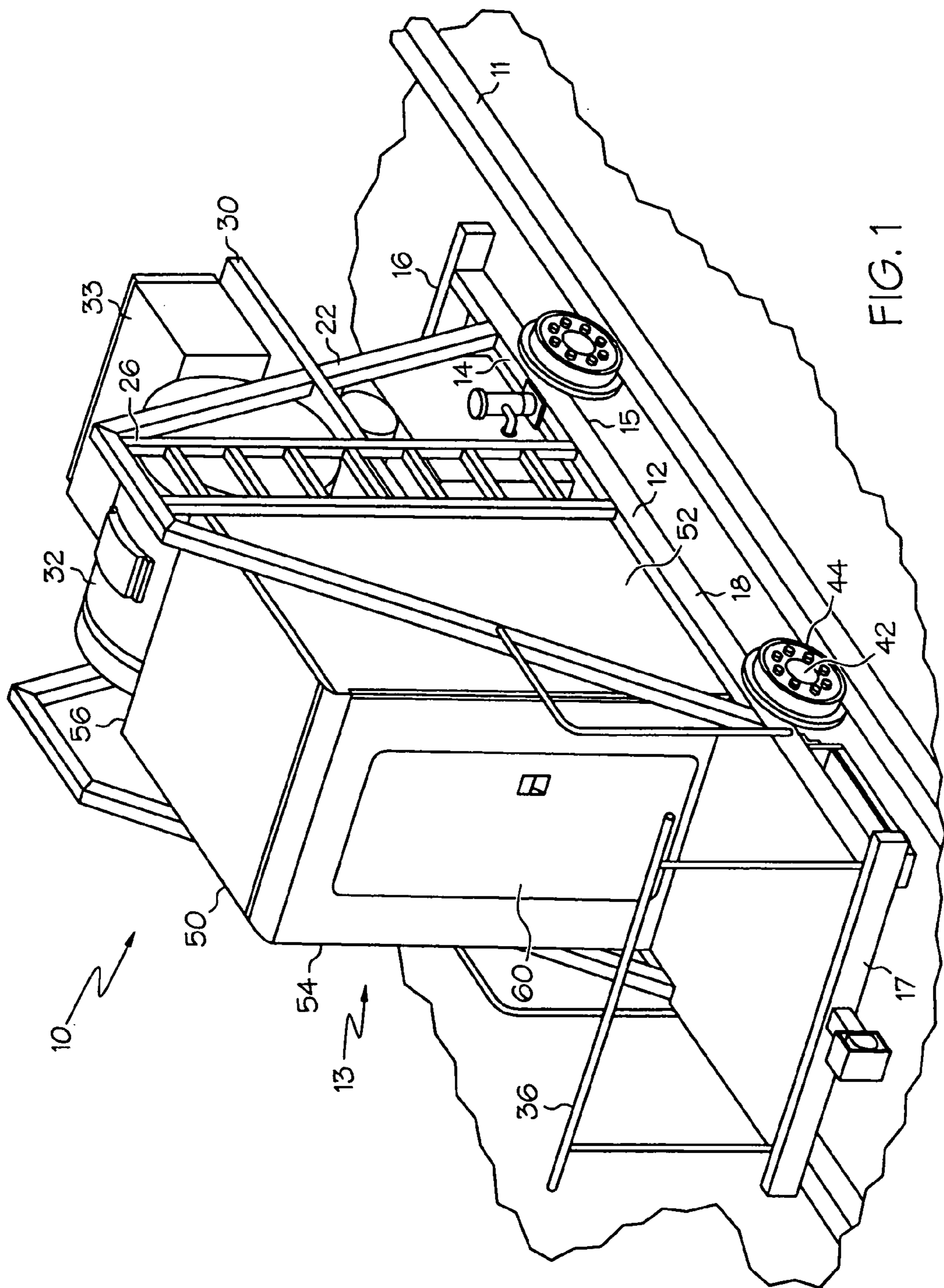


FIG. 1

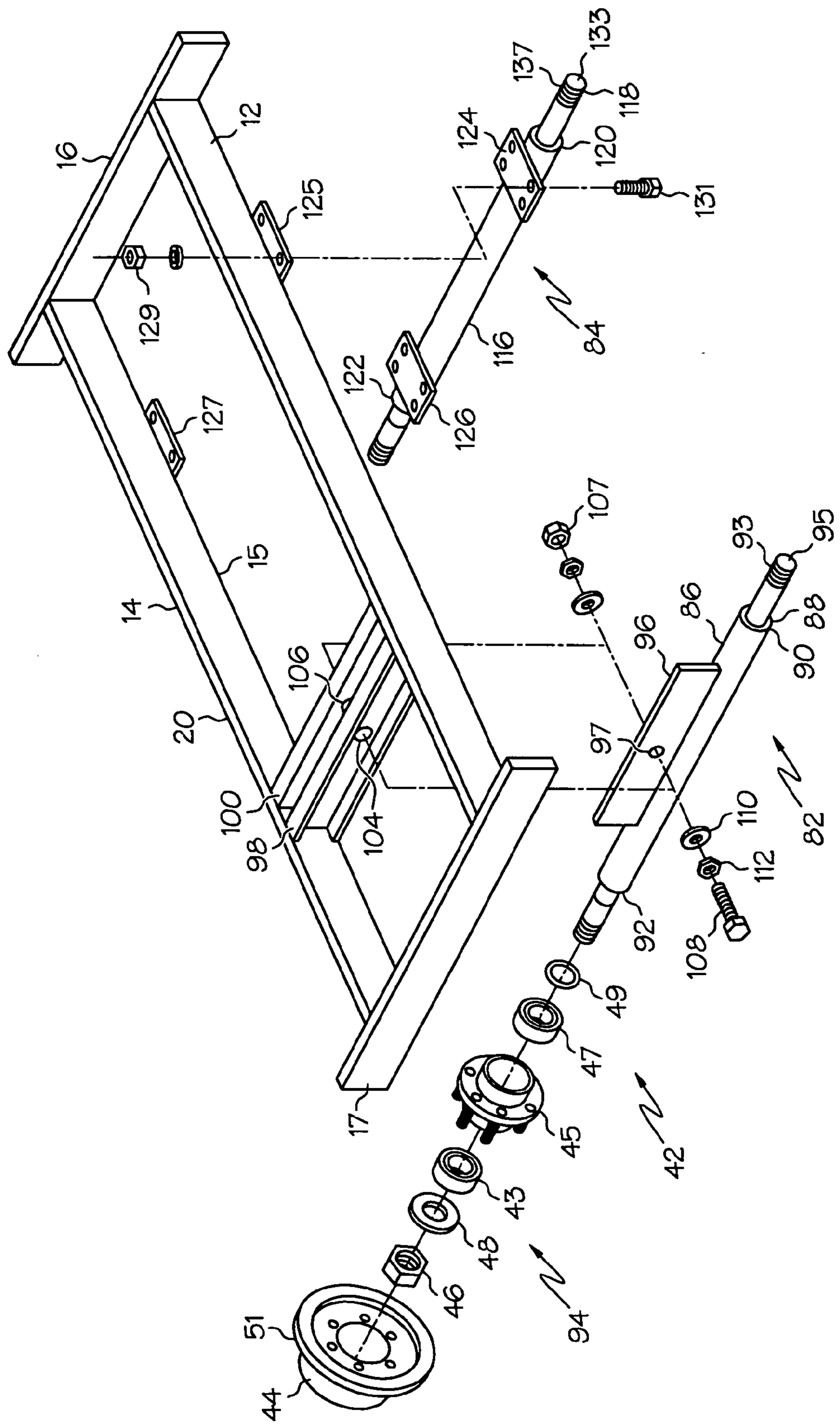


FIG. 2

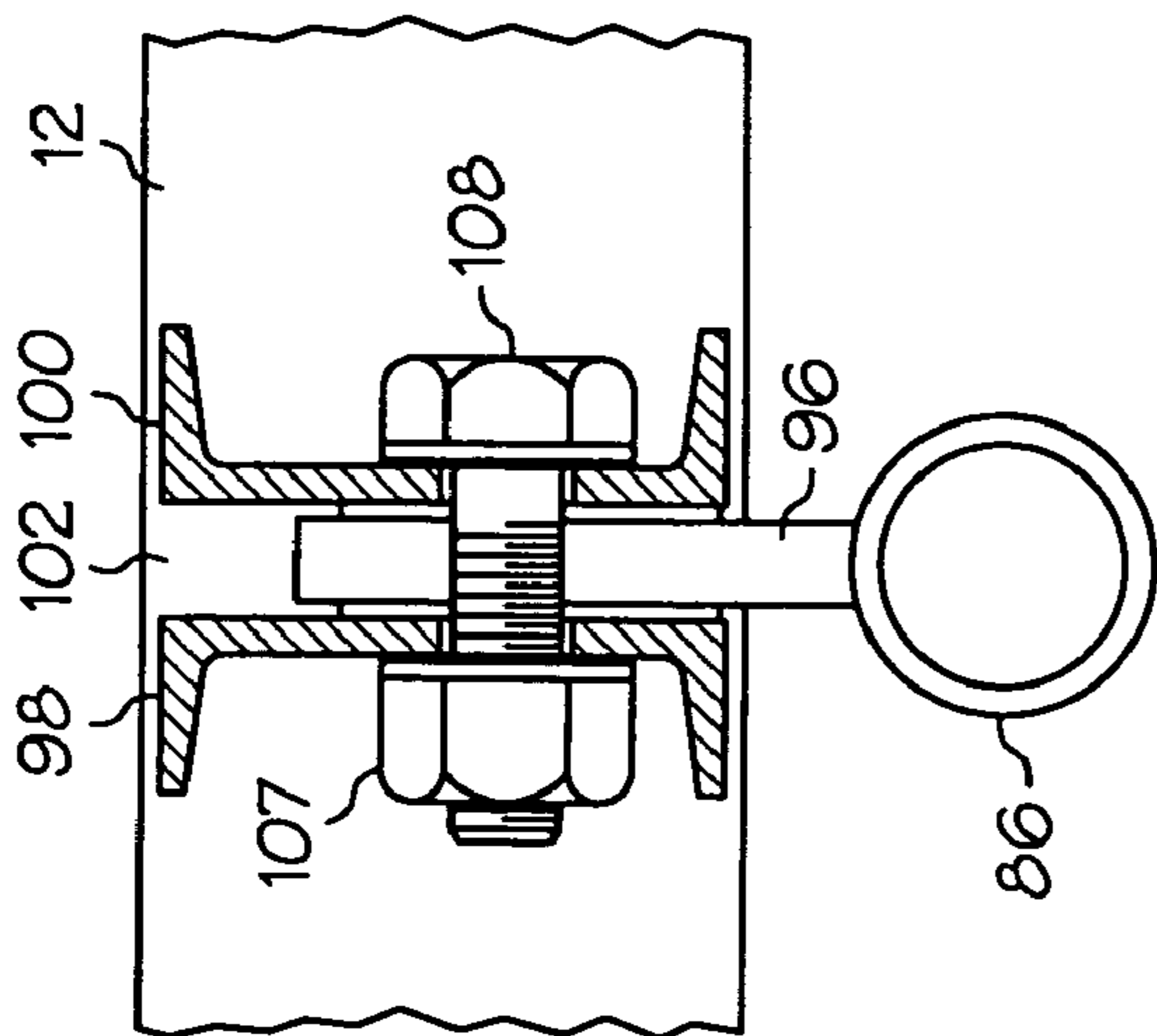


FIG. 3

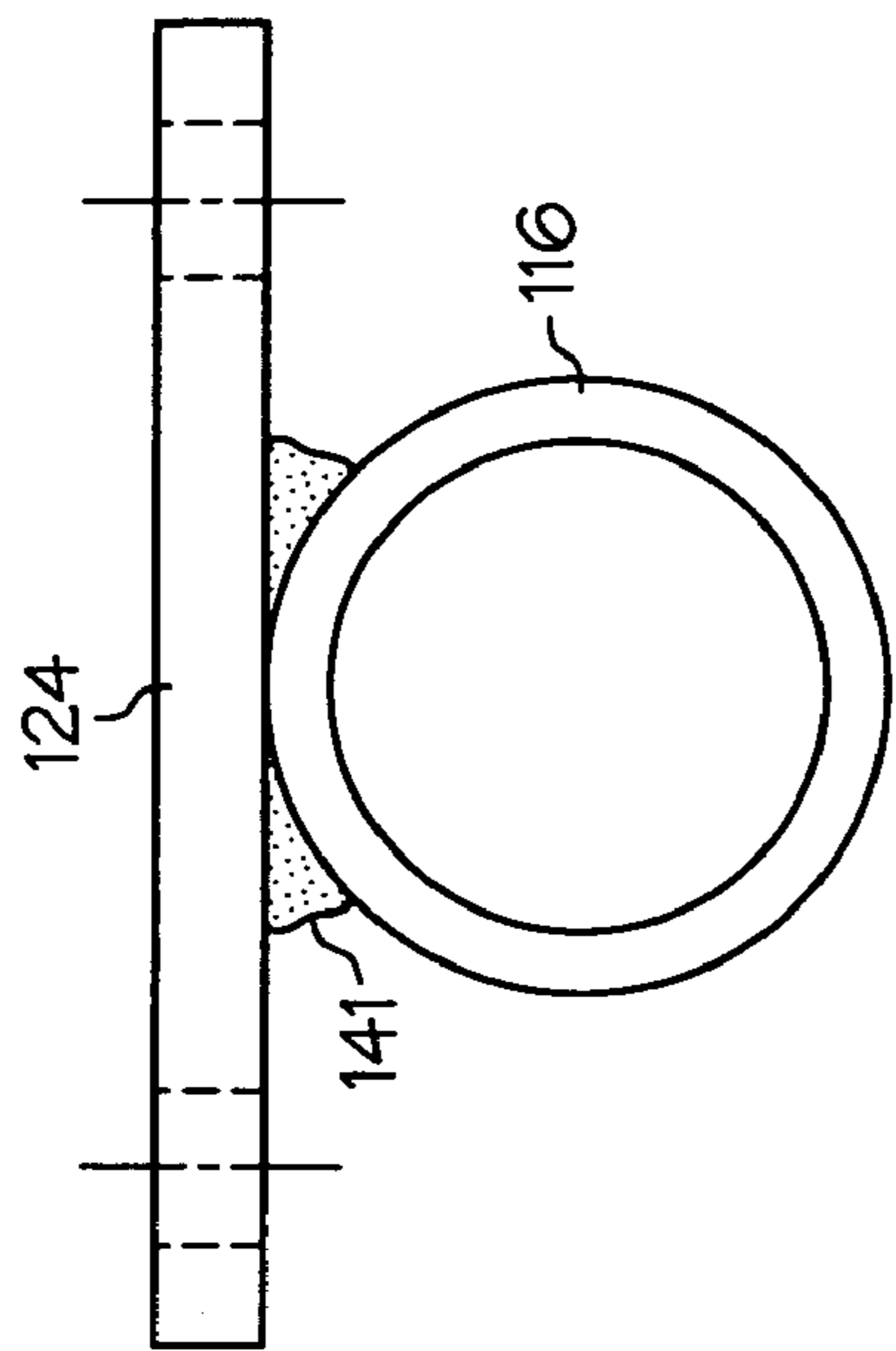


FIG. 4

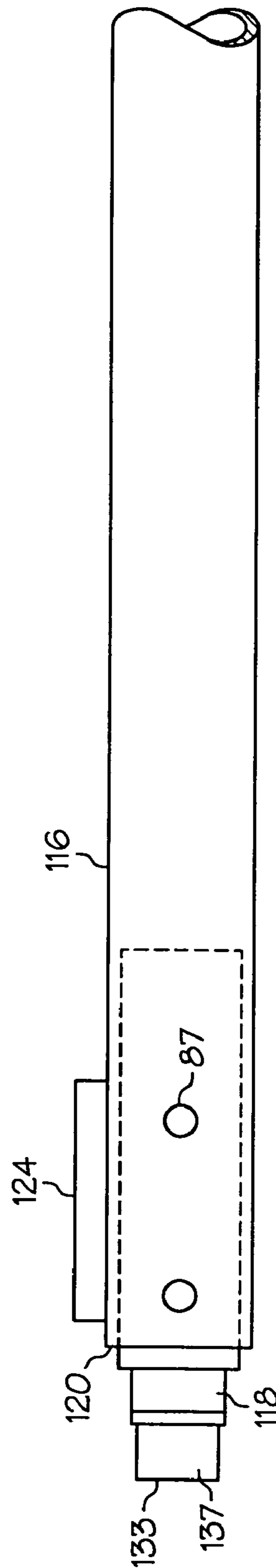
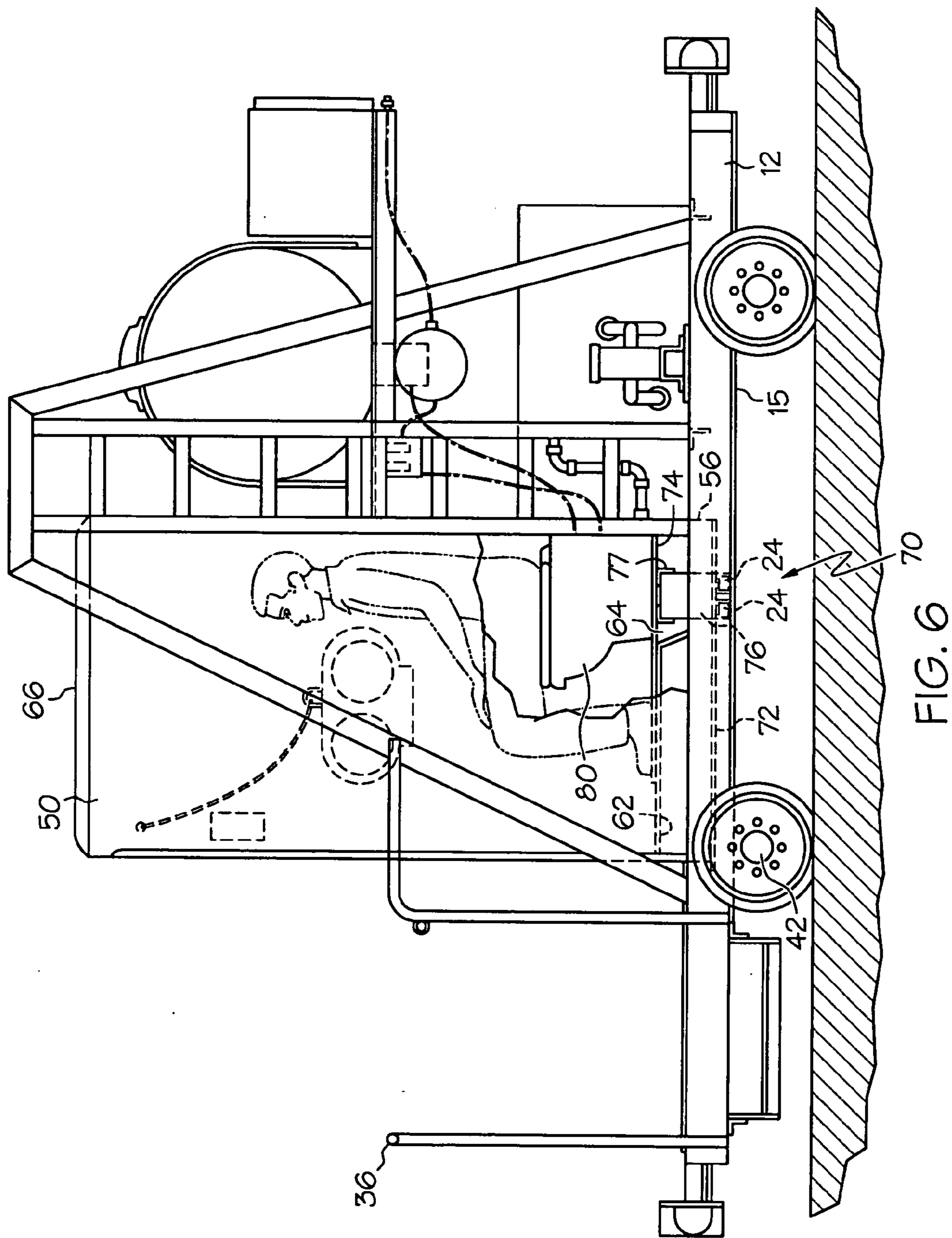


FIG. 5



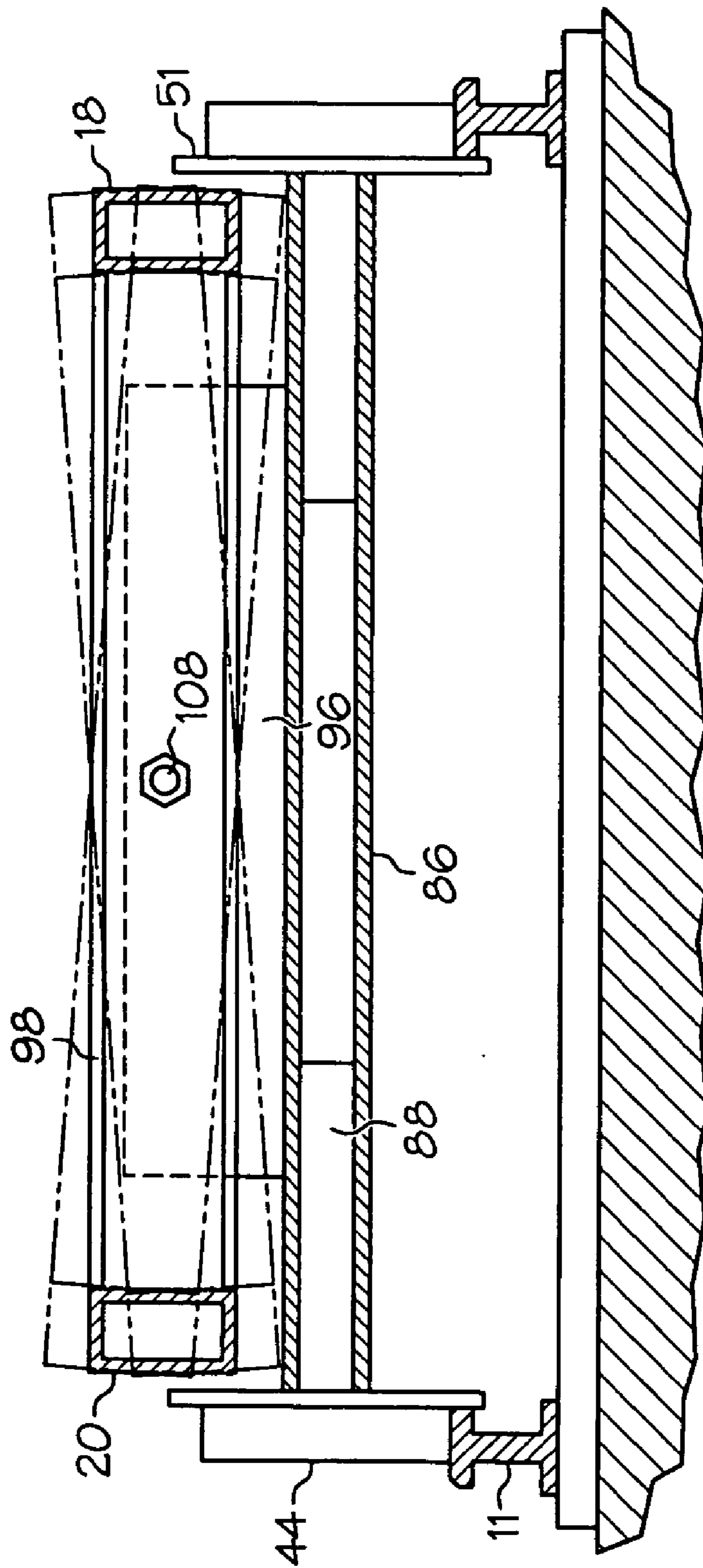


FIG. 7

RAILCAR WITH AXLE ASSEMBLY

[0001] This patent application claims priority from U.S. Provisional patent application No. 60/533,032, filed on Dec. 29, 2003, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to railcars, and more particularly to an axle assembly for a railcar.

[0003] Railcars generally have a platform including an upper surface and a lower surface. The lower surface attaches to front and rear axle assemblies with terminal ends that support hub and wheel assemblies. The wheels are shaped to engage a set of railroad tracks or rails so the railcar can travel along the rails. The upper surface supports one of a variety of different railcar applications, such as a freight car, flatbed car, or a light duty car.

[0004] One factor to account for when designing a railroad car is uneven railroad tracks (i.e. one track is higher or lower than the other). Uneven railroad tracks may be the result of an intended design feature, such as increasing the height of an outer track to prevent the railcar from derailing as it rounds a particularly sharp corner, or they may simply be the result of poor installation or ground settling. In the interest of safety and protection of cargo it is important that railroad cars are designed so that all four wheels remain on the rails at all times.

[0005] A number of complicated systems are known for providing to railroad cars in order to keep the wheels on the rails. These systems often include an independent suspension assembly attached to each wheel, such that each wheel can move up and down vertically to accommodate for changes in track height. While these systems work well for a wide variety of railroad car applications, they tend to be overly complicated and expensive for simpler railcar applications. In some cases, this problem can be solved by providing a railcar with a somewhat flexible platform. Instead of requiring a complicated suspension system, these "flexible" railroad cars rely only on the flex of the platform to adjust the wheels to the unevenness of the track. This system is much simpler and much cheaper than the use of complicated suspensions, however, it is not feasible with those railcar applications that require a rigid platform.

SUMMARY OF THE INVENTION

[0006] The aforementioned problems are overcome by the present invention wherein a railcar is provided with an axle assembly including first and second axle devices that allow one axle device to move relative to the other axle device.

[0007] In one embodiment, a first axle device is rigidly secured to the platform and the second axle device is pivotally secured to the platform. The second axle device includes a tubular member with terminal ends that support conventional hub and wheel assemblies. A plate extends from the tubular member and attaches to the platform such that the tubular member can pivot with respect to the platform. The plate may extend between a pair of cross members on the platform, and may pivotally attach to the platform by a bolt that extends through holes in the walls and the plate.

[0008] In another embodiment, the present invention is used in connection with a mobile toilet system. The mobile

toilet system includes a toilet and sanitation system supported on the upper side of the platform. The platform is relatively rigid to accommodate for the hard plumbing connections of the mobile toilet system.

[0009] The movement of the second axle device relative to the first axle device allows all four wheels of the railroad car to maintain engagement with uneven railroad tracks. The attachment of the second axle device to the platform with a plate and a single bolt is much simpler and cost effective than previous suspension systems, while allowing the platform to be comprised of relatively rigid material.

[0010] These and other objects, advantages, and features of the invention will be more fully understood and appreciated by reference to the detailed description of the current embodiment and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 shows a perspective view of a railroad car in accordance with one embodiment of the present invention;

[0012] FIG. 2 shows an exploded view of the platform and front and rear axle devices;

[0013] FIG. 3 shows cross sectional view of the rear axle device;

[0014] FIG. 4 shows a cross sectional view of the front axle device;

[0015] FIG. 5 shows a front view of a portion of the front axle device;

[0016] FIG. 6 shows a side view of the railroad car;

[0017] FIG. 7 shows a cross sectional view of the rear axle device pivotally connected to the platform.

DETAILED DESCRIPTION OF THE CURRENT EMBODIMENT

[0018] For purposes of illustration, the present invention will be shown and described in detail according to one particular embodiment of the railroad car, wherein the railroad car is equipped with a portable toilet system. It should be known, however, that the present invention is applicable to a wide variety of railroad car applications where it is desirable to have a simple, cost effective means for keeping the wheels on the rails.

[0019] Referring to FIGS. 1 through 4, the railroad car or railcar 10 includes a platform 12 having upper 14 and lower, i.e. bottom 15 sides, terminal ends 16, 17 and sidewalls 18, 20. The upper side 14 of the platform 12 is set-up to support the toilet system 13 and includes a V-shaped supports 22 spaced one from the other. The V-shaped supports 22 extend upwardly from each of the sidewalls 18, 20. The V-shaped supports 22 include a ladder 26 at the sidewall 18. The platform 12 includes a deck 30 extending from the V-shaped support 22 in a cantilevered fashion. The deck 30 is designed to hold a water tank 32 and other components of a sanitation system (not shown) and storage boxes 33. The platform 12 includes a railing defining an entrance, generally shown at 36, at the terminal end 17. The bottom 15 of the platform 12 supports axles and hub assemblies, generally indicated at 42 in FIGS. 1 and 6, discussed in details further below, located in the lower right and left sides at the terminal ends 16, 17.

The axle and hub assemblies **42** support wheels **44** for transporting the platform **12** and portable toilet system **13**.

[0020] The portable toilet system **13** includes a cabana **50** disposed on the platform **12** between the V-shaped supports **22**. The cabana **50** includes two molded side panels **52, 54**, a molded rear panel **56**, a door **60** pivotally connected to a door frame (not shown), and a floor **62** having an aperture **64** defined therein. As shown in the illustrated embodiment, the cabana **50** is connected to the platform **12** by a clamping assembly, generally indicated at **70**. The clamping assembly **70** includes a bottom plate **72** of a generally rectangular configuration having an aperture defined therein, a top plate **74** having configuration complementary to the floor **62** and an aperture defined therein. The clamping assembly **70** includes tubular members **76** and angle members **77** disposed within the apertures of the top plate **74** and bottom plate **72**. The bottom plate **72** is rigidly attached to the platform **12**, for instance, to cross members **24** on the platform **12**. The tubular members **76** are connected to the bottom plate **72** and they extend upwardly from the bottom plate **72**. The tubular members **76** are aligned within the aperture **64** defined in the floor **62** of the cabana **50**. The top plate **74** is laid onto the floor **62** inside the cabana **50** to receive the angular members **77** extending through the platform **12**, and the aperture **64** of the floor **62**, thereby engaging the floor **62** in a sandwiched relationship between the bottom plate **72** and top plate **74** of the clamping assembly **70**. The tubular members **76** may additionally attach to a toilet **80** to add force to the clamping engagement of the plates **72, 74** and the floor **62** sandwiched therebetween. While the drawings show a particular embodiment of the toilet system **13** attached to the platform **12** with the clamping system **70**, it should be recognized that the toilet system **13** may be attached to the platform **12** in many different arrangements, such as by bolting the toilet system **13** onto the upper surface **14** of the platform **12**.

[0021] Referring to FIGS. 2 through 5, the axle assemblies **42** include a rear axle device **82** and a front axle device **84**. As shown in FIG. 2, the rear axle device **82** is pivotally attached to the platform **12**, and the front axle device **84** is rigidly attached to the platform **12**. In an alternative embodiment, the front axle device **84** may pivotally attach to the platform **12** and the rear axle device **82** may be stationary with respect to the platform **12**. The rear axle device **82** includes a tubular member **86**, and a pair of stub shafts **88**. The stub shafts **88** are generally steel rods, each having a portion extending into opposite ends **90, 92** of the tubular member **86** that is rigidly attached to the tubular member **86**. The tubular member **86** may include rosette holes **87** (as shown in FIG. 5 in connection with the front axle device **84**) near each end **90, 92** for attaching the tubular member **86** to the stub shafts **88** with a conventional rosette weld. The stub shafts **88** may each include a terminal ends **95** extending outside the tubular member **86** that includes a threaded spindle portion **93** to operably connect with a wheel and hub assembly, generally shown at **94** in FIG. 2. The wheel and hub assembly **94** is generally conventional, and therefore will not be described in great detail. Suffice it to say that the assembly **94** includes one of the wheels **44**, a nut **46**, a washer **48**, an outer bearing **43**, a hub **45**, an inner bearing **47**, and a seal **49**. The assemblies **94** fit together to attach to each stub shaft **88**, such that each hub **45** and wheel **44** can rotate about the stub shaft **88**. The wheel **44** is adapted to engage and ride on a set of rails **11**, for instance, by including

a flange **51** extending from the wheel **44** about the circumference of the wheel **44** to engage the rails **11**.

[0022] The tubular member **86** additionally includes a plate **96** that extends from the tubular member **86**. The plate **96** may be formed integrally with the tubular member **86**, or it may be conventionally attached to the tubular member **86** as a separate piece. The plate **96** may have a length shorter than the length of the tubular member **86**. The plate **96** includes a plate hole **97** defined therein. As shown in FIGS. 2 and 3, the rear axle device **82** is operably connected to the platform **12** through a pair of cross members **98, 100** connected to and extending generally perpendicularly between the sidewalls **18, 20** of the platform **12**. The cross members **98, 100** are spaced one from the other to define a gap **102** therein to receive the plate **96**. The cross members **98, 100** include respective cross member holes **104, 106** aligned one with the other. The plate **96** is pivotally secured with the cross members **98, 100** by a bolt **108** extending through the cross member holes **104, 106** and the plate hole **97** and into a nut **107**. The bolt **108** and nut **107** may include a pair of steel washers **110** and a pair of brass washers **112**, extending between the bolt **108** and cross members **98, 100** and between the plate **96** and the cross members **98, 100**. Alternatively, the plate **96** may pivotally attach to only one of the cross members **98** or **100**, or the rear axle device **82** may be pivotally attached to the platform **12** by an alternative method, such as a bolt that extends directly from the tubular member **86** and into one or both of the cross member holes **104, 106**.

[0023] As shown in FIGS. 2, 4, and 5, the front axle device **84** is similar to the rear axle device **82**. The front axle device **84** includes a tubular member **116** having stub shafts **118** extending out of each of the opposite ends **120, 122** of the tubular member **116**. The stub shafts **118** may each include a terminal end **133** with a threaded spindle portion **137** that is operably connected to one of the wheel and hub assemblies (not shown). Unlike the rear axle device **82**, the tubular member **116** of the front axle device **84** includes a first plate **124** and a second plate **126** that may be spaced apart and are attached with a weld **141**, or another conventional attachment, to the tubular member **116**. The first plate **124** and second plate **126** are rigidly attached to corresponding plates **125, 127** on the sidewalls **18, 20** of the platform **12**, for example, by a nut **129**, and bolt **131**. The front axle device **84** is thereby rigidly secured to the platform **12**, as opposed to the rear axle device **82**, which is pivotally secured to the platform **12**.

[0024] In operation, the railcar **10** is placed on a set of conventional railroad tracks or rails **11**, such that the wheels **44** of the railcar **10** each engage the rails **11**. The railcar **10** is moved along the rails **11** by conventional connection to another railcar (not shown) with driving capabilities, or by including engine means on the railcar **10** for driving the railcar **10**. The wheels **44** roll along the rail **11** attached to the stub shafts **88** and **118** of each of the axle devices **82, 84** rotating within their respective tubular members **86, 116**. As shown in FIG. 7, in situations where the rails **11** are uneven, the rear axle device **82** can pivot relative to the platform **12** to allow the wheels **44** attached to the rear axle **82** to remain in contact with the rails **11**. In a preferred embodiment, the plate **96** has enough height to accommodate for the pivot of the rear axle device through all railroad track conditions. The rear axle device **82** can move in a pivotal motion in

either direction about the bolt **108** attached through the plate **96** and the cross members **98, 100**. The wheels **44** attached to the front axle device **84** also remain in contact with the rails because of the pivot of the wheels **44** on the rear axle device **82**.

[0025] The above descriptions are those of a current embodiment of the invention. Various alterations and changes can be made without departing from the spirit and broader aspects of the invention, which are to be interpreted in accordance with the principles of patent law including the Doctrine of Equivalents.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A railcar for transporting equipment by rails, the railcar comprising:

- a platform for supporting the equipment on rails;
- a first axle assembly and a second axle assembly having wheels rotatably supported thereon with the first axle assembly rigidly connected to the platform, and
- a plate extending outwardly from the second axle assembly and pivotally connected to the platform, the second axle assembly movable relative to the first axle assembly for facilitating stabilized movement of the railcar relative to the rails.

2. A railcar as set forth in claim 1 wherein said platform includes a pair of sidewalls, and a pair of cross members connected to and extending between the sidewalls with the cross members being spaced apart to define a gap therein to receive the plate.

3. A railcar as set forth in claim 2 wherein the cross members each include a cross member hole, the cross member holes being aligned.

4. A railcar as set forth in claim 2 wherein the plate includes a plate hole defined therein aligned with the cross member holes.

5. A railcar as set forth in claim 2 including a bolt extending through the cross member holes and the plate hole for facilitating pivotal motion of the second axle assembly relative to the first axle assembly.

6. A railcar as set forth in claim 1 wherein the second axle assembly includes a second tubular member having a pair of second steel shafts extending through a portion of the second tubular member with the second steel shafts presenting terminal ends extending through the second tubular member.

7. A railcar as set forth in claim 6 including a second wheel and hub assembly operably connected to each terminal end.

8. A railcar as set forth in claim 6 wherein the plate includes a length and the second tubular member includes a length, the length of the plate being shorter than the length of the second tubular member.

9. A railcar as set forth in claim 1 wherein the first axle assembly includes a first tubular member having a first steel shaft extending through a portion of the tubular member presenting a terminal end extending from the first tubular member.

10. A railcar as set forth in claim 9 including a first wheel and hub assembly operably connected to the terminal end of each first steel shaft.

11. A railcar as set forth in claim 9 including a pair of spaced plates rigidly connected to the first tubular member for attaching the first tubular member to the platform.

12. A railcar for transporting equipment by rail, said railcar comprising:

- a cabana;
- a platform for supporting the cabana with the platform having sidewalls;
- a second axle assembly and a first axle assembly connected to the platform for holding wheels positioned thereon for moving the railcar, the second axle assembly including a second tubular member having a length and terminal ends, the first axle assembly including a first tubular member having a length and terminal ends;
- a second wheel and hub assembly operably connected to each of the terminal ends of the second axle assembly;
- a pair of spaced plates connected to the second tubular member for attaching the second tubular member to the platform;
- a first wheel and hub assembly operably connected to each of the terminal ends of the first axle assembly;
- a plate extending from the first tubular member and having a length, the length of the plate being shorter than the length of the first tubular member, the plate including a plate hole defined therein; and
- a pair of cross members connected to and extending between the sidewalls of the platform with the cross members being spaced one from the other to define a gap to receive the plate, the cross members each including a cross member hole, the cross member holes aligned one with the other whereby the plate is pivotally secured with and relative to said cross members by a bolt extending through the cross member holes and the plate hole for facilitating pivotal motion of the first axle assembly relative to the second axle assembly.

13. The railcar of claim 12 wherein the cabana is attached to the platform by a clamping assembly, wherein a first portion of the clamping assembly is disposed inside the cabana and a second portion of the clamping assembly is disposed outside the cabana and is attached to the platform, at least part of the cabana being sandwiched between the first and second portions of the clamping assembly.

14. The railcar of claim 13 wherein the clamping assembly includes a top plate and a bottom plate, and the cabana includes a floor, the top plate attached to the platform, the floor sandwiched between the top and bottom plates.

15. An axle assembly for maintaining the wheels of a railcar on rails, comprising:

- a platform;
- a first axle device rigidly attached to the platform, the first axle device including a first axle and a pair of wheels, the first axle including terminal ends, the wheels attached to the terminal ends and adapted to engage the rails; and
- a second axle device pivotally secured to the platform, the second axle device including an axle and a pair of wheels, the axle having terminal ends, the wheels attached to the terminal ends and adapted to engage the rails.

16. The axle assembly of claim 15 wherein the platform includes a pair of sidewalls and a first cross member, and the

second axle device includes a plate extending from the axle that is pivotally secured to the first cross member.

17. The axle assembly of claim 16 wherein the plate defines a plate hole and the first cross member defines a first cross member hole, the plate pivotally secured to the first cross member by a bolt extending through the plate hole and the first cross member hole.

18. The axle assembly of claim 17 wherein the platform includes a second cross member, the first and second cross members spaced to define a gap therebetween, the first cross member and the second cross member defining a first cross member hole and a second cross member hole, the plate extending into the gap and pivotally secured to the platform by a bolt extending through the first and second cross member holes and the plate hole.

19. The axle assembly of claim 15 wherein the first axle and the second axle each include a tubular member and a pair of shafts, the tubular member including opposite ends, the shafts each including a first portion extending into one of the opposite ends and rigidly attached to the opposite ends, the shafts each including a second portion attached to one of the wheels.

20. The axle assembly of claim 15 wherein the platform includes an upper surface, the upper surface supporting a mobile toilet system.

21. The axle assembly of claim 20 wherein the mobile toilet system includes a cabana for housing a toilet, the cabana including a floor attached to the platform by sandwiching the floor between a lower plate attached to the platform and an upper plate inside the cabana.

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