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**Crean**

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(54) **TRAVEL TRAILER WITH EXTENDABLE TWO LEVEL BATHROOM AND BEDROOM**

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(58) Field of Search ..... **296/26.12, 26.13, 296/171-173, 175-176, 165, 25, 24.1, 168, 181; 52/67**

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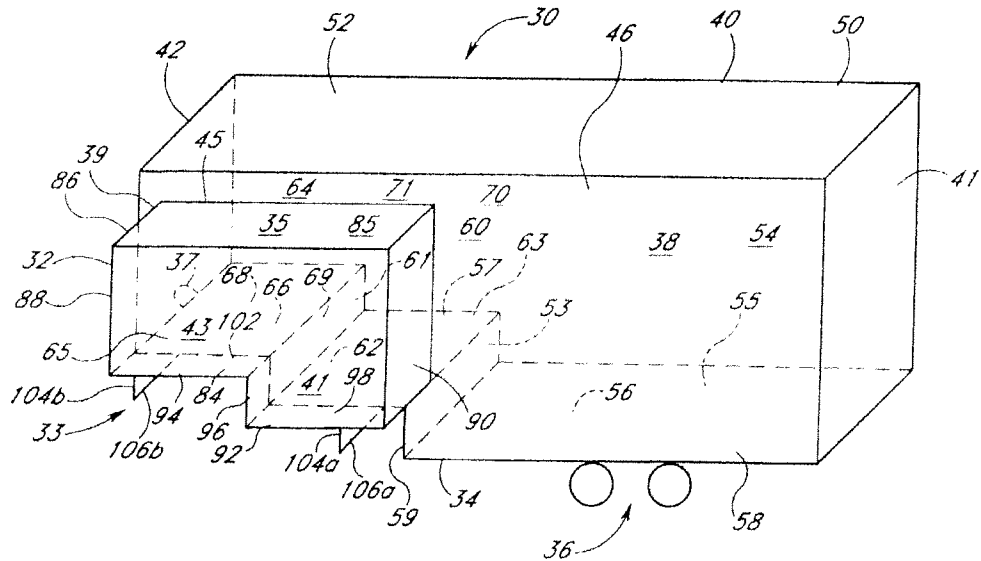
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(57) **ABSTRACT**

A recreational travel trailer comprising a main housing which encloses a living space having multiple floor levels, and a two level extendable housing having a deployed configuration and an extended configuration. The extendable housing is movably positioned within an opening in the main housing so that a first floor of the extendable housing is positioned adjacent to a first floor of the main housing and so that a second floor of the extendable housing is positioned adjacent to a second floor of the main housing. In the deployed configuration, the extendable housing extends through the opening of the main housing so as to increase the enclosed space within the trailer. In the retracted configuration, the extendable housing is substantially positioned within the main housing so as to provide the main housing with a shape and size that is suitable for being towed on a public road. The trailer is further comprised of a two level actuator assembly which moves the two level extendable housing. The actuator assembly is comprised of a rear and front rail assembly that are vertically offset from each other and a two level drive mechanism positioned therebetween that causes the rail assemblies to move opposite ends of the extendable housing in a synchronous manner. A foldable wardrobe having a deployed configuration and a retracted configuration is mounted to the extendable housing. In the deployed configuration, the wardrobe extends into a full size wardrobe. In the retracted configuration, the width of the wardrobe is reduced so as to enable the extendable housing to be placed into the retracted configuration.

**42 Claims, 7 Drawing Sheets**



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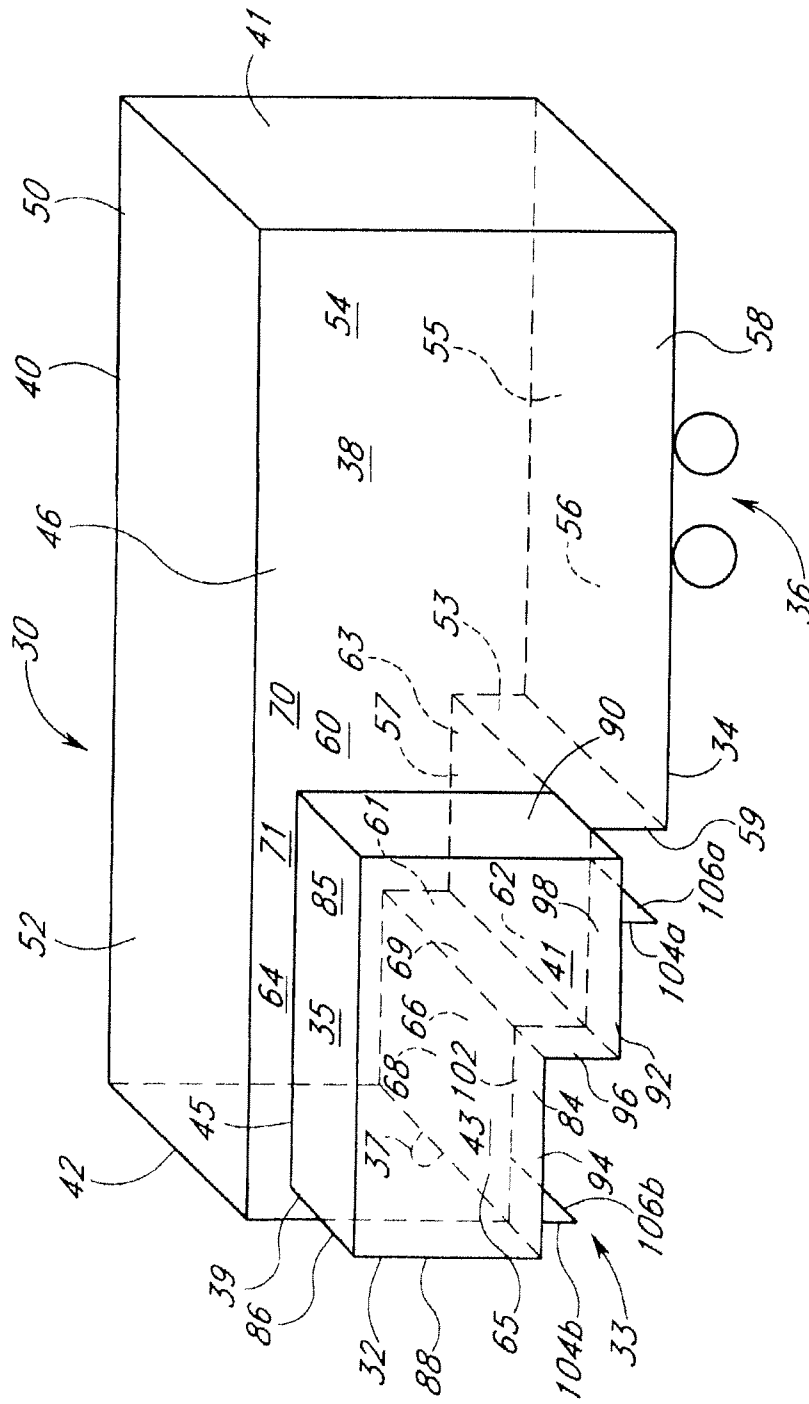
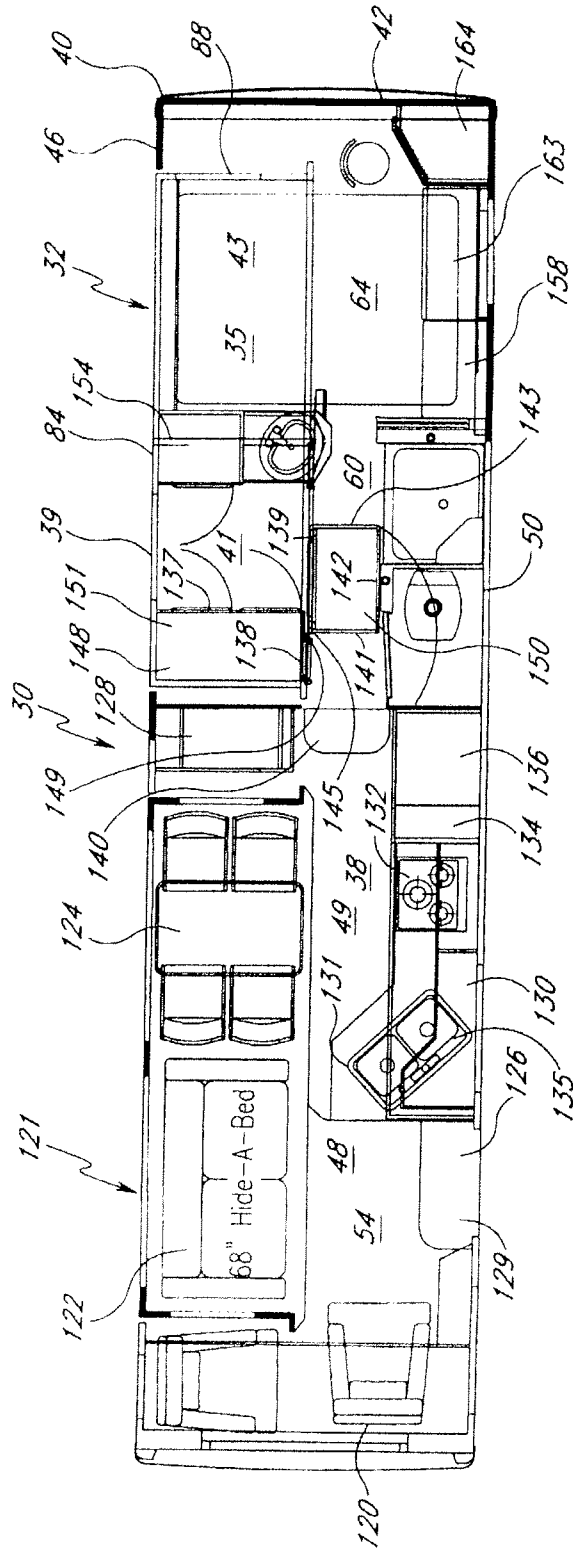


FIG. 1



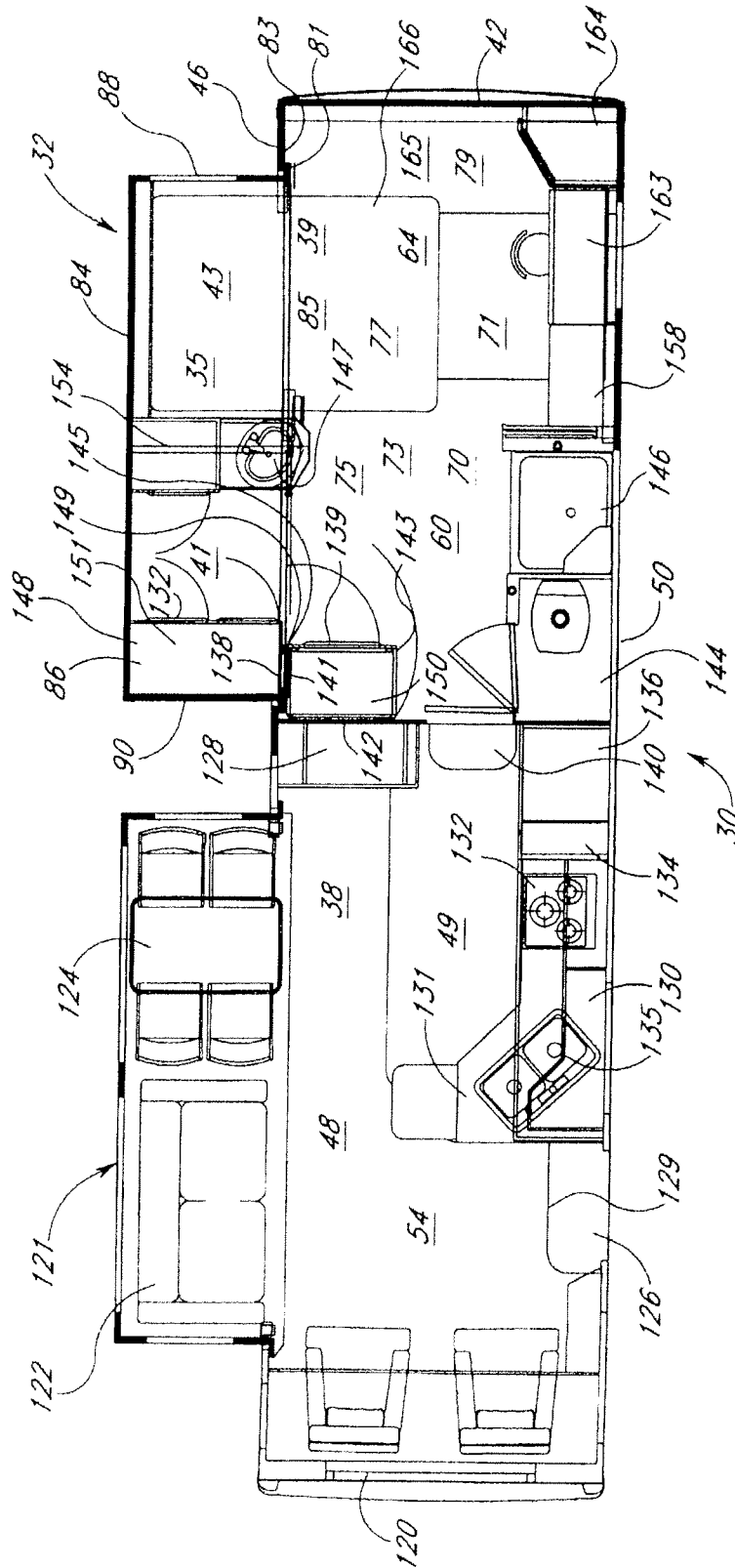


FIG. 2B

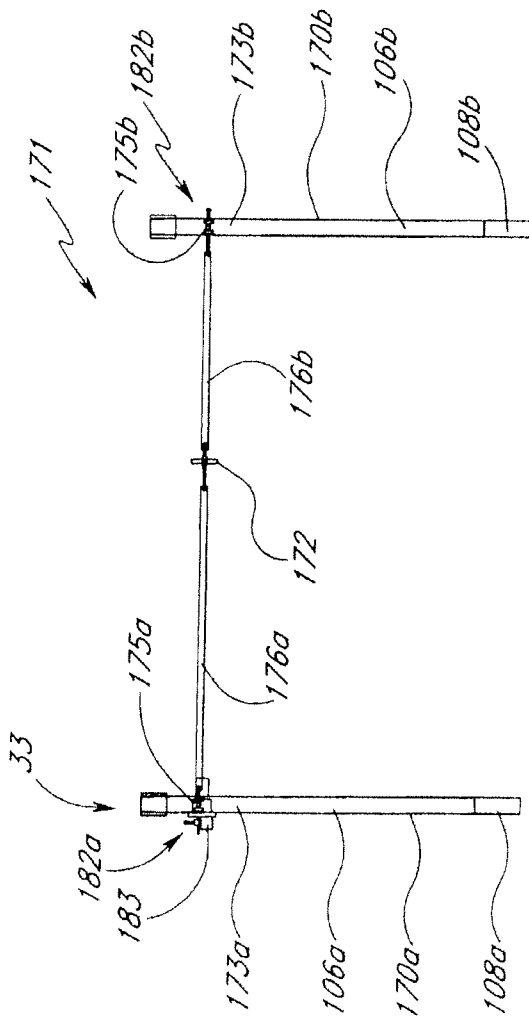


FIG. 3A

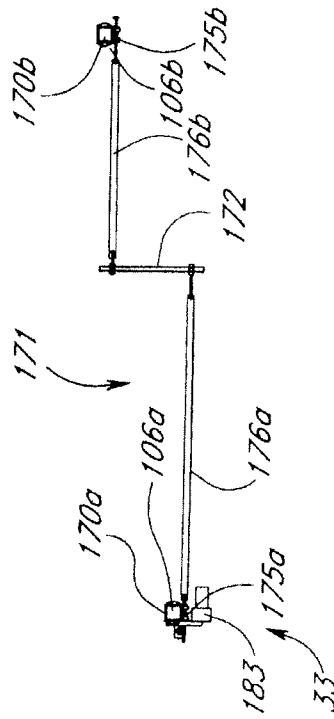


FIG. 3B

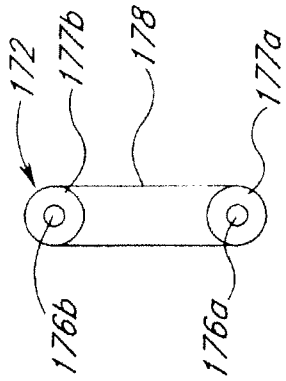


FIG. 3D

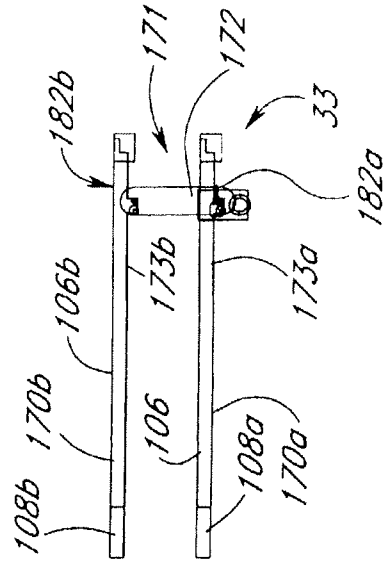


FIG. 3C



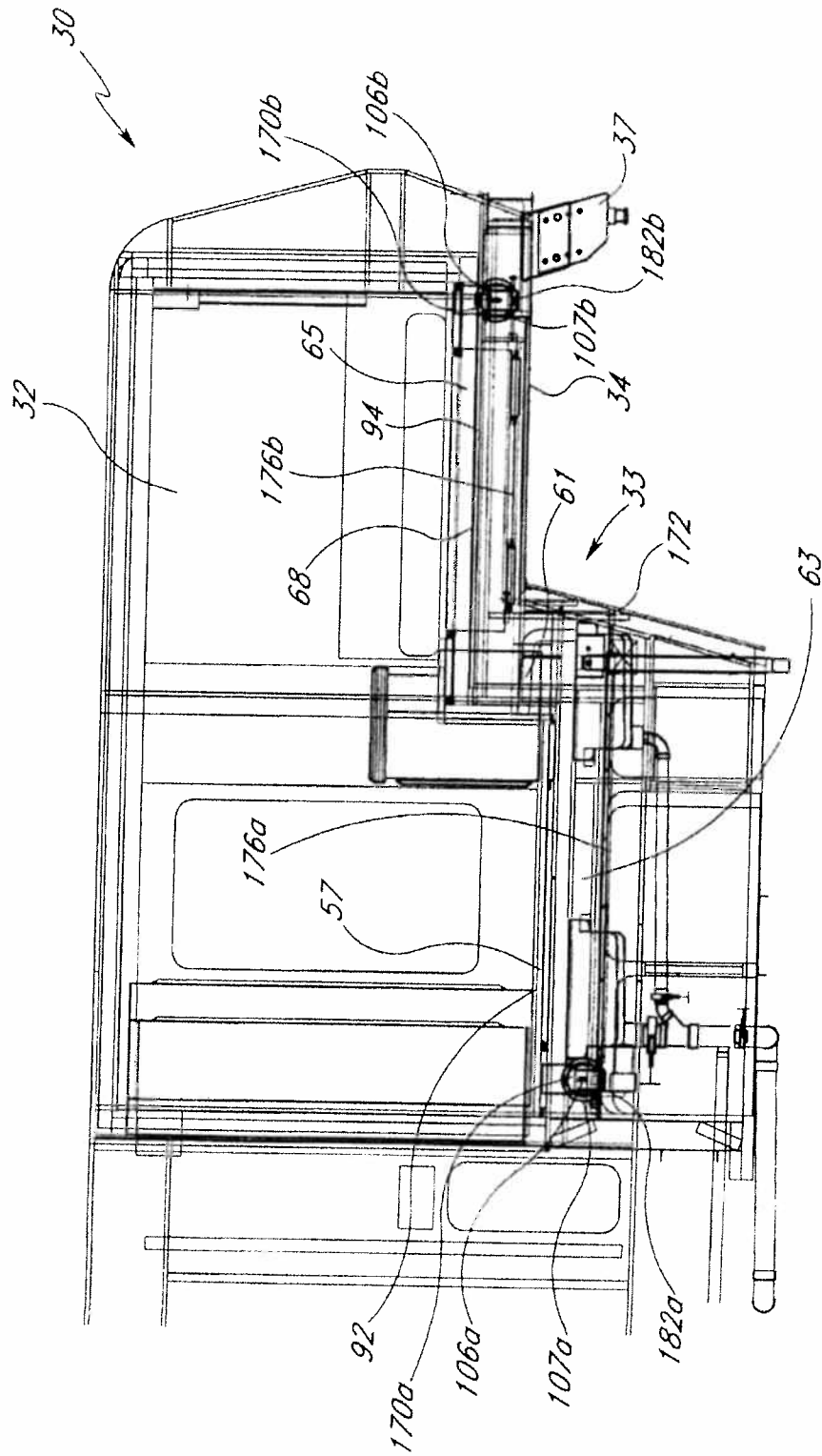


FIG. 4A

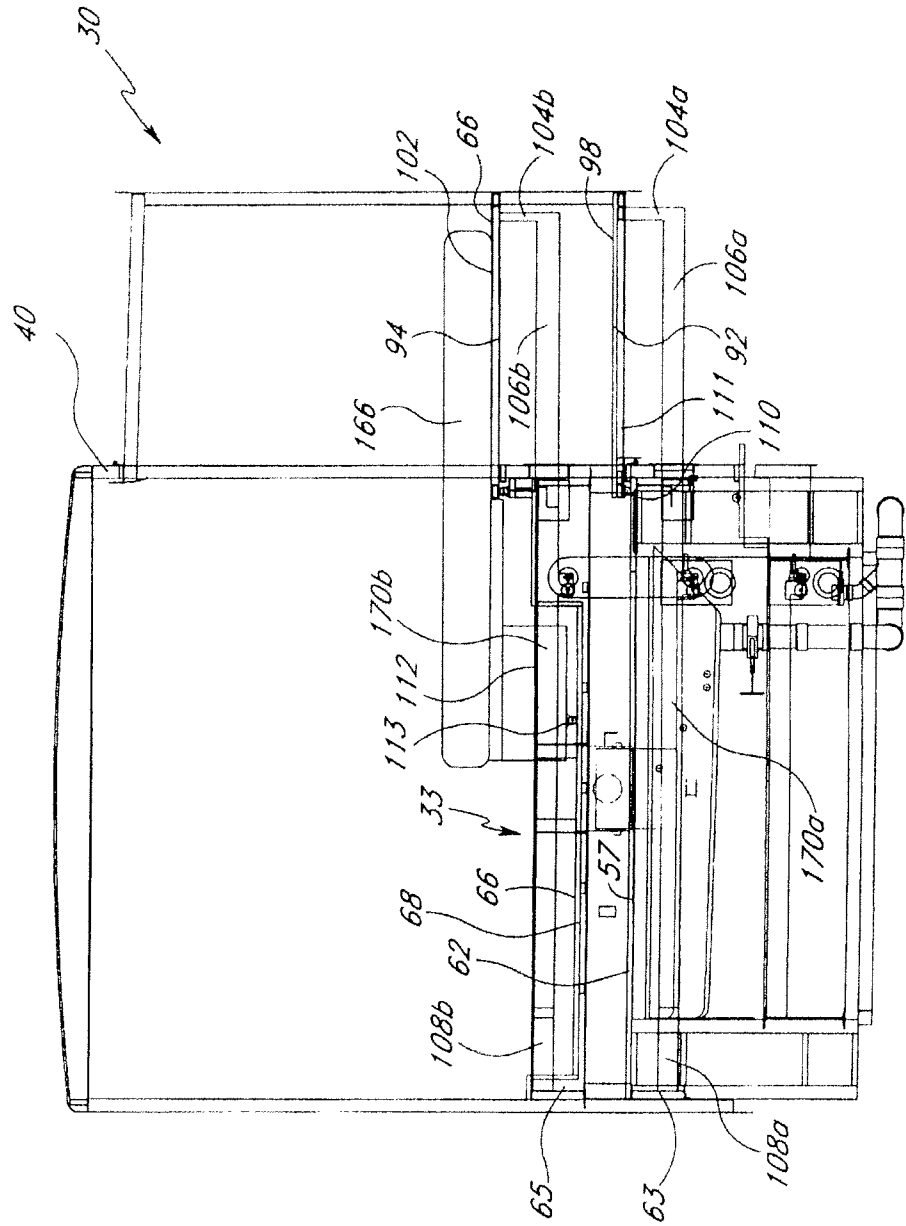


FIG. 4B

1

## TRAVEL TRAILER WITH EXTENDABLE TWO LEVEL BATHROOM AND BEDROOM

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to travel trailers and in particular relates to travel trailers that are adapted to expand in size so as to increase the effective interior area of the travel trailer.

#### 2. Description of the Related Art

Recreational travel trailers are becoming increasingly popular with people who wish to retain the comforts and conveniences of home while spending extended periods of time away at remote locations. In particular, a recreational travel trailer is a modestly priced mobile structure which can be towed behind a passenger vehicle, such as a truck, and forms an enclosed interior living space so as to provide a shelter for individuals. In more elaborate configurations, the travel trailer typically includes amenities such as a bedroom, a bathroom with a sink and a flushing toilet, a kitchen with a refrigerator, stove, and sink, and a generously sized living area with reclining chairs and an entertainment center. Furthermore, a travel trailer can be easily parked at a wide variety of locations so that users can enjoy the amenities of the travel trailer at their favorite destination. Consequently, people who use travel trailers can usually be assured of a comfortable living environment at their preferred destination without having to rely on the availability of suitable hotels.

In response to consumer demand, manufactures of travel trailers have developed increasingly larger travel trailers. However, state and federal laws limit the dimensions of travel trailers that can be transported on public roads, thereby limiting the living space within the travel trailer. In particular, current regulations specify a maximum length, otherwise known as the maximum allowed length, of highway bound travel trailers to be no greater than 40 feet. Furthermore, current regulations specify a maximum width, otherwise known as the maximum allowed width, of highway bound travel trailers to be no greater than 8.5 feet. Thus, the travel trailer industry has devoted considerable resources to develop improved travel trailers so as to increase the living space of the travel trailer in a manner that is consistent with the forgoing size restrictions.

Consequently, manufacturers have developed travel trailers with one or more extendable members that provide the user with a supplemental living space when the travel trailer is parked. In particular, the extendable member is adapted to extend into a deployed configuration during the time that the travel trailer is parked so that the living space within the travel trailer is increased by an amount which is substantially equal to the supplemental living space of the extendable member. Furthermore, the extendable member is adapted to retract into a retracted configuration during the time that the travel trailer is being towed so that the traveling dimensions of the travel trailer are within the maximum allowed width and length.

The typical extendable member is positioned within an opening of the housing of the travel trailer and is comprised of a plurality of walls that form the supplemental living space therein and an opening that provides access to the supplemental living space. In particular, the walls of the typical extendable member are comprised of a lower horizontal wall that forms a single level planer floor which substantially aligns with an adjacent floor of the travel trailer and an upper horizontal wall that forms a single level planer

2

ceiling which substantially aligns with an adjacent ceiling of the travel trailer. Furthermore, the extendable member is comprised of an outer vertical wall that is adapted to align with an outer wall of the travel trailer while the extendable member is placed in the retracted configuration, and a pair of horizontal side walls that join the upper and lower horizontal walls and the outer vertical wall together.

According to state of the prior art, the known extendable member is typically mounted on a pair of movable support rail assemblies which are positioned at a common elevation so as to provide movement of the extendable member with respect to the travel trailer. In particular, each support rail assembly is typically comprised of a fixed member which is fixedly attached to the frame of the travel trailer and a sliding member which telescopes from the fixed member and couples with the extendable member so that the extendable member moves with the sliding member of each support rail assembly. Furthermore, the sliding member of each of the support rail assemblies is displaced with respect to the fixed member by an actuator assembly that typically comprises either an electrically powered linear rack and pinion drive mechanism or a hydraulic assembly which moves each of the sliding members so that the extendable member remains in an aligned state with respect to the travel trailer during the movement process. Moreover, the actuator assembly typically further includes push button control so that the user can conveniently place the extendable member in either the retracted or the deployed configuration.

Such an extendable member, when in the retracted configuration, is positioned so that the outer vertical wall aligns with the side wall of the travel trailer and so that the remaining walls, including the lower horizontal wall, of the extendable member are positioned within the interior living space of the travel trailer. Consequently, in the retracted configuration, the housing of the travel trailer forms a more aerodynamic shape having a width and length that are within the maximum allowed width and length.

However, when the extendable member is placed into the deployed configuration, the extendable member extends from the travel trailer so that the walls of the extendable member extend from the opening of the housing of the travel trailer so as to align the opening of the extendable member with the opening of the side wall of the travel trailer. Consequently, the floor of the extendable member extends through the opening of the housing so that the effective living area of the travel trailer is increased. Furthermore, the walls of the extendable member effectively become exterior walls of the travel trailer so that the interior living space of the travel trailer remains enclosed.

Typically, the largest variety of travel trailers, otherwise known as fifth wheel travel trailers, are manufactured so that the weight of the trailer is partially supported by a plurality of wheels that extend from a chassis of the trailer and partially supported at the front by the towing vehicle. In particular, such travel trailers are comprised of a raised front section that is adapted to substantially extend over a supporting portion of the towing vehicle and a lowered rear section that is positioned above the plurality of wheels of the travel trailer. Furthermore, such travel trailers may further be comprised of a midsection that encloses a portion of a plumbing assembly which includes a fresh water storage tank and a waste water storage tank. Thus, typical fifth wheel travel trailers are typically formed with multiple levels which often include a rear section having a lowered floor area, a front section having a raised floor area, and a middle section having an intermediately elevated floor area.

In the typical fifth wheel travel trailer, the living space is typically segmented along the boundaries between the

lower, middle, and upper sections of the travel trailer. In particular, since the rear section is closest to the ground and since the rear section is the largest of the three sections, the rear section typically comprises the living room and kitchen that are both accessible from the outside by an entry door positioned along a side wall of the housing of the travel trailer that opens into the lower level. Furthermore, since the middle section often comprises the plumbing assembly, the middle section often comprises the bathroom. Moreover, since the front section has the least amount of headroom and is the most remote of all three sections, the front section often comprises the bedroom.

In known fifth wheel travel trailers having extendable members, the extendable members are somewhat limited in that they extend from only a single section of the travel trailer. In particular, known extendable members extend from either the rear section, the midsection, or the front section of the trailer. For example, the typical extendable travel trailer is comprised of a first extendable member having a single level floor that extends from a first opening in the side wall of the travel trailer in the vicinity of the rear section so as to increase the size of the living room. Further, the typical trailer also includes a second extendable member having a single level floor that extends from a second opening of the side wall of the travel trailer in the vicinity of the front section so as to increase the size of the bedroom.

Although such recreational travel trailers provide a significant increase in living space, the increase is not as great as it could be. In particular, since the known extendable member can only extend from a single level floor of the recreational travel trailer, the width of the known extendable member is limited by the dimensions of the corresponding trailer section. Consequently, such extendable members provide a supplemental living space that is sometimes relatively narrow in size, thereby preventing relatively large items from being positioned within the extendable member. For example, although the second extendable member from the aforementioned example enables a bed to be mounted within the supplemental living space formed therein, it is not capable of including the bathroom along with the bed due to the limited size of the front section of the travel trailer and due to the inability of known extendable members to encompass multiple floor levels. Furthermore, since structural limitations require adjacent extendable members to be spaced sufficiently far apart, it is generally not feasible to position extendable members adjacent to each other, wherein the extendable members extend from both the middle and front sections of the travel trailer. Thus, it is generally not feasible to position both the bathroom and the bedroom in one or more extendable members of the travel trailer. Consequently, either the middle section or the front section of the known travel trailer is not fully utilized.

Although special purpose commercial grade mobile structures have been developed with extendable members having multiple floor levels, such known commercial structures utilize elaborate and expensive actuator assemblies for manipulating the extendable member between the retracted configuration and the deployed configuration. In particular, in the Applicants previous design of a commercial grade movable concession booth having a multilevel extendable member that forms a supplemental space therein, the actuator assembly comprises an elaborate system of cables that engage with an elaborate system of pulleys in a relatively complicated manner so as to effectively move the relatively large multilevel extending member between the retracted configuration and the deployed configuration. However, since the fabrication of such known actuator assemblies

require a substantial amount of manual effort and materials, the implementation of such known multilevel extendable members in the recreational travel trailer industry is generally prohibited due to the high costs involved.

Another problem associated with known travel trailers having extendable members is that the furnishings that attach to the extendable members are somewhat limited in size. For example, it is usually not practical to include a laterally positioned wardrobe having a substantially elongated shape as part of the extendable member. In particular, due to the extended length of the wardrobe and the limited space within the travel trailer, the wardrobe may inhibit the extendable member from being placed in the retracted configuration. Furthermore, even if it is possible for such an extendable member to be placed in the retracted configuration, it is likely that the wardrobe will limit access to the interior regions of the travel trailer. Consequently, it is often the case that the wardrobe must be fixedly positioned to a front region of the bedroom, thereby limiting the space within the bedroom.

From the foregoing, therefore, it will be appreciated that there is a need for an improved travel trailer that can be configured with a living space that is greater than that of travel trailers known in the art. In particular, there is a need for an improved travel trailer that comprises an improved extendable member that can be manipulated between a retracted configuration and a deployed configuration so that the extendable member encompasses multiple sections of the travel trailer so as to increase of the width of the extendable member over that of extendable members known in the art. To this end, there is a need for the improved extendable member to include a multilevel floor so as to enable the extendable member to encompass multiple sections of the travel trailer which could include a bathroom and a bedroom in tandem.

Furthermore, there is a need for the improved extendable member to include an actuator assembly that is capable of moving the extendable member between the retracted and the deployed configurations in a manner that does not result in the extendable member becoming immobilized due to improper alignment between the extendable member and the travel trailer. Moreover, there is a need for the actuator assembly to be relatively simple so that it can be manufactured in a cost effective manner. Additionally, there is a need for the improved extendable member to include a configurable wardrobe having an elongated shape in an extended configuration and a non-elongated shape in a retracted configuration so that the wardrobe can be laterally positioned in the bathroom region of the improved extendable member of the travel trailer in a non-interfering manner so as to free up space in the bedroom.

#### SUMMARY OF THE INVENTION

The aforementioned needs are satisfied by the travel trailer of the present invention comprising a frame, a set of wheels attached to the frame to permit rolling movement of the trailer over the ground, and a floor attached to the frame. In particular, the floor defines the inner living space of the trailer and the floor has a first vertical level positioned at a first height above the ground and a second vertical level positioned at a second height above the ground. The travel trailer further comprises a plurality of walls mounted on the floor so as to enclose the inner living space of the trailer and a pop-out assembly attached to a first wall of the plurality of walls of the trailer, the pop out assembly including a floor having a first and a second level and a plurality of walls

5

mounted at the outer edges of the floor. In particular, the first and second level of the floor of the pop-out are respectively positioned adjacent the first and second vertical levels of the floor of the trailer attached to the frame. Furthermore, the pop-out assembly is movable between a first position such that the outer wall of the pop-out assembly is positioned adjacent the first wall and a second position wherein the pop-out assembly is extended outward from the first wall.

In one embodiment, the travel trailer further comprises a movement mechanism coupled with the pop-out assembly that moves the pop-out assembly between the first position and the second position. In particular, the movement mechanism comprises a first rail attached to a first end of the pop-out assembly, wherein the first rail is movable between a retracted and an extended position. Furthermore, the movement mechanism comprises a second rail attached to a second end of the pop-out assembly, wherein the second rail is movable between a retracted and an extended position. Moreover the movement mechanism further comprises a motor which is coupled with the first rail so as to be able to move the first rail between the retracted and extended position. Furthermore, the movement mechanism further comprises a linkage assembly that links the first and second rail so as to ensure that the first and second rail move between the retracted and the extended position simultaneously at the same rate.

In one embodiment, the linkage assembly comprises a first shaft member mounted to the travel trailer so as to extend generally horizontally at a first height above the ground so as to be rotatable, wherein the first shaft member is attached to the first rail so that rotation of the first shaft member results in corresponding movement of the first rail between the retracted and the extended position. The linkage assembly further comprises a second shaft member mounted to the trailer assembly so as to extend generally at a second height above the ground and so as to be rotatable, wherein the second shaft member is attached to the second rail so that rotation of the second shaft member results in movement of the second rail between the retracted and extended position. The linkage assembly further comprises a vertical linkage mechanism that is coupled to the first and second shaft members so that rotational movement of the first shaft member results in corresponding rotational movement of the second shaft member.

From the foregoing, it should be apparent that the improved pop-out assembly of the travel trailer of the present improved invention encompasses two floor levels of the travel trailer, therefore enabling the pop-out assembly to have a supplemental living space which is significantly greater than that of pop-out assemblies known in the art. Furthermore, the travel trailer of the present invention utilizes a simple yet effective linkage assembly that can be manufactured at low cost. These and other objects and advantages of the present invention will become more apparent from the following description taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a recreational travel trailer of the present invention that comprises a two level extendable member;

FIG. 2A is an overhead plan view of the travel trailer of FIG. 1 showing the two level extendable member in a retracted configuration;

FIG. 2B is an overhead plan view of the travel trailer of FIG. 1 showing the two level extendable member in a deployed configuration;

6

FIG. 3A is an overhead plan view of a two level actuator assembly of the travel trailer of FIG. 1 that actuates the two level extendable member between the retracted configuration and the deployed configuration;

FIG. 3B is a side elevational view of the actuator assembly of FIG. 3A;

FIG. 3C is a front elevational view of the actuator assembly of FIG. 3A;

FIG. 3D is a side view of a torque transfer assembly of the two level actuator assembly of FIG. 3A that induces a lower horizontal shaft and an upper horizontal shaft of the two level actuator assembly to rotate in a synchronous manner;

FIG. 4A is a side elevational view of the travel trailer of FIG. 1;

FIG. 4B is a front elevational view of the travel trailer of FIG. 1;

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made to the drawings wherein like numerals refer to like parts through out. In particular, FIG. 1 schematically illustrates a recreational fifth wheel travel trailer 30 comprised of a main housing 40 and a two level extendable housing 32, wherein the extendable housing 32 is shown extending from an opening 39 of the main housing 40 in a deployed configuration. As will be described in greater detail below, the two level extendable housing 32 can either be placed in the deployed configuration so as to effectively increase a living space 38 of the trailer 30 or be placed in a retracted configuration so as to provide that trailer 30 with a more suitable size and shape for being towed on a public road. Furthermore, although the preferred embodiment of FIG. 1 includes the extendable housing 32 that extends from the left side of the trailer 30, it will be appreciated that the extendable housing 32 could be adapted to extend from the right side of the trailer 30 in another embodiment.

In this application, the adjectives "front", "rear", "left", "right", "inboard", "outboard", "longitudinal", and "lateral" will be frequently used to indicate the spatial relationship between many of the elements of the trailer 30. In particular, the adjective front is used to indicate that the corresponding element is positioned proximal to a front end of the trailer 30 and the adjective rear is used to indicate that the corresponding element is positioned proximal to a rear end of the trailer 30, wherein the trailer 30 preferably travels on a road with the front end leading and the rear end lagging. Furthermore, the adjectives left and right are defined with respect to an observer who is looking at the trailer 30 along a direction that extends from the rear end of the trailer 30 to the front end of the trailer and are used to indicate that the corresponding element is either positioned adjacent to the left side of the trailer 30 or adjacent to the right side of the trailer 30. Moreover, the adjective inboard refers to an element being positioned proximal to a medial line that extends from the rear end of the trailer 30 to the front end of the trailer 30 and the adjective outboard refers to an element being positioned distally from the medial line. Additionally, the adjectives longitudinal and lateral are used to indicate direction, wherein longitudinal refers to a horizontal direction that extends between the rear and front ends of the trailer 30, and wherein lateral refers to a horizontal direction that extends between the left and right sides of the trailer 30.

As generally shown in FIG. 1, the trailer 30 further comprises a frame 34 that structurally supports the trailer 30. Essentially, the frame 34 forms a multilevel structure and is

constructed from conventional structural members in a manner known in the art so that the frame 34 structurally supports the main housing 40 of the trailer 30. In the preferred embodiment, the frame 34 is comprised of a rear horizontal platform 58, a front horizontal platform 65, and a middle horizontal platform 63 interposed therebetween. However, it will be appreciated that, in other embodiments, the frame 34 could be comprised of a different number of platforms. Furthermore, the frame 34 comprises a rear vertical riser 59 that joins the rear horizontal platform 58 with the middle horizontal platform 63 so that the platform 63 is elevated above the platform 58. Moreover, the frame 34 comprises a front vertical riser 61 that joins the middle horizontal platform 63 with the front horizontal platform 65 so that the platform 65 is elevated above the platform 63.

In the preferred embodiment, the platforms 58, 63, and 65 of the frame 34 are formed from steel structural members. However, it will be appreciated that frame 34 could be constructed in alternative manner in other embodiments of the invention. For example, the rear platform, in an alternative embodiment, could be formed of steel members and extended in length so as to join with a single steel riser that joins with the front platform formed of steel. Furthermore, the middle platform, in this alternative embodiment, could comprise a wooden structure that mounts at the front of the rear platform.

As generally shown in FIG. 1, the main housing 40 is mounted above the frame 34 and is essentially formed of a plurality of planer walls that are joined together in a known manner and mounted to the frame 40 in a known manner so as to form the space 38 above a plurality of floor levels. In particular, the main housing 40 includes a front vertical wall 42, a rear vertical wall 44, a left side or drivers side vertical wall 46, a right side or passenger side vertical wall 50, and an overhead vertical wall 52 that all join together in a mutually orthogonal manner to form a substantially rectangular shaped enclosure having the living space 38 formed therein. Furthermore, the main housing 40 is further comprised of a rear lower horizontal wall 55, a middle lower horizontal wall 57, and an front lower horizontal wall 68 that are mounted directly above the rear platform 58, middle platform 63, and front platform 65, respectively, of the frame 34.

Moreover, the upper surfaces of the rear, middle, and front horizontal walls 55, 57, and 68 respectively form a rear floor 56, a middle floor 62, and a front floor 66. In particular, the middle floor 62 is elevated above the rear floor 56 and separated from the rear floor 56 by a rear step 53 that rises from the rear floor to the middle floor. Furthermore, the front floor 66 is elevated above the middle floor 62 and separated from the middle floor 62 by a front step 69 that rises from the middle floor 62 to the front floor 66. Consequently, the living space 38 formed within the main housing 40 is segmented into a rear space 54 that encompasses the rear floor 56, a middle space 60 that encompasses the middle floor 62, and a front space 64 that encompasses the front floor 66.

As generally shown in FIG. 1, the trailer 30 further comprises a known wheel assembly 36 having a plurality of rotatable wheels that attaches to the frame so as to enable the trailer 30 to be transported on a road. Furthermore, the trailer 30 further comprises a known male hitch assembly 37 at the front of the trailer 30 that couples with a known female hitch assembly of a towing vehicle so that the trailer 30 can be towed by the towing vehicle.

As generally shown in FIG. 1, the two level extendable housing 32 that is adapted to extend from the main housing

40 of the trailer 30 is formed of a plurality of walls that join together to form a supplemental living space 35 therein. In particular, the housing 32 comprises an outboard vertical wall 84, an overhead horizontal wall 86, a front lateral vertical wall 88, a rear lateral vertical wall 90, a rear lower horizontal wall 92 having a lower floor 98 formed thereon, a front lower horizontal wall 94 having an upper floor 102 formed thereon, and a middle lateral vertical wall 96 that collectively join together in a substantially orthogonal manner. Specifically, the middle vertical wall 96 vertically offsets the rear lower horizontal wall 92 from the front lower horizontal wall 94 so that the upper floor 102 is elevated above the lower floor 98. Furthermore, the extendable housing 32 includes an inboard opening 85 that allows access to the supplemental living space 35, wherein the opening 85 is positioned opposite of the outboard vertical wall 84. Moreover, the supplemental living space 35 comprises a lower space 41 that encompasses the lower floor 98 and an upper space 43 that encompasses the upper floor 102 of the extendable housing 32. As will be described in greater detail below, the lower space 41, in the preferred embodiment, forms a part of a bathroom area 73 and the upper space 43 forms a part of a sleeping area 77 of the trailer 30.

As generally shown in FIG. 1, the main housing 40 of the trailer 30 includes the opening 39 that enables the two level extendable housing 32 to extend from the main housing 40. In particular, the opening 39 is formed with a perimeter 45 having a shape that enables the two level extendable housing 32 to extend from the opening 39 when the extendable housing 32 is placed into the deployed configuration. Moreover, the opening 39 is formed with a shape that provides a substantially airtight seal when the extendable housing 32 is placed in the retracted configuration. Furthermore, the opening 39 is positioned adjacent to the middle and front spaces 60 and 64 of the trailer 30 so as to allow the extendable housing to extend into and out of the middle and front spaces 60 and 64 of the trailer 30.

As generally shown in FIG. 1, the two level extendable housing 32, in the deployed configuration, extends through the opening 39 of the main housing 40 along a direction that is substantially perpendicular to the left side vertical wall 46 so that the opening 85 of the extendable housing 32 substantially aligns with the opening 39 of the main housing 40 so as to provide the trailer 30 with an expanded interior middle space 70 and an expanded interior front space 71. In particular, the extendable housing 32 is positioned so that the middle floor 62 of the main housing 40 extends into the lower floor 98 of the extendable housing 32 so as to combine the middle space 60 of the main housing 40 with the lower space 41 of the extendable housing 32 into the expanded middle space 70. Furthermore, the extendable housing 32 is positioned so that the front floor 66 of the main housing 40 extends into the upper floor 102 of the extendable housing 32 so as to combine the front space 64 of the main housing 40 with the upper space 43 of the extendable housing 32 into the expanded front space 71.

As schematically shown in FIG. 1, the two level extendable housing 32 is coupled to an actuator assembly 33 that moves the two level housing 32 between the deployed configuration and the retracted configuration. In the preferred embodiment, the actuator assembly 33 is comprised of a rear horizontal slidable rail 106a having a rear upwardly extending vertical bracket 104a at an outboard end of the rail 106a and a front slidable rail 106b having a front upwardly extending vertical bracket 104b at an outboard end of the rail 106b, wherein the rear and front brackets 104a and 104b

attach to the extendable housing 32 so that movement of the rails 106a and 106b produce a corresponding movement of the extendable housing 32 between the extended and retracted positions.

As schematically shown in FIG. 1, the rails 106a and 106b laterally extend from the frame 40 along different horizontal planes. In particular, the rail 106a extends from the middle platform 63 of the frame 34 and is positioned beneath the rear horizontal wall 92 of the extendable housing 32 so that the rear bracket 104a can attach to the extendable housing 32 in a manner which will be described in greater detail below. Similarly, the rail 106b extends from the front platform 65 of the frame 34 and is positioned beneath the front horizontal wall 94 of the extendable housing 32 so that the front bracket 104b can attach to the extendable housing 32. As will be described in greater detail below in connection with FIGS. 3A-3B, the actuator assembly 33 is further comprised of a two level drive assembly 47 that moves the vertically offset rails 106a and 106b in a lateral manner so as to move the extendable housing 32 between the deployed configuration and the retracted configuration.

Reference will now be made to FIGS. 2A and 2B which provide a detailed plan view of the living space 38 within the trailer 30 of FIG. 1. In particular, FIG. 2A illustrates the trailer 30 with the extendable housing 32 in the retracted configuration and FIG. 2B illustrates the trailer 30 with the extendable housing 32 in the deployed configuration. Moreover, in FIGS. 2A and 2B, the front of the trailer 30 is shown on the right hand side of the page and the rear of the trailer 30 is shown in the left hand side of the page.

As shown in FIG. 2A, the extendable housing 32, in the retracted configuration, extends into the main housing 40 so that the extendable housing 32 is substantially positioned within the middle and front spaces 60 and 64 of the living space 38 of the trailer 30. Consequently, the outboard vertical wall 84 of the extendable housing 32 is aligned with the opening 39 of the main housing 40 so as to form the trailer 30 with a more aerodynamic shape and so as to reduce the effective width of the trailer 30 while the trailer is being towed.

As shown in FIG. 2B, the extendable housing 32, in the deployed configuration, extends out of the opening 39 of the left vertical side wall 46 of the main housing 40 so that the opening 85 of the extendable housing 32 aligns with the opening 39 of the main housing 40. Thus, the lower and upper spaces 41 and 43 of the supplemental living space 35 of the extendable housing 32 combine with the middle and front spaces 60 and 64 of the living space 38 of the housing 40 to form the expanded middle and front spaces 70 and 71 of the trailer 30.

As shown in FIGS. 2A and 2B, the extendable housing 32 further comprises a lip 81 that outwardly extends from the inboard edges of the front, overhead, and rear walls 88, 86, and 90 of the extendable housing 32 in a substantially orthogonal manner. In particular, when the extendable housing 32 is placed in the deployed configuration of FIG. 2B, the lip 81 flushly contacts an inner surface 83 of the main housing 40 adjacent the opening 39 of the left side vertical wall 46 of the main housing 40 so as to partially support the extendable housing 32 in the deployed configuration. As will be described below in connection to FIG. 4B, the actuator assembly 33 provides additional support to the extendable housing 32 in the extended position.

As shown in FIGS. 2A and 2B, the preferred embodiment of the trailer 30 further comprises a conventional single level extendable housing 121 having a deployed configuration

and a storage configuration. In particular, the single level extendable housing 121, when in the deployed configuration as shown in FIG. 1B, extends through the main housing 40 so as to increase the rear space of the trailer 30. Furthermore, the single level extendable housing 121, when in the retracted configuration as shown in FIG. 1A, is substantially positioned within the main housing 40 so as to provide the trailer 30 with a shape and size that is more suitable for traveling.

As shown in FIGS. 2A and 2B, the rear space 54 of the trailer 30 includes a living room area 48 and a kitchen area 49. In particular, the living room area 48 includes a plurality of recliner chairs 120, a hide-a-bed 122, a set of dining furniture 124, an entertainment center 128 for storing a television, and an entry area 129 adjacent an entry door 126 which is positioned within the right side vertical wall 50 of the main housing 40. Moreover, the hide-a-bed 122 and the set of dining furniture 124 are positioned within the single level extendable housing 121 so that the hide-a-bed 122 and the set of dining furniture 124 are displaced away from the kitchen area 49 when the single level extendable housing 121 is placed into the deployed configuration. Furthermore, the kitchen area 49 includes a cabinet assembly 130 that comprises a kitchen counter 131, a stove 132, a food pantry 134, a refrigerator 136, a kitchen sink 135, and a step 140 that provides easy access to the elevated expanded middle space 70 of the trailer 30.

As shown in FIG. 2B, the expanded middle space 70 comprises a bathroom area 73 and a dressing room area 75. In particular, the bathroom area 73 includes a toilet closet 144, a shower 146, and a bathroom sink 147. Furthermore, the dressing room area 75 includes a movable cabinet such as a foldable wardrobe assembly 151 having a deployed configuration and a retracted configuration that will be described in greater detail below and a storage cabinet 154. Moreover, the foldable wardrobe assembly 151, the storage cabinet 154, and the bathroom sink 147 are attached to the two level extendable housing 32 within the lower space 41 of the housing 32 so that the assembly 151, cabinet 154 and sink 147 are displaced away from the toilet closet 144 and shower 146 when the housing 32 is placed into the deployed configuration (FIG. 2B). To accommodate movement of the sink 147 with respect to the frame 34, the sink 147 includes a known flexible hose assembly that communicates a faucet of the sink 147 with a fresh water reservoir and communicates a drain of the sink 147 with a waste water reservoir in a manner known in the art.

As shown in FIGS. 2A and 2B, the foldable wardrobe assembly 151 comprises a stationary cabinet 148 that is fixedly mounted to the two level extendable housing 32 within the lower space 41 of the housing 32, and a movable cabinet 150 which is pivotally mounted to the stationary cabinet by way of a hinge 149 so that the rotational axis of the hinge 149 is aligned in a vertical direction. As shown in FIG. 2B, the stationary cabinet 148 includes a front side 137 and an inboard side 138 and the movable cabinet 150 includes a front side 139, an outboard side 141, an inboard side 143, and a rear side 142, wherein the front and rear sides 139 and 142 are wider than the inboard and outboard sides 141 and 143. Furthermore, the hinge 149 couples with the inboard side 138 of the stationary cabinet 148 and further couples with the movable cabinet 150 along a corner 145 that connects the front side 139 with the outboard side 141 of the movable cabinet 150.

As shown in FIG. 2A, the foldable wardrobe assembly 151 is placed into the retracted configuration by rotating the movable cabinet 150 about the hinge 149 so that the wider

front side 139 of the movable cabinet 150 is substantially aligned with the inboard side 138 of the stationary cabinet 148. As a result, the extendable housing 32 is able to be placed in the retracted configuration so that the rear side 142 of the movable cabinet 150 is flushly positioned adjacent the toilet closet 144.

As shown in FIG. 2B, when the extendable housing 32 is placed in the deployed configuration, a space is created with enables the foldable wardrobe assembly 151 to be placed into the deployed configuration. In particular, the movable cabinet 150 is rotated about the hinge 149 so that the outboard side 141 of the movable cabinet 150 substantially aligns with the inboard side 138 of the stationary cabinet 148. Thus the foldable wardrobe assembly 151 forms an elongated shape which is similar to that of known wardrobes. Moreover, the fully deployed extendable housing 32 provides sufficient room between the movable cabinet 150 and the toilet closet 144 so that a person can walk therebetween and so that a person can access the toilet closet 144.

As shown in FIG. 2B, the expanded front space 71 comprises a sleeping area 77 and a study area 79. In particular, the sleeping area 77 includes a queen sized bed 166 and an access space 165 adjacent the front vertical wall 42 of the main housing 40 that enables individuals to access the bed 166 in a convenient manner. Furthermore, the study area 79 includes a linen closet 158, a table 163, a chair 162, and a comer cabinet 164.

As shown in FIGS. 2A and 2B, the bed 166 is fixedly attached to the extendable housing 32 so that the bed 166 extends through the opening 39 of the main housing 40 when the extendable housing 32 is placed in the deployed configuration. Furthermore, the inboard end of the bed 166 is positioned under the linen closet 158 and table 163 when the extendable housing 32 is placed in the retracted configuration. Moreover, the bed 166 extends away from the linen closet 158, the table 163, and the comer cabinet 164 when the extendable housing 32 is placed in the deployed configuration so as to form a space therebetween that allows individuals to access the sleeping area 77 and study area 79.

It will be appreciated that the two level extendable housing 32 provides the trailer 30 with a more luxurious atmosphere. In particular, the expanded middle space 70 of the trailer 30 which results from the extendable housing 32 being placed in the deployed configuration provides ample room for individuals to conveniently utilize the bathroom and dressing areas 73 and 75. In contrast, travel trailers known in the art, including those having known extendable housings, typically comprise relatively small bathroom and dressing areas.

It will also be appreciated that the enlarged middle space 70 of the trailer 30 combined with the retractable nature of the foldable wardrobe assembly 151 enables the assembly 151 to be positioned outside from the sleeping area 77. Consequently, the sleeping area 77 is able to include the access space 165 so that individuals can conveniently access the bed 166. In contrast, travel trailers known in the art that utilize extendable housings typically position a wardrobe adjacent a front wall of the trailer adjacent to a sleeping area so that the space within the sleeping area is substantially reduced.

Reference will now be made to FIG. 3A-FIG. 3D which provide detailed illustrations of the actuator assembly 33 used to move the extendable housing 32. In particular, FIG. 3A is an overhead plan view of the actuator assembly 33, wherein the left side of FIG. 3A corresponds to the rear end of the actuator assembly 33 and the right side of FIG. 3A

corresponds to the front end of the actuator assembly 33. Furthermore, FIG. 3B is a side elevational view of the actuator assembly 33, wherein the left side of FIG. 3B corresponds to the rear end of the actuator assembly 33 and the right side of FIG. 3B defines the front end of the actuator assembly 33. Moreover, FIG. 3C is a front elevational view of the actuator assembly 33. Additionally, FIG. 3D is a side elevational view of a torque transfer assembly 172 of the actuator assembly 33 from the perspective of an observer who is looking along the elongated axis of a rear horizontal shaft 176a.

As shown in FIGS. 3A-3C, the actuator assembly 33 is comprised of a rear rail assembly 170a, a front rail assembly 170b, and a drive assembly 171 interposed therebetween, wherein the front rail assembly 170b is elevated above the rear rail assembly 170a. As best shown in FIGS. 3A and 3C, the rear rail assembly 170 is comprised of a rear fixed support guide 108a and the rear horizontal slidable rail 106a that extends from the support guide 108a in a telescoping manner. Specifically, the rail 106a is adapted to slidably extend from an elongated channel formed within the support guide 108a so that the motion of the rail 106a is restricted to be along the elongated channel of the support guide 108a. Furthermore, a substantial portion of the slidable rail 106a will always remain within the support guide 108a so as to enable the rail 106a to function as a cantilever as will be described in greater detail below.

As shown in FIGS. 3A-3C, the front rail assembly 170b is substantially similar to the rear rail assembly 170a and is positioned so as to be elevated above the rear rail assembly 170a. As best shown in FIGS. 3A and 3C, the front rail assembly 170b is comprised of a front fixed support guide 108b and the front horizontal slidable rail 106b that extends from the support guide 108b in a telescoping manner. Specifically, the rail 106b is adapted to slidably extend from an elongated channel formed within the support guide 108b so that the motion of the rail 106b is restricted to be along the elongated channel of the support guide 108b. Furthermore, a substantial portion of the slidable rail 106b will always remain within the support guide 108b so as to enable the rail 106b to function as a cantilever as will be described in greater detail below.

As shown in FIGS. 3A and 3C, the front and rear rail assemblies 170a and 170b are preferably positioned so that the support guides 108a and 108b are aligned in a parallel manner and so that the outboard ends of the support guides 108a and 108b are both positioned in a common plane which is perpendicular to the elongated axis of both the support guides 108a and 108b. Furthermore, the rear slidable rail 106a is adapted with a plurality of uniformly spaced rack grooves 173a along a lower surface of the rail 106a that enable the slidable rail 106a to form a portion of a rear rack and pinion assembly 182a. Similarly, the front slidable rail 106b is adapted with a plurality of uniformly spaced rack grooves 173b along a lower surface of the rail 106b that are substantially similar to the grooves 173a of the rear rail 106a that enable the slidable rail 106b to form a portion of a front rack and pinion assembly 182b that is substantially similar to the rear rack and pinion assembly 182a.

As schematically shown in FIGS. 3A and 3B, the drive assembly 171 of the actuator assembly 33 is comprised of a rear pinion 175a, a rear horizontal shaft 176a, the torque transfer assembly 172, a front horizontal shaft 176b, a front pinion 175b which is substantially similar to the rear pinion 175a, and an electric motor 183. In particular, the rear pinion 175a is fixedly attached at a rear end of the rear horizontal shaft 176a and the front pinion 175b is fixedly attached at a



front end of the front horizontal shaft 176b. Furthermore, the rear and front horizontal shafts 176a and 176b are rotatably mounted so that the rotational axes of the front and rear shaft 176a are parallel to each other and both lie in a substantially common vertical plane. Moreover, the rear horizontal shaft 176a is positioned so that the rear pinion 175a engages with the plurality of rack grooves 173a of the rear slidable rail 106a so as to form the rear rack and pinion assembly 182a. Additionally, the front horizontal shaft 176b is positioned so that the front pinion 175b engages with the plurality of rack grooves 173b of the front slidable rail 106b so as to form the front rack and pinion assembly 182b.

As schematically shown in FIGS. 3A and 3B, torque transfer assembly 172 couples the rear shaft 176a with the front shaft 176b so that a torque applied by the rear shaft 176a will be transferred to the front shaft 176b. In particular, the front end of the rear shaft 176a attaches to a descending portion of the torque transfer assembly 172 and a rear end of the front shaft 176b attaches to an ascending portion of the torque transfer assembly 172.

As shown in FIG. 3D, the preferred embodiment of the torque transfer assembly 172 comprises a lower gear 177a, an upper gear 177b, and a flexible chain 178 having a closed end. In particular, the front end of the rear shaft 176a is fixedly attached to the lower gear 177a in a conventional manner and the rear end of the front shaft 176b is fixedly attached to the upper gear 177b in a conventional manner. Furthermore, the lower and upper gears 177a and 177b are aligned in a common vertical plane and the appropriately sized chain 178 is positioned to surround the lower and upper gears 177a and 177b so that the chain 178 engages with both the lower and upper gears 177a and 177b. Consequently, when a torque is applied by the rear shaft 176a onto the lower gear 177a, the tension of the chain 178 will increase in an asymmetrical manner so that a torque is transferred to the upper gear 177b and front shaft 176b. Moreover, the diameters of the lower and upper gears 177a and 177b are substantially equal so that the rear shaft 176a and the front shaft 176b always have the same angular velocity.

As shown in FIGS. 3A and 3B, the electric motor 183 of the drive assembly 171 of the actuator assembly 33 couples with the rear shaft 176a of the drive assembly 171 in a well known manner so as to enable the electric motor 183 to activate the drive assembly 171. In particular, when electric current is passed through the electric motor 183, the electric motor 183 generates a torque which causes the rear and front shafts 176a and 176b to rotate at a substantially equal angular velocity. Consequently, the rear and front rack and pinion assemblies 182a and 182b will operate in a substantially identical manner so that the rear and front slidable rails 106a and 106b will both travel with the same linear velocity.

It will be appreciated that the actuator assembly 33 provides an effective means for moving the extendable housing 32. In particular, the electric motor 183 couples with the rear shaft 176a, thereby providing the rear shaft 176a with a torque that induces the rear shaft 176a and the rear pinion 175a into a state of rotation. Thus, since the rear pinion 175a is positioned so as to engage the rack grooves 173a of the rear slidable rail 106a, the rotating rear pinion 175a will induce the slidable rail 106a to move in a lateral manner.

Furthermore, the rear shaft 176a will provide the torque transfer assembly 172 with a torque so as to rotate the front shaft 176b. In particular, since the rear shaft 176a is coupled with the lower gear 177a of the torque transfer assembly

172, the rear shaft 176a applies a torque onto the lower gear 177a, thereby causing the chain 178 of the torque transfer assembly 172 to experience an asymmetrical tension. Thus, the chain 178 applies a torque onto the upper gear 177b which transfers the torque to the front shaft 176b, thereby inducing the shaft 176b and, consequently, the front pinion 175b into a state of rotation. Moreover, since the front and rear rack and pinion assemblies 182a and 182b are substantially identical to each other and since the lower and upper gears 177a and 177b are substantially identical to each other, the rotating front pinion 175b will induce the front slidable rail 106b into a state of motion that is substantially identical to the state of motion of the rear slidable rail 106a.

Consequently, since the rear and front slidable rails 106a and 106b are coupled with the extendable housing 32 in a manner that will be described in greater detail below, the synchronous movement of the rear and front slidable rails 106a and 106b will move the extendable housing 32 in an aligned manner. In particular, the synchronous movement of the rear and front slidable rails 106a and 106b will induce movement of the extendable housing so that the outboard wall 54 of the extendable housing 32 will tend to align with a plane which is parallel to the plane of the left side wall 46 of the main housing 40. Therefore, it is unlikely that the extendable housing 32 will become immobilized with respect to the frame 34 of the trailer 30 due to improper alignment between the extendable housing 32 and the main housing 40.

Reference will now be made to FIGS. 4A and 4B which illustrate the recreational travel trailer 30 in greater detail. In particular, FIG. 4A is a side elevational view of the trailer 30 of FIG. 1. Furthermore, FIG. 4B is a front elevational view of the trailer 30 of FIG. 1, wherein the extendable housing 32 is illustrated in the deployed configuration.

As shown in FIG. 4A, the actuator assembly 33 is mounted within the frame 34 of the trailer 30. In particular, the rear rail assembly 170a, the rear rack and pinion assembly 182a, and the rear horizontal shaft 176a of the actuator assembly 33 are positioned within the middle platform 63 of the frame 34 so that the rear horizontal shaft 176a is positioned in a substantially longitudinal manner and so that the rear rail assembly 170a is positioned in a lateral manner. Furthermore, the torque transfer assembly 172 of the actuator assembly 33 is positioned within the front vertical riser 61 of the frame 34. Moreover, the front horizontal shaft 176b, the front rack and pinion assembly 182b, and the front rail assembly 170b of the actuator assembly 33 are positioned within the front platform 65 of the frame 34 so that the front horizontal shaft 176b is positioned in a substantially longitudinal manner and so that the front rail assembly 170b is positioned in a lateral manner.

As shown in FIG. 4A, the rear and front horizontal slidable rails 106a and 106b of the actuator assembly 33, which are used to move the extendable housing 32 between the retracted and deployed configurations, are adapted to extend from the frame 34 of the trailer 30. In particular, the frame 34 includes a rear opening 107a at an outboard edge of the middle platform 63 adjacent the rear end of the middle platform 63 that enables the rear slidable rail 106a of the rear rail assembly 170a to extend from the frame 34 in a lateral manner. Similarly, the frame 34 includes a front opening 107b at an outboard edge of the front platform 65 adjacent the front end of the front platform 65 that enables the front slidable rail 106b of the front rail assembly 170b to extend from the frame 34 in a lateral manner.

As shown in FIGS. 4A and 4B, the actuator assembly 33 is positioned underneath the extendable housing 32 and the

15

middle and front lower horizontal walls 57 and 68 of the trailer 30. In particular, the rear rail assembly 170a is positioned beneath the rear lower wall 92 of the extendable housing 32 and the front rail assembly 170b is positioned beneath the front lower wall 94 of the extendable housing 32. As will be described in greater detail below, the slidable rails 106a and 106b respectively couple with the rear lower wall 92 and the front lower wall 94 so as to enable the actuator assembly 33 to move the extendable housing 32 between the retracted and deployed configurations.

As shown in FIG. 4B, the lower floor 98 of the extendable housing 32 is vertically aligned with the middle floor 62 of the main housing 40 in a substantial manner and is adapted to travel across the middle floor 62 during movement of the extendable housing in a non-sliding manner. In the preferred embodiment, a known roller assembly 110 having a low profile is mounted to a lower surface 111 of the lower horizontal wall 92 of the extendable housing 32 adjacent the inboard edge of the lower horizontal wall 92 so as to be interposed between the lower surface 111 of the lower horizontal wall 92 and the middle floor 62 of the main housing 40 in a flush manner. Thus, when the extendable housing 32 is moved in a lateral manner, the roller assembly 110 will roll across the middle floor 62 so that the extendable housing 32 can be moved with a relatively small lateral force.

As shown in FIG. 4B, the preferred embodiment of the trailer 30 comprises the upper floor 102 of the extendable housing 32 that is substantially elevated above the front floor 66 of the main housing 40. In particular, this enables the outboard end of the bed 166 to be positioned directly on the upper floor 102 so that the inboard end of the bed 166 is sufficiently elevated above the front floor 66 of the main housing 40 so as to enable individuals to conveniently access the bed 166. However, it will be appreciated that, in another embodiment, the upper floor 102 of the extendable housing 32 could be adapted to align with the upper floor 66 of the main housing 40.

As shown in FIG. 4B, the inboard end of the bed 166 is supported by an inboard bed support 112 having a known roller assembly 113. In particular, the inboard bed support 112 is positioned beneath the inboard end of the bed so as to support the bed 166 as well as individuals who are sleeping on the bed 166. Furthermore, the roller assembly 113 is attached to a lower surface of the inboard bed support 112 so that the roller assembly 113 is flushly interposed between the inboard bed support 112 and the front floor 66 of the main housing 40. Thus, when the bed 166 is moved along with the extendable housing 32, the roller assembly 113 of the inboard bed support 112 will roll along the front floor 66 of the main housing 40 so as to reduce the lateral force that is required to move the extendable housing 32.

As shown in FIG. 4B, the rear and front rail assemblies 170a and 170b of the actuator assembly 33 are laterally mounted to the frame 34 of the trailer 30. In particular, the rear support guide 108a of the rear rail assembly 170a is laterally mounted within the middle platform 63 so that the slidable rail 106a can extend from the trailer 30 in a lateral manner and be supported by the rear support guide 108a. Furthermore, the front support guide 108b of the front rail assembly 170b is laterally mounted within the front platform 65 so that the slidable rail 106b can extend from the trailer 30 in a lateral manner and be supported by the front support guide 108b.

As shown in FIG. 4B, the slidable rails 106a and 106b engage with the extendable housing 32 so that they can

16

maneuver and support the extendable housing 32. In particular, the rear and front slidable rails 106a and 106b laterally extend from the frame 34 of the trailer 30 so that the outboard ends of the rails 106a and 106b are substantially adjacent the outboard vertical wall 84 of the extendable housing 32. Furthermore, the upwardly extending bracket 104a connects the outboard end of the rear rail 106a with the rear lower horizontal wall 92 of the extendable housing 32 so that the rear rail assembly 170a can move the extending housing 32 and so that the rear slidable rail 106a of the rear rail assembly 170a can cantilever the extendable housing 32 in the deployed configuration. Moreover, the upwardly extending bracket 104b attaches the outboard end of the front rail 106b with the front lower horizontal wall 94 of the extendable housing 32 so that the front rail assembly 170b can move the extending housing 32 and so that the front slidable rail 106b of the front rail assembly 170b can cantilever the extendable housing 32 in the deployed configuration.

It will be appreciated that the two level extendable housing 32 of the trailer 30 extends across two floor levels of the trailer 30. Thus, the supplemental living space 35 formed within the extendable housing 32 is substantially greater than the supplemental living space of similarly positioned extendable housings of travel trailers known in the art. Consequently, the extendable housing 32 is able to encompass the bathroom area 73 as well as the sleeping area 77, so as to provide both of these areas with greater space.

It will also be appreciated that the actuator assembly 33 enables the extendable housing 32 to be maneuvered between the deployed and retracted configurations in a desirable manner. In particular, the vertically offset slidable rails 106a and 106b are adapted to respectively move the rear and front ends of the extendable housing 32 in a synchronous manner so as to maintain the extendable housing 32 in an aligned state with respect to the main housing 40.

It will also be appreciated that the actuator assembly can be manufactured at a relatively low cost. In particular, the components of the actuator assembly 33 can be readily fabricated and installed within the frame 34 of the trailer 32 using relatively simple installation techniques known in the art.

Although the preferred embodiment of the present invention has shown, described and pointed out the fundamental novel features of the invention as applied to this embodiment, it will be understood that various omissions, substitutions and changes in the form of the detail of the device illustrated may be made by those skilled in the art without departing from the spirit of the present invention. Consequently, the scope of the invention should not be limited to the foregoing description, but should be defined by the appending claims.

What is claimed is:

1. A travel trailer comprising:

- a frame having a first length;
- a set of wheels attached to the frame to permit rolling movement of the trailer over the ground;
- a floor attached to the frame, wherein the floor defines the inner living space of the trailer and wherein the floor has a first vertical level positioned at a first height above the ground and a second vertical level positioned at a second height above the ground;
- a plurality of walls mounted on the floor so as to enclose the inner living space of the trailer wherein the inner living space defines a bedroom with a bed, a bathroom and a living room; and

17

a pop-out assembly attached to a first wall of the plurality of walls of the trailer, the pop out assembly including a floor having a first and a second level and a plurality of walls mounted at the outer edges of the floor, wherein the first and second level of the floor of the pop-out are respectively positioned adjacent the first and second vertical levels of the floor of the trailer attached to the frame wherein the pop-out assembly is movable between a first position such that an outer wall of the plurality of walls of the pop-out assembly is positioned adjacent the first wall and a second position wherein the pop-out assembly is extended outward from the first wall wherein the pop-out assembly in the second position expands the inner living space of the bathroom and at least one of the bedroom or the living room such that the inner living space of the trailer can be expanded to a desired maximum area so that the desired maximum area can be obtained while shortening the required length of the frame.

2. The travel trailer of claim 1, further comprising a movement mechanism coupled with the pop-out assembly so as to be able to move the pop-out assembly between the first position and the second position.

3. The travel trailer of claim 2, wherein the movement mechanism is comprised of at least one lineal actuator attached to the pop out assembly that is movable between a retracted and an extended position.

4. The travel trailer of claim 3, wherein the movement mechanism further comprises a means for moving the linear actuator between the retracted and the extended position.

5. The travel trailer of claim 4, wherein the movement mechanism comprises:

- a first rail attached to a first end of the pop-out assembly, wherein the first rail is movable between a retracted and an extended position;
- a second rail attached to a second end of the pop-out assembly, wherein the second rail is movable between a retracted and an extended position;
- a motor which is coupled with the first rail so as to be able to move the first rail between the retracted and extended position; and
- a linkage assembly that links the first and second rail so as to ensure that the first and second rail move between the retracted and the extended position simultaneously at the same rate.

6. The travel trailer of claim 5, wherein the linkage assembly comprises:

- a first shaft member mounted to the trailer assembly so as to extend generally horizontally at a first height above the ground so as to be rotatable wherein the first shaft member is attached to the first rail so that rotation of the first shaft member results in corresponding movement of the first rail between the retracted and the extended position;
- a second shaft member mounted to the trailer assembly so as to extend generally at a second height above the ground and so as to be rotatable wherein the second shaft member is attached to the second rail so that rotation of the second shaft member results in movement of the second rail between the retracted and extended position;
- a vertical linkage mechanism that is coupled to the first and second shaft members so that rotational movement of the first shaft member results in corresponding rotational movement of the second shaft member.

18

7. The travel trailer of claim 6, wherein the vertical linkage mechanism is comprised of a first sprocket attached to the first shaft member and a second sprocket attached to the end of the second shaft member and a continuous chain that is engaged with the first and second sprocket members so that rotation of the first sprocket member results in rotation of the second sprocket member.

8. The travel trailer of claim 1, wherein the travel trailer includes a main level, a first elevated level corresponding to the first vertical level and a second elevated level.

9. The travel trailer of claim 8, wherein the first elevated level comprises a bathroom and the first floor of the pop-out assembly expands the floor area of the bathroom.

10. The travel trailer of claim 9, wherein the second elevated level comprises a bedroom having a bed positioned therein, wherein the bed is mounted so that a portion of the bed is positioned within the pop-out assembly so that when the pop-out assembly is in the second position, a portion of the bed is positioned outside of the outer walls of the trailer.

11. The travel trailer of claim 1, further comprising a foldable wardrobe assembly that is positioned within the pop-out assembly so that the foldable wardrobe assembly moves with the pop-out assembly, wherein the foldable wardrobe assembly is foldable between a first orientation that enables the pop-out assembly to be moved into the first position and a second orientation wherein the foldable wardrobe extends into the pop-out assembly when the pop out assembly is in the second position.

12. The travel trailer of claim 11, wherein the foldable wardrobe comprises:

- a first cabinet attached to the pop-out assembly;
- a hinge attached to a first cabinet adjacent a first surface of the first cabinet;
- a pivoting cabinet attached to the hinge at a first surface of the first cabinet so that the pivoting cabinet can be pivoted about the hinge.

13. The travel trailer of claim 12, wherein the first surface of the pivoting cabinet is orientated so as to be substantially perpendicular to the first surface of the first cabinet when the foldable wardrobe is placed into the first orientation, and wherein the first surface of the pivoting cabinet is oriented so as to be substantially parallel with the first surface of the first cabinet when the foldable wardrobe is placed into the second orientation.

14. A travel trailer comprising:

- a frame having a first length;
- a plurality of wheels attached to the frame to permit rolling movement of the trailer over the ground;
- a multilevel floor attached to the frame, wherein the multilevel floor defines the inner living space of the trailer having a bathroom on one level of the multilevel floor and at least one bedroom and a living room on other levels of the multilevel floor and wherein the multilevel floor includes a first level positioned at a first height above the plurality of wheels and a second level positioned at a second height above the plurality of wheels;
- a main housing comprised of a plurality of walls mounted above the frame that enclose the inner living space of the trailer; and
- an extendable housing attached to a first wall of the plurality of walls of the trailer, the extendable housing including a multilevel floor having a first and a second level and a plurality of walls mounted at the outer edges of the floor, wherein the first and second level of the multilevel floor of the extendable housing are respec-

19

tively positioned adjacent the first and second levels of the multilevel floor of the trailer attached to the frame, wherein the extendable housing is movable between a retracted configuration such that an outer wall of the plurality of walls of the extendable housing is positioned adjacent the first wall and a deployed configuration wherein the extendable housing is extended outward from the first wall such that the extendable housing in the extended position increases the area of any two of the bathroom, the bedroom or the living room such that the inner living space of the trailer can be expanded to a desired maximum area so that the desired maximum area can be obtained while shortening the required length of the frame.

15. The travel trailer of claim 14, further comprising an actuator assembly coupled with the extendable housing so as to be able to move the extendable housing between the first position and the second position.

16. The travel trailer of claim 15, wherein the actuator assembly comprises:

a first rail attached to a first end of the extendable housing, wherein the first rail is movable between a retracted and an extended position;

a second rail attached to a second end of the extendable housing, wherein the second rail is movable between a retracted and an extended position;

a drive assembly that links the first rail with the second rail so as to ensure that the first rail and the second rail move between the retracted and the extended position simultaneously at the same rate; and

a motor which is coupled with the drive assembly so as to be able to move the first rail and the second rail between the retracted and extended position.

17. The travel trailer of claim 16, wherein the drive assembly comprises:

a first shaft member mounted to the travel trailer so as to extend generally horizontally at a first height above the ground so as to be rotatable, wherein the first shaft member is coupled to the first rail so that rotation of the first shaft member results in corresponding movement of the first rail between the retracted and the extended position;

a second shaft member mounted to the travel trailer so as to extend generally at a second height above the ground and so as to be rotatable wherein the second shaft member is attached to the second rail so that rotation of the second shaft member results in movement of the second rail between the retracted and extended position;

a torque transfer assembly that is coupled to the first and second shaft members so that rotational movement of the first shaft member results in corresponding rotational movement of the second shaft member.

18. The travel trailer of claim 17, wherein the torque transfer assembly is comprised of a first gear attached to the first shaft member and a second gear attached to the end of the second shaft member and a continuous chain that is engaged with the first and second gear so that rotation of the first gear results in rotation of the second gear.

19. The travel trailer of claim 14, wherein the multilevel floor includes a main level, wherein the first level and the second level are elevated above the main level.

20. The travel trailer of claim 19, wherein the first level comprises a bathroom and the first floor of the extendable housing expands the floor area of the bathroom.

21. The travel trailer of claim 20, wherein the second level comprises a bedroom having a bed positioned therein,

20

wherein the bed is mounted so that a portion of the bed is positioned within the extendable housing so that when the extendable housing is in the second position, a portion of the bed is positioned outside of the first wall of the plurality of walls of the trailer.

22. The travel trailer of claim 14, further comprising a foldable wardrobe assembly that is positioned within the extendable housing so that the foldable wardrobe assembly moves with the extendable housing, wherein the foldable wardrobe assembly is foldable between a first orientation that reduces the width of the foldable wardrobe assembly so as to enable the extendable housing to be moved into the retracted configuration and a second orientation wherein the foldable wardrobe extends into the pop-out assembly when the pop out assembly is in the second position.

23. The travel trailer of claim 22, wherein the foldable wardrobe comprises:

a first cabinet attached to the extendable housing;

a hinge attached to the first cabinet adjacent a first surface of the first cabinet; and

a pivoting cabinet attached to the hinge at a first surface of the first cabinet so that the pivoting cabinet can be pivoted about the hinge.

24. The travel trailer of claim 23, wherein the first surface of the pivoting cabinet is oriented so as to be substantially perpendicular to the first surface of the first cabinet when the foldable wardrobe is placed in the first orientation, and wherein the first surface of the pivoting cabinet is oriented so as to be substantially parallel with the first surface of the first cabinet when the foldable wardrobe is placed into the second orientation.

25. The travel trailer of claim 24, wherein the fixed cabinet of the foldable wardrobe is positioned on the first level of the multilevel floor of the extendable housing.

26. A recreational travel trailer that can be towed on a road by a passenger vehicle, the recreational travel trailer comprising:

a frame having a first length;

a plurality of wheels that attach to the frame so as to support the travel trailer in a state of rest and so as to support the travel trailer in a state of relative motion with respect to the road;

a main housing having a plurality of walls that form an interior living space, wherein the main housing is coupled with the frame so as to support the main housing, wherein the main housing includes a first floor and a second floor with the first floor defining a bedroom and the second floor defining a bathroom that are vertically offset from each other, wherein the plurality of walls of the main housing further includes a first wall having a first opening; and

an extendable housing having a storage configuration and a deployed configuration, wherein the extendable housing is comprised of a plurality of walls that form a supplemental living space therein, wherein the plurality of walls of the extendable housing form a first floor and a second floor, wherein the first floor and the second floor of the extendable housing are vertically offset from each other, wherein the extendable housing is positioned within the first opening of the first wall of the main housing so that the first floor of the extendable housing is positioned proximate the first floor of the main housing and so that the second floor of the extendable member is positioned proximate the second floor of the main housing, wherein the extendable housing, in the storage configuration, is positioned

21

substantially inside the housing so as to provide the travel trailer with a shape that is suitable for being towed on a public road, and wherein the extendable housing, in the deployed configuration, is positioned substantially outside the housing so as to increase the interior living space of the bedroom and the bathroom of the travel trailer such that the interior living space of the main housing and supplemental living space of the extendable housing define the living space of the trailer so that when the extendable housing is in the deployed configuration, the living space of the trailer is maximized in a manner that reduces the required length of the frame.

27. The trailer of claim 26, further comprising a movement mechanism coupled with the pop out assembly so that the pop out assembly is movable between the extended and the retracted position.

28. The travel trailer of claim 27 wherein the movement mechanism is comprised of at least one lineal actuator attached to the pop out assembly that is movable between a retracted and an extended position.

29. The travel trailer of claim 28 wherein the movement mechanism further comprises a means for moving the linear actuator between the retracted and the extended position.

30. The travel trailer of claim 29, wherein the movement mechanism comprises:

- a first rail attached to the first end of the pop out assembly, wherein the first rail is movable between a retracted and an extended position;
- a second rail attached to a second end of the pop out assembly, wherein the second rail is movable between a retracted and an extended position;
- a motor which is coupled with the first rail so as to be able to move the first rail between the retracted and the extended position;
- a linkage assembly that links the first and the second rail so as to ensure that the first and second rails move between the retracted and the extended position simultaneously at the same rate.

31. The travel trailer of claim 30, wherein the linkage assembly comprises;

- a first shaft member mounted to the trailer assembly so as to extend generally horizontally at a first height above the ground so as to be rotatable wherein the first shaft member is attached to the first rail so that movement of the first rail between the retracted and the extended position results in corresponding rotation of the first shaft member;
- a second shaft member mounted to the trailer assembly so as to extend generally at a second height above the ground and so as to be rotatable wherein the second shaft member is attached to the second rail so that rotation of the second shaft member results in movement of the second rail between the retracted and the extended position;
- a vertical linkage mechanism that is coupled to the first and second shaft members so that rotational movement of the first shaft member results in corresponding rotational movement of the second shaft member.

32. The travel trailer of claim 31, wherein the vertical linkage mechanism is comprised of a first sprocket attached to the first shaft member and a second sprocket attached to the end of the second shaft member and a continuous chain that is engaged with the first and second sprocket members so that rotation of the first sprocket member results in rotation of the second sprocket member.

22

33. A travel trailer comprising:

- a frame having a first length;
- a set of wheels attached to the frame to permit rolling movement of the trailer over the ground;
- a floor attached to the frame, wherein the floor defines the inner living space of the trailer and wherein the floor has a first vertical level positioned at a first height above the ground and a second vertical level positioned at a second height above the ground greater than the first level wherein the first vertical level defines the bathroom of the trailer and the second vertical level defines the bedroom of the trailer;
- a plurality of walls mounted on the floor so as to enclose the inner living space of the trailer; and
- a pop out assembly attached to the first wall of the plurality of walls of the trailer, the pop out assembly including a floor having a first and a second level and a plurality of walls mounted at the outer edges of the floor, wherein the pop out assembly is movable between a first position such that the outer wall of the pop out assembly is positioned adjacent the outer wall of the first wall and a second position wherein the pop out assembly is extended outward from the first wall and wherein the pop out assembly is attached to the first wall so that the first level of the pop out assembly increases the floor area of the bathroom of the trailer and wherein the second level of the pop out assembly increases the floor area of the bedroom of the trailer when the pop out assembly is in the extended position such that the inner living area of the trailer and the floor area of the pop out assembly define the overall living area of the trailer when the pop-out assembly is in the second position so that when the pop out assembly is in the second position, the overall living space of the trailer is maximized in a manner that reduces the required length of the frame of the trailer.

34. The travel trailer of claim 33, further comprising a movement mechanism coupled with the pop out assembly so that the pop out assembly is movable between the extended and the retracted position.

35. The travel trailer of claim 34, wherein the movement mechanism is comprised of at least one lineal actuator attached to the pop out assembly that is movable between a retracted and an extended position.

36. The travel trailer of claim 35, wherein the movement mechanism further comprises a means for moving the linear actuator between the retracted and the extended position.

37. The travel trailer of claim 36, further comprising a mechanism for ensuring that a first end and a second end of the pop out assembly move between the retracted and the extended state at substantially the same rate.

38. The travel trailer of claim 37, wherein the movement mechanism comprises:

- a first rail attached to the first end of the pop out assembly, wherein the first rail is movable between a retracted and an extended position;
- a second rail attached to a second end of the pop out assembly, wherein the second rail is movable between a retracted and an extended position;
- a motor which is coupled with the first rail so as to be able to move the first rail between the retracted and the extended position;
- a linkage assembly that links the first and the second rail so as to ensure that the first and second rails move between the retracted and the extended position simultaneously at the same rate.

23

39. The travel trailer of claim 33, further comprising a movable cabinet assembly that is positioned within the pop out assembly that is movable between a storage configuration and a deployed configuration.

40. The travel trailer of claim 39, wherein the movable cabinet is comprised of a foldable wardrobe assembly that is positioned within the pop-out assembly so that the foldable wardrobe assembly moves with the pop-out assembly, wherein the foldable wardrobe assembly is foldable between a first orientation that reduces the width of the foldable wardrobe assembly so as to enable the pop-out assembly to be moved into the retracted configuration and a second orientation wherein the foldable wardrobe extends into the pop-out assembly when the pop out assembly is in the second position.

41. The travel trailer of claim 40, wherein the foldable wardrobe comprises:

24

a first cabinet attached to the pop-out assembly;  
a hinge attached to the first cabinet adjacent a first surface of the first cabinet; and

a pivoting cabinet attached to the hinge at a first surface of the first cabinet so that the pivoting cabinet can be pivoted about the hinge.

42. The travel trailer of claim 41, wherein the first surface of the pivoting cabinet is oriented so as to be substantially perpendicular to the first surface of the first cabinet when the foldable wardrobe is placed in the first orientation, and wherein the first surface of the pivoting cabinet is oriented so as to be substantially parallel with the first surface of the first cabinet when the foldable wardrobe is placed into the second orientation.

\* \* \* \* \*

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 6,170,903 B1  
DATED : January 9, 2001  
INVENTOR(S) : Johnnie Robert Crean

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 17,

Line 29, please change "moveing" to -- moving --.

Column 21,

Line 37, please change "fist" to -- first --.

Column 22,

Line 65, please change "fist" to -- first --.

Signed and Sealed this

Fourth Day of December, 2001

Attest:

*Nicholas P. Godici*

Attesting Officer

NICHOLAS P. GODICI  
Acting Director of the United States Patent and Trademark Office

# Tab Y





US005746473A

# United States Patent [19] Crean

[11] Patent Number: 5,746,473  
[45] Date of Patent: May 5, 1998

- [54] TRAVEL TRAILER CHASSIS
- [75] Inventor: Johnnie Robert Crean, Chino, Calif.
- [73] Assignee: Alfa Leisure, Inc., Chino, Calif.
- [21] Appl. No.: 476,436
- [22] Filed: Jun. 7, 1995
- [51] Int. Cl.<sup>6</sup> ..... B60R 11/00
- [52] U.S. CL ..... 296/181; 296/168
- [58] Field of Search ..... 296/168, 24.1,  
296/178, 181, 182, 208, 37.1, 37.6, 156

4,957,323 9/1990 Johnson ..... 296/37.1 X  
4,974,899 12/1990 Sargent ..... 296/24.1 X

Primary Examiner—Joseph D. Pape  
Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP

### [57] ABSTRACT

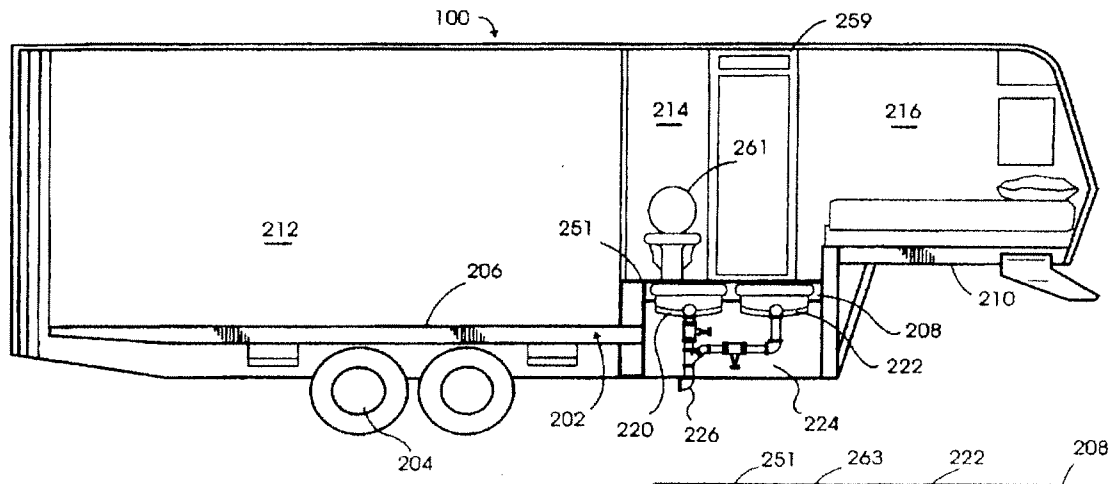
An improved travel trailer chassis that has a main section, which is connected to the axles of the wheels, a first elevated section that is connected to a forward end of the main section and is elevated above the main section and a second elevated section that is connected to a forward end of the first elevated section and is elevated above the first elevated section. The first elevated section is configured to receive a floor and fixtures to support a bathroom. A trunk space for storage is defined by a floor that extends forward from the main section of the chassis underneath the first elevated section of the chassis. One or more sewage tanks are mounted to the first elevated section of the chassis immediately beneath and substantially adjacent the floor of the bathroom supporting the fixtures. A drain assembly extends through the trunk space to an exhaust positioned outside of the trailer. The controls of the drain assembly are advantageously located within the trunk space at an elevated position above the ground.

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37 Claims, 6 Drawing Sheets



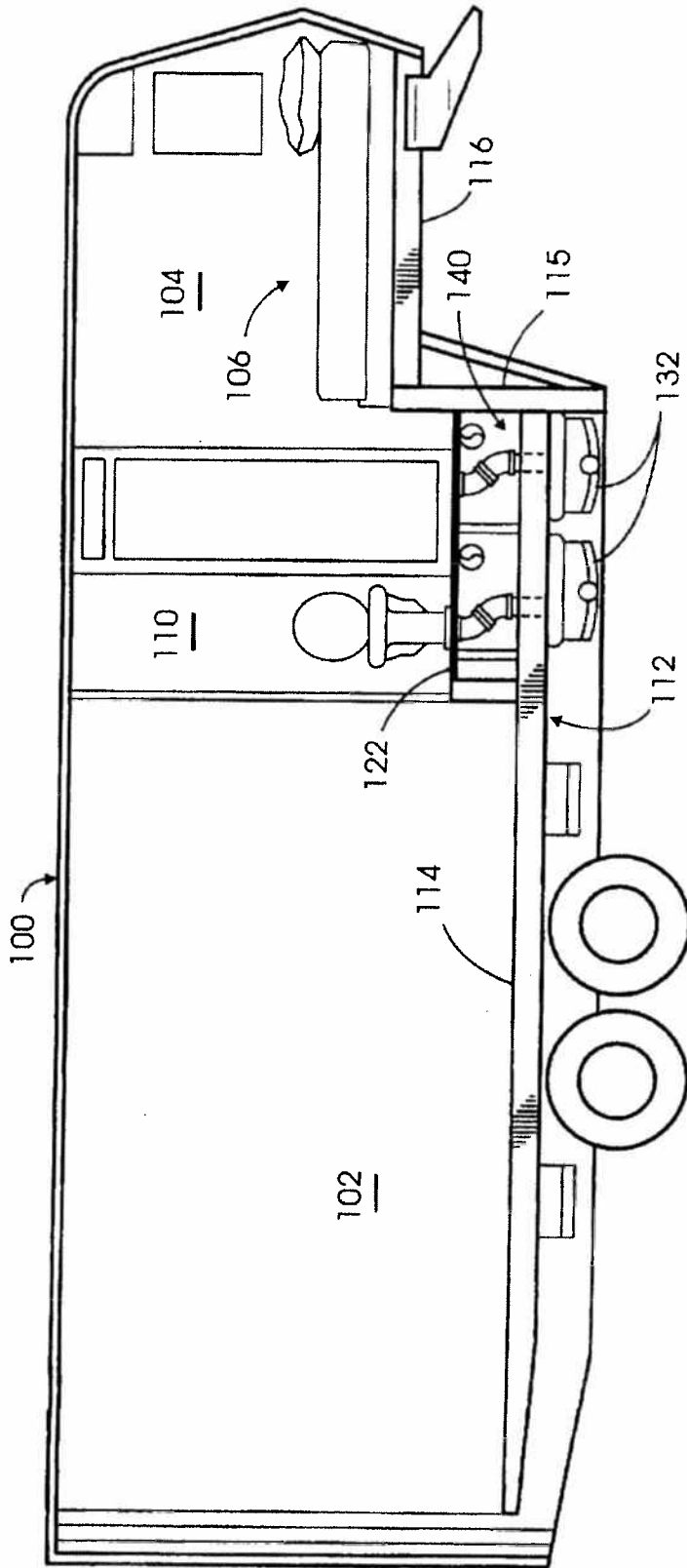


FIGURE 1A (PRIOR ART)

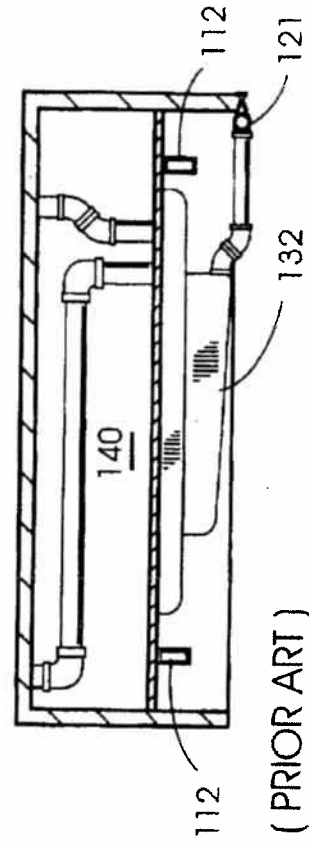
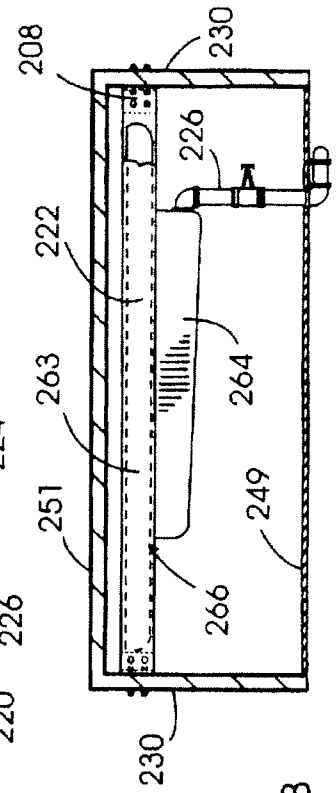
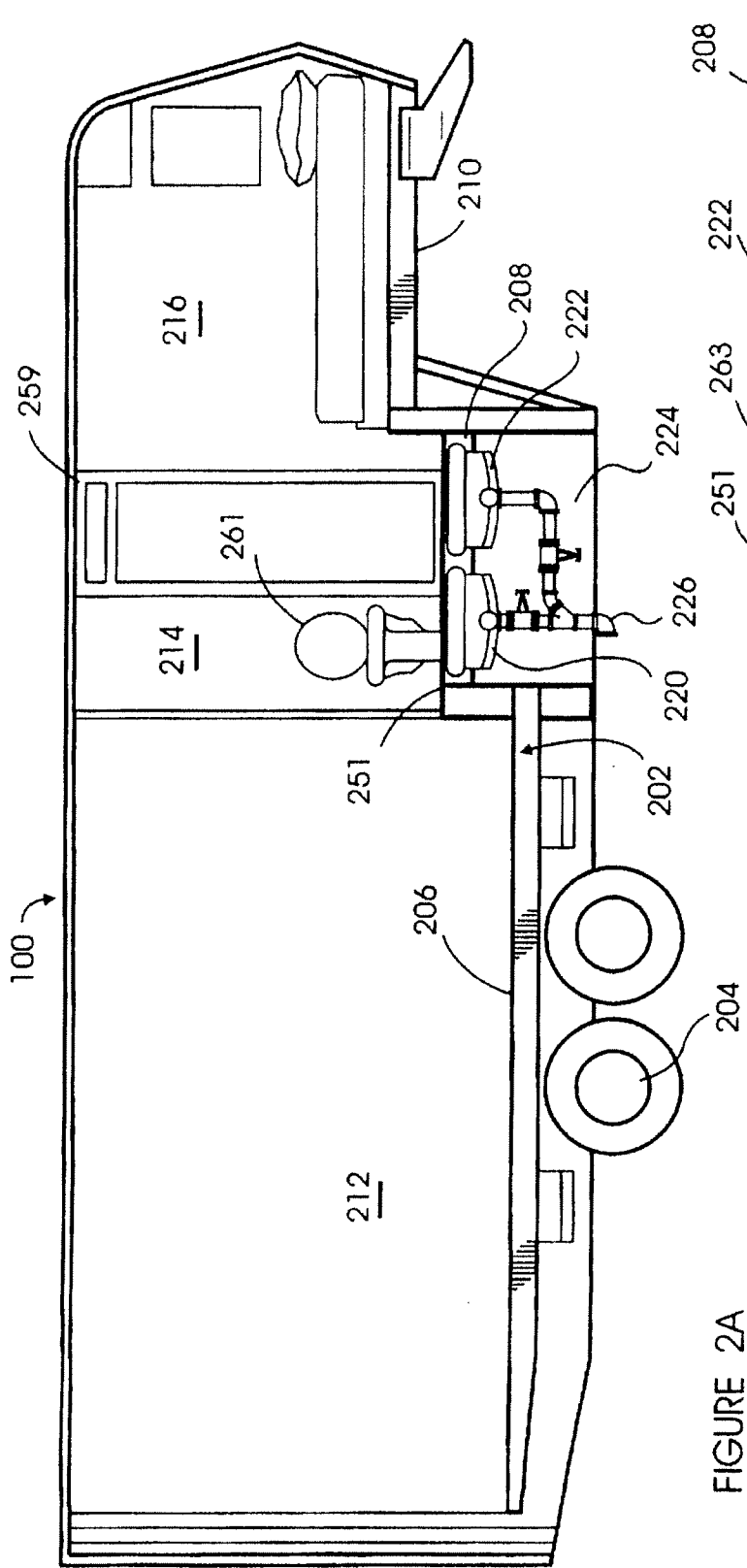


FIGURE 1B (PRIOR ART)



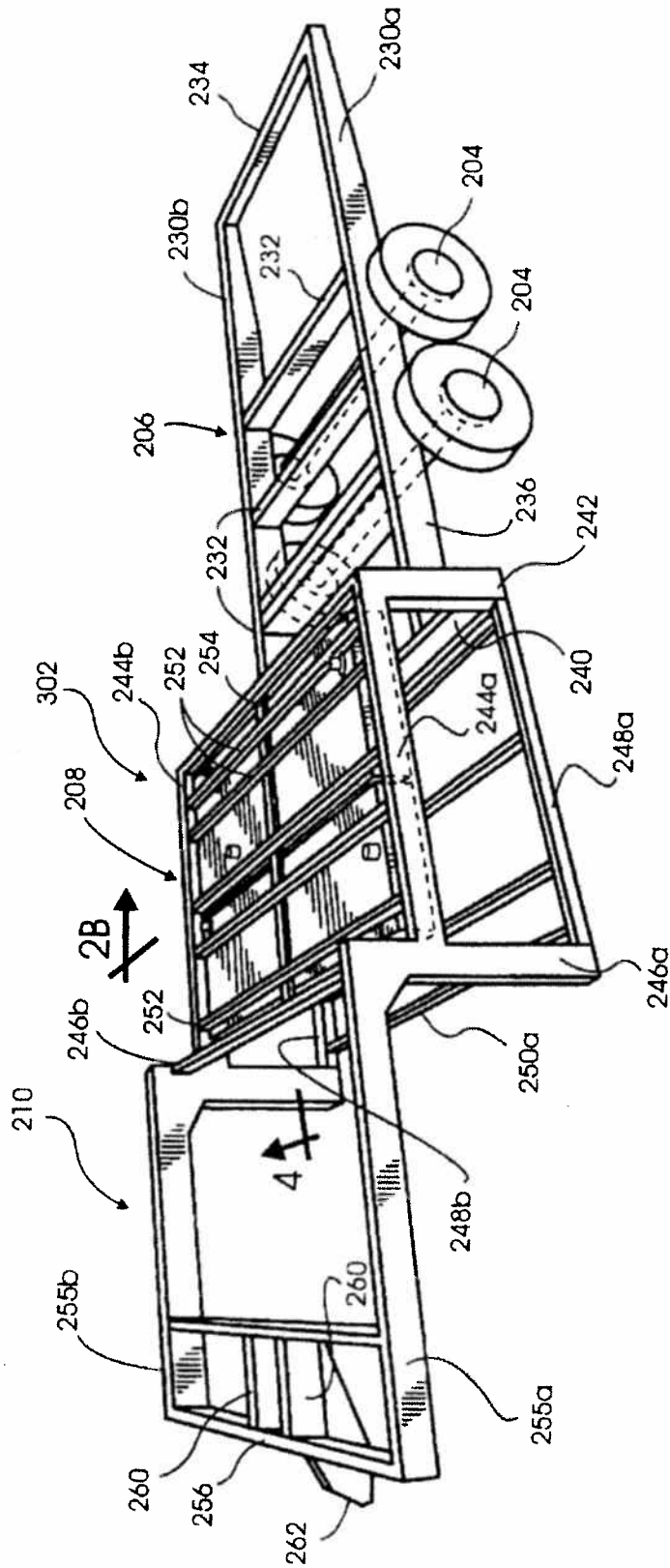


FIGURE 3

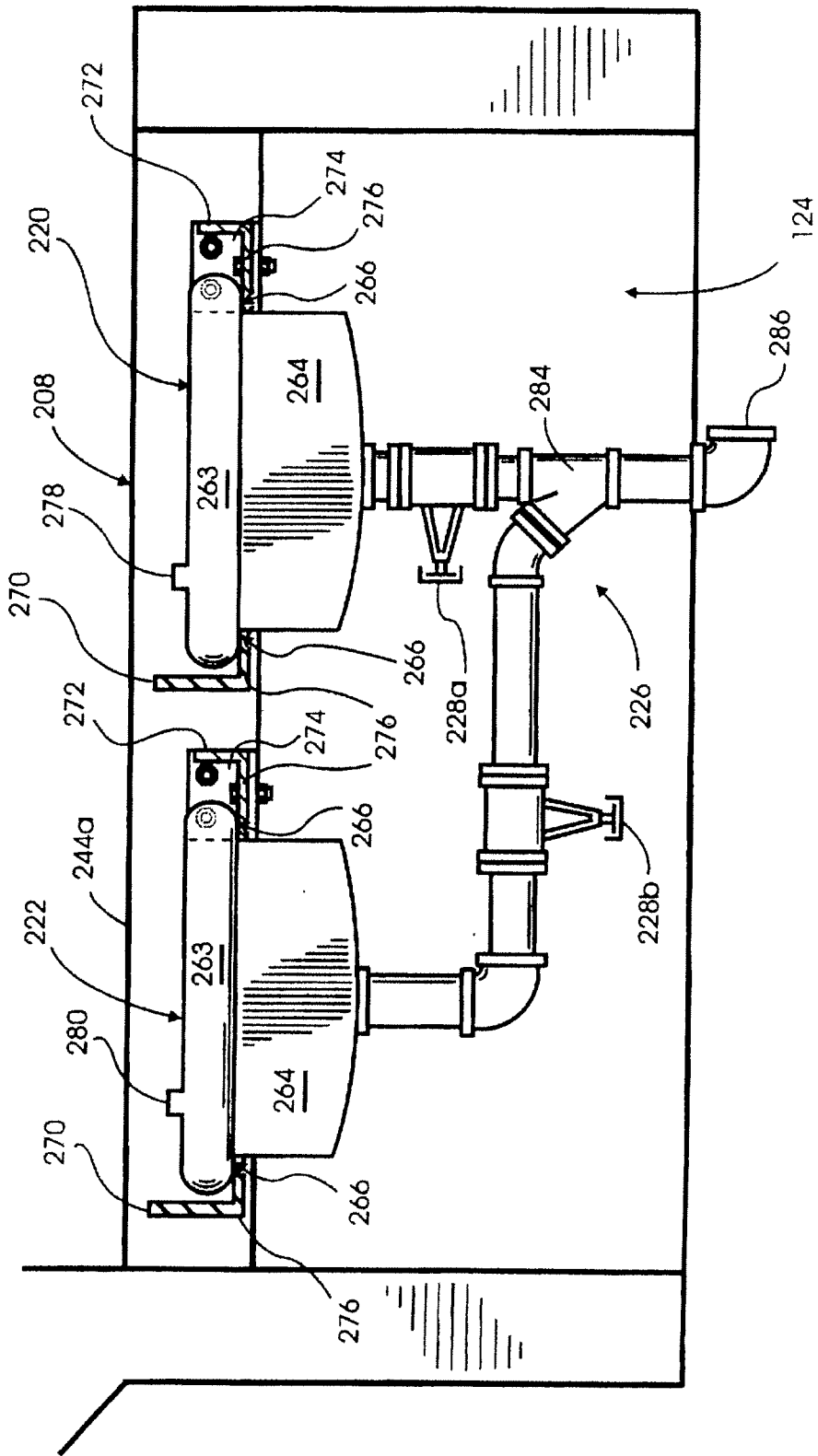


FIGURE 4

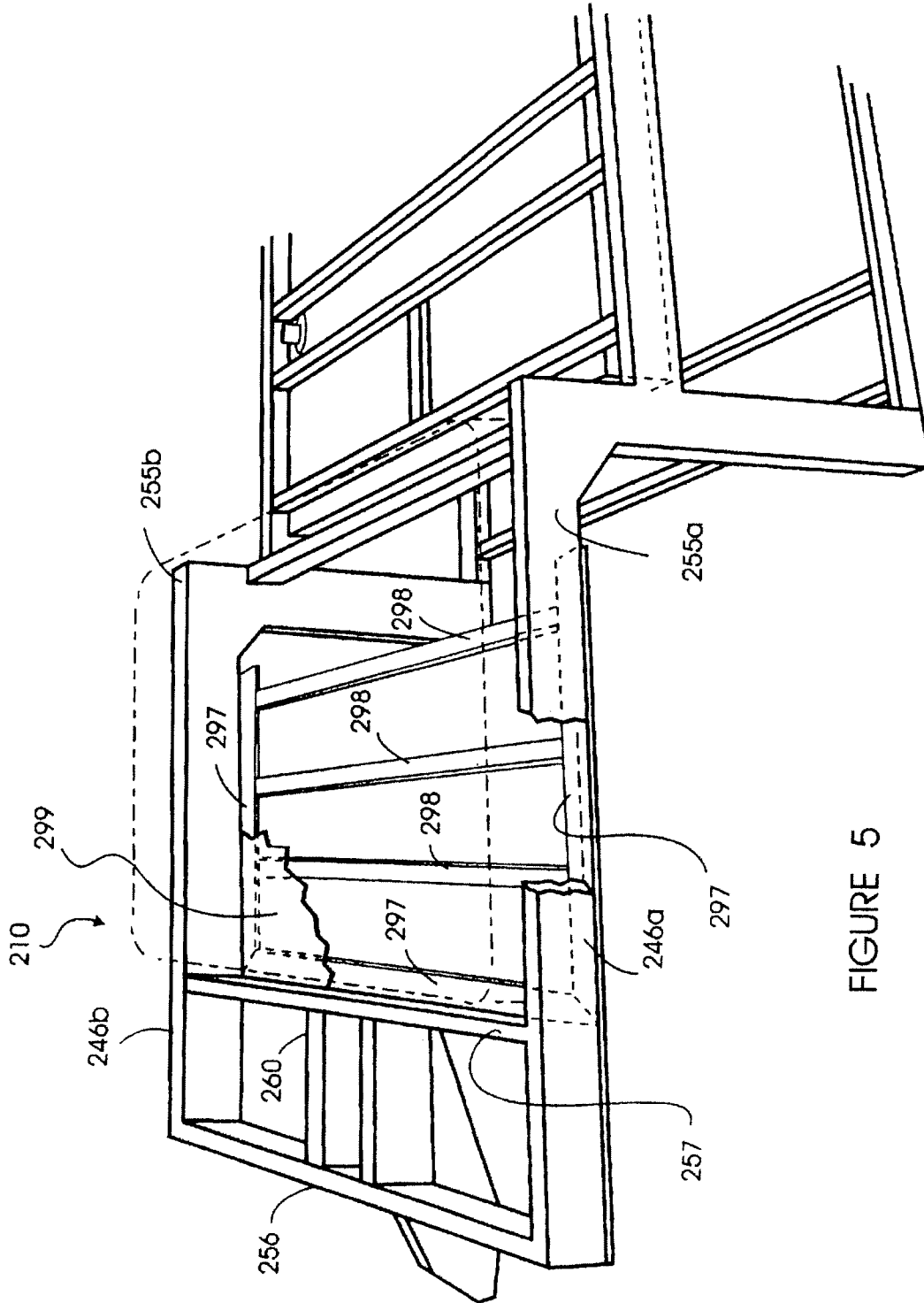


FIGURE 5

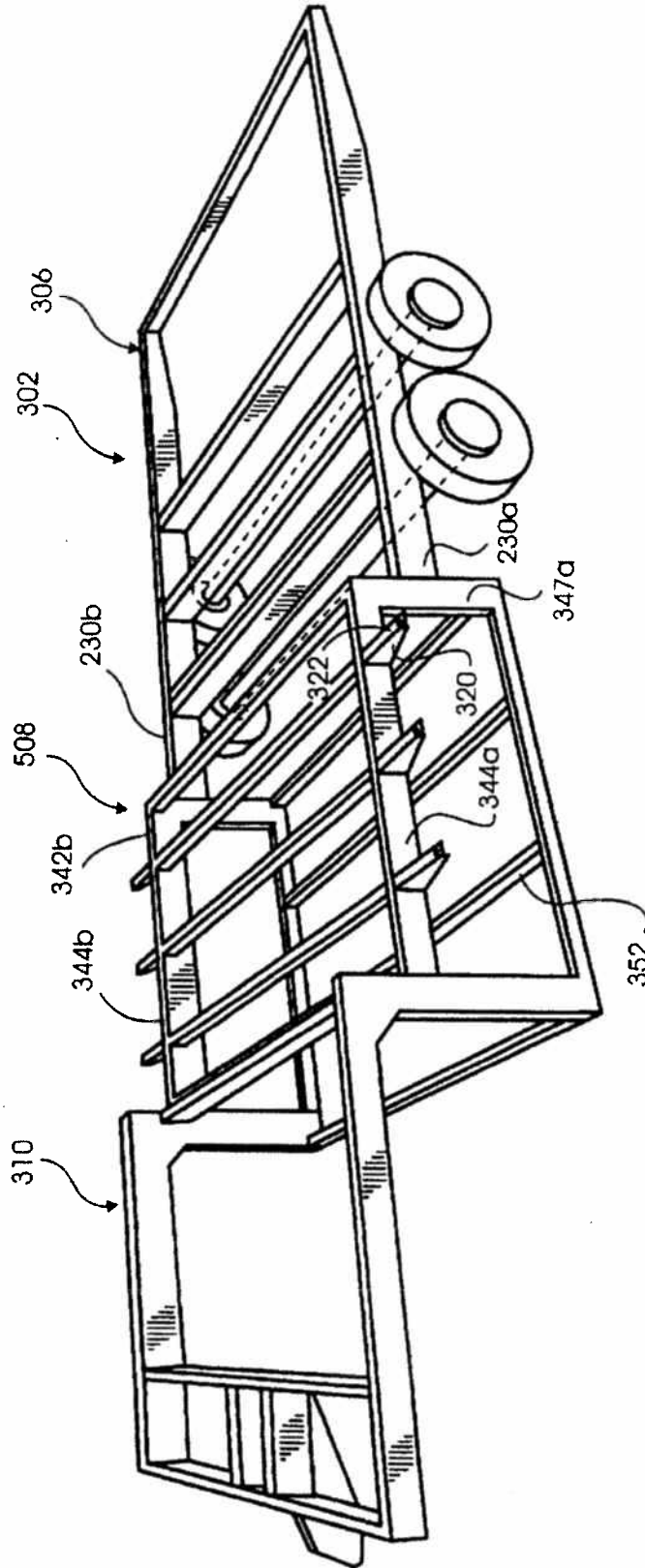


FIGURE 6

## TRAVEL TRAILER CHASSIS

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The present invention relates to travel trailers and, in particular, concerns an improved chassis for travel trailers which provides better positioning for sewage tanks and allows for a trailer construction that makes more efficient use of storage space.

## 2. Description of the Related Art

Travel trailers are towed vehicles that have been outfitted with some or all of the facilities of a home for the convenience of the traveller. These types of trailers have become very popular throughout the world in the last several decades. One relatively recent innovation in travel trailers is the "fifth wheel" trailer wherein the forward section of the trailer is elevated and the hitch mechanism is mounted on the bottom side of the elevated section of the trailer. The hitch mechanism is typically attached to a towing apparatus mounted in the bed of a pickup truck. A cross-sectional view of a typical fifth wheel trailer is illustrated in FIG. 1A. The fifth wheel trailer configuration allows the towing vehicle to tow a generally larger trailer.

As shown in FIG. 1A, the typical fifth wheel travel trailer 100 has a main level 102 and an elevated level 104. The elevated level 104 typically contains a bedroom 106 and the main level 102 contains eating facilities and the like (not shown). Generally, a bathroom 110 is interposed between the bedroom 106 and the main level 104. In the typical prior art fifth wheel travel trailer, the trailer is supported on a two-level chassis 112. The chassis 112 includes a main section 114, an elevated section 116 and an interconnecting vertical section 115. The main level 102 of the trailer is built on top of the main section 114 of the chassis and the elevated level 104 is built on top of the elevated section 116 of the chassis 112.

In the typical prior art trailer 100, the bathroom 110 is positioned on a floor 122 that is built up and supported above the main section 114 of the trailer chassis 112 in a position substantially adjacent the elevated level 104 of the trailer 100. Generally, one or more sewage storage tanks 132 are mounted on the chassis 112 underneath the bathroom 110. As shown in FIG. 1B, in the typical prior art fifth wheel trailer configuration, the tanks are mounted on the main section 114 of the frame and plumbing extends from the bathroom 110 to the tanks 130, 132 through a storage space, generally referred to as a trunk space 140, that extends between the floor of the bathroom 110 and the chassis 112.

One shortcoming of this configuration is that the plumbing in the trunk space 140 limits the use of the space 140. Specifically, as illustrated in FIG. 1B, the plumbing can occupy a substantial portion of the trunk space 140 leaving the space unavailable for storage of larger items. Further, it can be appreciated that it is difficult to load heavier objects in the storage space as the storage space is elevated above the sewage tanks. It can also be appreciated that, since the sewage tanks and drains are mounted on the chassis, they are often exposed to the outside environment which can result in the contents of the tanks and drains freezing in cold weather, thereby hindering draining of the tank.

A further shortcoming of this configuration is that, since the sewage tanks are located adjacent the bottom of the trailer, a drainage control 121 (FIG. 1B) is also typically located adjacent the bottom of the chassis of the trailer. In many fifth wheel trailer configurations, a user who is drain-

ing the sewage tanks ends up having to sit in the dirt or climb underneath the trailer to manipulate the controls to drain the sewage tanks. It can be appreciated that it is generally not desirable to have to sit or crawl in the dirt surrounding a sewage dumping facility.

## SUMMARY OF THE PRESENT INVENTION

In the preferred embodiment, the main section of the chassis is mounted to the wheel axle(s) of the trailer. Forward of the main section, the chassis of the trailer has a first elevated section which is elevated above the main section. In the preferred embodiment, a second elevated section of the chassis is positioned forward of the first elevated section of the chassis and the second elevated section is elevated above the first elevated section. In the preferred embodiment, the bathroom facilities of the trailer are mounted on the first elevated section of the chassis. Further, the bedroom facilities of the trailer are mounted on the second elevated section of the chassis. This allows the tanks to be positioned adjacent the chassis of the trailer, and thus be adequately supported, and still be raised sufficiently above the ground so that the valves and controls for the tanks are readily accessible to a user. Further, since the trunk space is below the tanks, it will be easier for a user to load heavy objects into the trunk space.

A significant feature of the preferred embodiment of the present invention is that, the sewage tanks are mounted to the first elevated section of the chassis immediately underneath the floor of the bathroom. The controls for the sewage tanks are positioned within the space immediately underneath the sewage tanks. It can be appreciated that since the tanks are mounted on an elevated section of the chassis, the tank drainage valves and controls will be elevated thereby reducing the need for the user to have to climb under the trailer to access the controls of the drainage valves. Further, since the drain assembly and controls can be positioned within the enclosed trunk space, the necessity of the user contacting the ground is further reduced and the likelihood of the contents in the drain assembly freezing is also minimized.

Another feature of the invention is that the utility of the storage trunk space beneath the tanks is substantially enhanced. In the preferred embodiment of the invention, the space immediately below the first elevated section is enclosed to provide this storage facility.

In the preferred embodiment, the tanks have a low profile so that, when they are mounted underneath the floor on the chassis, they are substantially retained adjacent the chassis. The trunk space is thus generally more accessible for storage purposes as only the drainage piping and controls are positioned within the trunk space.

These and other objects and advantages of the present invention will become more fully apparent from the following description and appended claims taken in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a sectional side view of a typical prior art trailer assembly;

FIG. 1B is a sectional front detailed view of the trunk space of the prior art trailer shown in FIG. 1;

FIG. 2A is a sectional side view of the trailer assembly of the preferred embodiment;

FIG. 2B is a sectional front detailed view of the trunk space of the trailer assembly shown in FIG. 2A;



FIG. 3 is a perspective view of the chassis assembly of the trailer shown in FIG. 2A;

FIG. 4 is a partial perspective view of the chassis assembly shown in FIG. 3, illustrating the configuration of a first elevated section of the chassis configured to receive the sewage tanks;

FIG. 5 is a partial perspective view of the chassis assembly shown in FIG. 3 illustrating the configuration of a second elevated section of the chassis configured to support a floor of a bedroom of the trailer; and

FIG. 6 is an alternate embodiment of a chassis for a trailer.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made to the drawings wherein like numerals refer to like parts throughout. FIGS. 2A and 2B illustrate a preferred embodiment of an improved travel trailer 200. As shown in FIG. 2A, the travel trailer 200 includes a chassis 202 (outlined in heavy black lines) that is coupled to the axles of the wheels 204. The chassis 202 has a main section 206, a first elevated section 208 and a second elevated section 210. Preferably, the main section 206 of the chassis 202 supports the floor, walls and equipment contained within a main section 212 of the trailer 200. The main trailer section 212 preferably includes the eating and cooking facilities, various common areas and auxiliary sleeping areas (not shown). The first elevated section 208 of the chassis 202 preferably supports the floor, walls and equipment contained within a bathroom 214. The second elevated section 210 of the chassis 202 preferably supports the floor, walls and equipment contained within a bedroom 216.

In the preferred embodiment, a black-water tank 220 and a gray-water tank 222 are mounted on the first elevated section 208 of the chassis 202 in an area immediately beneath the floor of the bathroom 214. Further, the space immediately beneath the tanks 220, 222 and first elevated section 208 of the chassis 202 is enclosed to define a storage trunk 224. The storage trunk 224 is largely clear of plumbing from the tanks 220, 222 except for a drain assembly 226. As shown in FIG. 2B, the drain line assembly 226 is preferably connected to the tanks 220, 222 at substantially one end of the tanks 220, 222 to leave the majority of the space within the trunk 224 empty. This allows for material and gear to be stored within the trunk 224. Advantageously, the sidewalls 230 of the trunk 224 are preferably equipped with access covers and doors (not shown) to allow access by a user to the trunk 224.

While, in the preferred embodiment, the trunk space 224 is comprised of the entire space below the first elevated section 208 of the chassis, it can be appreciated that trunk storage spaces can also be formed by mounting boxes to the chassis of the trailer without enclosing the entire space below the first elevated section 208 of the chassis 202.

Hence, as shown in FIGS. 2a and 2b, the tanks 220, 222 are preferably mounted on a first elevated section 208 of the chassis 202 that is elevated above the main section 206 of the chassis 202. This results in one or more control valves 228 of the drain line assembly 226 also being elevated above the main level 206 of the chassis 202. It can be appreciated that, if the first elevated section 208 of the chassis 202 is sufficiently elevated, the controls 228 of the drain line 226 can be located at a convenient level for the user to manipulate the controls, e.g., within the trunk space 224 at approximately waist level.

FIG. 3 is a perspective view of the chassis assembly 202 of the trailer 200. The main trailer section 206 of the chassis

assembly 202 includes two main side chassis members 230a, 230b. The main side chassis members 230a, 230b are interconnected by a plurality of transverse members 232. The axle(s) of the trailer 200 are connected to the main side chassis members 230a, 230b in a well-known manner so that the wheels 204 allow for rolling movement of the chassis 202. The rear ends of the main side chassis members 230a, 230b are also interconnected by a rear transverse member 234.

In the preferred embodiment, the main side chassis members 230a, 230b, are made of pieces of 10-inch steel I-beam which may range in length from 12 to 30 feet. The main transverse members 232 are comprised of one or more pieces of 10-inch by 68-inch steel Z-bar. The rear transverse member 234 is preferably comprised of a piece of 3.5-inch by 68-inch steel L-bar. The main side chassis members 230a, 230b, the main transverse members 232 and the rear transverse chassis members 234 are preferably bolted and/or welded together in a well-known manner.

The main side chassis members 230a, 230b are respectively connected, at their forward ends 236, to a transverse chassis strut 240. The transverse chassis strut 240 projects outward from the main side chassis members 230a, 230b on either side of the vehicle. A first vertical chassis member 242 is connected to both of the outward ends of the transverse chassis strut 240 (one shown). The first vertical chassis members 242 each extend, in the preferred embodiment, perpendicularly upward and are respectively connected to a first end of a first elevated chassis member 244a, 244b. The first elevated chassis members 244a, b extend longitudinally along the length of the trailer 200 to define the outer dimensions of the first elevated section 208 of the trailer 200. The second ends of the first elevated chassis members 244a, b are respectively connected to two second vertical chassis members 246a, 246b.

The second vertical chassis members 246a, 246b each extend upward from the height of the first elevated section 208 to the height of the second elevated section 210 and may extend downward substantially to the height of the main section 206. Alternatively, the vertical members 246a, 246b may only extend upward and other members can be attached to the first elevated chassis members 244a, b so as to extend downwardly towards the trunk space 224 and provide a platform for jacks (not shown) to be positioned. At the bottom ends of the second vertical chassis members 246a, 246b, two longitudinal trunk support members 248a, 248b are respectively connected between the second vertical chassis members 246a, 246b and the first vertical chassis members 242. A plurality of transverse trunk support struts 250 extend between the longitudinal trunk support members 248a, 248b. Flooring material, such as sheet metal or sheets of composite material, is then attached to the trunk support members 248 and the trunk support struts 250 to form a floor 249 of the trunk 224 (shown in FIG. 2b).

Similarly, a plurality of transverse floor support struts 252 are connected to both of the first elevated chassis members 244a, 244b and a longitudinal support strut 254 is connected between the rearmost transverse support strut 252 and the forward most transverse support strut 252. Flooring material is then preferably attached to the chassis members 244a, 244b and the floor support struts 252, 254 to form a floor 251 (FIGS. 2a and 2b) of the first elevated section 208 of the trailer 200. In the preferred embodiment, a shower 259 and a toilet 261 (FIG. 2,) are then securely mounted on the floor 251 in the first elevated section 208 in a well-known manner.

In the preferred embodiment, the transverse chassis strut 240 is preferably comprised of one or more pieces of 2-inch

by 8-inch steel rectangular tubing that is 0.180 inches thick and is 88 inches long. The two first vertical chassis members 242 are preferably welded onto the transverse chassis strut 240 and are preferably comprised of 2-inch by 5-inch rectangular steel tubing that is 0.25 inches thick and is 26.5 inches long. The two first elevated chassis members 244a, 244b are preferably comprised of 2-inch by 5-inch rectangular steel tubing, 0.25 inches thick and approximately 71 inches long.

Further, in the embodiment shown in FIG. 3, the two second vertical chassis members 246a and 246b are preferably comprised of 2-inch by 5-inch rectangular steel tubing that is 0.25 inches thick. The two second vertical chassis members 246a and 246b extend downward approximately the same distance as the two first vertical chassis members 242a, 242b, i.e., to the approximate height of the main chassis section 206 of the trailer 200. The longitudinal trunk support members 248a, 248b are preferably comprised of 2 inch by 2 inch steel tubing that is 0.120 inches thick. The transverse trunk support struts 250 are preferably comprised of 2 inch by 2 inch angle iron that is 1/4 inch thick. The transverse floor support struts 252 are preferably comprised of pieces of 0.75 inch by 1.5-inch rectangular steel tubing that are 0.75 inches thick and have varying lengths.

FIG. 3 further illustrates that the chassis 202 is configured to provide support for a floor in the second elevated section 210 of the chassis 202. Specifically, two second elevated chassis members 255a, 255b are connected to the two second vertical chassis members 246a, 246b and extend horizontally forward therefrom. The second elevated section 210 of the chassis 202 includes a first transverse strut 256 which is positioned between the forward ends of the second elevated chassis members 255a, 255b. A second transverse strut 257 is also positioned between the second elevated chassis members 255a, 255b towards the forward end of the second elevated section 210 of the trailer. Further, two longitudinal struts 260 extend between the transverse struts 256, 257, at substantially the midpoint of the transverse struts 256, 257. The first and second transverse struts 256, 257 and the two longitudinal struts 260 provide structural support for a hitch assembly 262 so that the hitch assembly 262 can be used to couple the trailer 200 to a vehicle (not shown) that will pull the trailer 200.

In the preferred embodiment, the second elevated chassis members 255a, 255b are comprised of 2-inch by 5-inch rectangular steel tubing that is 0.25 inches thick and approximately 73.75 inches long. The two transverse support struts 256, 257 are preferably comprised of pieces of 2 inch by 5-inch rectangular steel tubing that is 0.25 inches thick and approximately 88.25 inches long. The two longitudinal support struts 260 are preferably included in a standard hitch attaching parts kit designed for the trailer hitch 262. The two longitudinal support struts 260 are centered about the center of the transverse support struts 256, 257 and are spaced approximately 13 inches apart.

FIG. 4 is a cross-sectional view of the first elevated section 208 of the chassis 202 which illustrates the manner in which the tanks 220, 222 are mounted on the chassis 202 in the preferred embodiment. The tanks 220, 222 are configured to have a wide upper section 263 and a lower section 264 that is narrower than the upper section 263. Hence a lip 266, which extends substantially the entire length of the tanks 220, 222 transversely across the chassis 202, is formed between the upper section 263 and the lower section 264 on either side of the lower section 264 of both the tanks 220, 222. A lengthwise view of the tanks 220, 222 is shown in FIG. 2B which further illustrates the two sections of the

tanks 220, 222. The tanks 220, 222 in the preferred embodiment are 44 gallon tanks having approximate dimensions of 4 inches by 80 inches by 11 inches and are available from Inca Plastics Corporation in Ontario, CA.

Each of the tanks 220, 222 are preferably supported underneath the floor 251 (FIG. 2b) of the first elevated section 208 of the chassis 202 by a pair of bracket members 270, 272 which are coupled to, and extend between, the first elevated chassis members 244a, 244b (see, FIG. 3). In the preferred embodiment, the bracket members 270 are welded at their ends to the first elevated chassis members 244a, 244b and the bracket members 272 are each bolted to a flange member 274 that is bolted to each of the first elevated chassis members 244a, 244b. The bracket members 270, 272 are generally L-shaped pieces of steel where a bottom surface 276 of each of the bracket members 270, 272 is configured to receive the lip 266 of the tanks 220, 222. In the preferred embodiment, the bracket are comprised of 2 inch by 2 inch angle iron that is 1/8 inch thick.

Specifically, in the preferred embodiment, the lip 266 is positioned so as to rest on the bottom surface 276 of each of the bracket members 270, 272. It can be appreciated that installation of the tanks 220, 222 is simplified by welding one of the two bracket members 270 for each tank to the first elevated chassis members 244a, 244b and then bolting the other bracket member 272 for each tank in place. For example, a first lip 266 on a first side of the tank 220 can initially be positioned on the bracket 270 while the bracket 272 is removed from the flange members 274. The opposite or second side of the tank 220 can then be lifted up and the bracket 272 can then be bolted to the flange members 274 while the tank 220 is being lifted out of the way. Subsequently, the second lip 266 on the second side of the tank can then be lowered onto the bottom surface 276 of the bolted bracket member 272. Removal of either of the tanks 220, 222 is also simplified, the bracket 272 simply has to be unbolted from the flange 274, the plumbing connected to the tank has to be disconnected and the tank can be removed.

Hence, in the preferred embodiment, each of the tanks 220, 222 are respectively supported by two bracket members 270, 272 which extend transversely across the width of the chassis 202 between the first elevated chassis members 244a, 244b. The tanks 220, 222 are, therefore, mounted adjacent the floor 251 of the first elevated section 208 of the chassis 202, i.e., adjacent the ceiling of the trunk space 224. Since, in the preferred embodiment, the first elevated section 208 contains the toilet 261 and shower 259, plumbing can be directly run from the toilet to an opening 278 in the upper surface of the upper section 263 of the black-water tank 220. Similarly, in the preferred embodiment, plumbing can be run from the shower through vented pipe fittings and the like to an opening 280 in the upper surface of the upper section 263 of the gray-water holding tank 222. In the preferred embodiment shown in FIG. 4, the tanks 220, 222 extend transversely across the chassis 202. It can be appreciated however, that the tanks 220, 222 can be mounted to extend longitudinally along the elevated section 208 of the chassis 202 by simply mounting brackets 270, 272 of an appropriate length longitudinally along this section of the chassis 202. As is generally understood in the art, the tanks 220, 222 can be mounted in such a way to allow for different bathroom configurations within the trailer 200.

It can be appreciated that, unlike the prior art, designing the chassis 202 to have the first elevated section 208, which is supported by the first elevated chassis members 244a, 244b, allows the tanks 220, 222 to be securely mounted to the chassis 202 adjacent the ceiling of the trunk 224. Hence,

the plumbing which connects the bathroom fixtures to the tanks 220, 222 does not extend into the trunk space 224 which allows for more storage inside the trunk space.

Further, as shown in FIG. 4, the only plumbing which is positioned within the trunk 224 is the drain plumbing assembly 226. The drain plumbing assembly 226 in the preferred embodiment includes a y-shaped fitting 284 that receives plumbing from both tanks 220, 222. The bottom end of the y-shaped fitting connects to an exhaust opening 286. The exhaust opening 286 is preferably positioned underneath the level of the transverse trunk support struts 250 (FIG. 3) and hence underneath the floor 249 of the trunk space 224. The exhaust opening 286 is thus preferably positioned immediately underneath the floor of the trunk 224 in a position where it is readily accessible to the user. For example, it would generally be desirable to locate the exhaust opening 286 substantially adjacent one side of the trailer 200 to allow for easy access by the user and to also maximize the available storage space within the trunk space 224 (FIG. 2B).

The drain plumbing assembly 226 is preferably valved to allow the user to selectively drain the tanks 220, 222. In the embodiment shown in FIG. 4, there is a grey-water control valve 228a on the plumbing extending from the grey-water tank 222 to the y-shaped fitting 284. Further, there is black valve 228b that is positioned on the plumbing extending from the black water tank 220 to the shaped fitting 284. In the preferred embodiment, the drain plumbing assembly 226 is comprised of plastic piping such as 3" ABS piping with accompanying valves.

It can be appreciated that, since the tanks 220, 222 are located at top of the trunk space 224, the valves 228a, 228b are positioned within the trunk space 224 and not underneath the chassis 202. In the preferred embodiment, the bottom of the main level 206 of the chassis 202 is approximately 20 inches off of the ground and the bottom of the first elevated section 208 is approximately 46 inches off of the ground. The floor 249 of the trunk space 224 is at substantially the same level as the bottom of the main section 206 of the chassis 202 and the ceiling of the trunk space 224 is at the underside of the first elevated section 208, or approximately 46 inches above the ground.

Hence, since the control valves 228a, 228b are located towards the middle of the trunk space 224, the control valves are approximately 2 to 3 feet off of the ground which makes them readily accessible to the user. The user therefore does not have to climb underneath the trailer 200 to manipulate the control valves to drain the black and gray-water tanks 220, 222 as is generally required with prior art trailers. Rather, the user simply has to open an access door (not shown) to the trunk space 224 and reach in and manipulate the valves 228a, 228b.

FIG. 5 illustrates that the second elevated section 210 of the trailer is configured to have the floor mounted towards the bottom of the second elevated chassis members 255a, 255b. Specifically, a railing 297 extends around the interior perimeter of the second elevated chassis members 255a, 255b and the rear transverse strut 257. Floor support struts 298 are then coupled to the railing 297 so as to extend transversely across the chassis 202 of the trailer. A floor 299 (partially shown) of the bedroom 216 is then built on top of the railing 297 and the floor support struts 298. It can be appreciated that using a floor supporting structure, such as the railings 297 and the floor support struts 298, which is attached to the bottom surface of the second elevated chassis members 255a, 255b maximizes the amount of headspace

that is provided in the bedroom 216 without increasing the overall height of the trailer 200.

The foregoing description has described a trailer 200 that utilizes an "outboard" design, i.e., the elevated sections 208, 210 of the chassis 202 extend outward from the main section 206 of the chassis 202. This is the result of the transverse chassis strut 240 being wider than the width of the main section 206 of the chassis 202. It can be appreciated, however, that the unique aspects of the double step chassis 202 can be incorporated into different chassis designs.

For example, FIG. 6 illustrates an alternate chassis 302 which includes a main section 306, a first elevated section 308 and a second elevated section 310. As in the embodiment described above, the first elevated section 308 preferably supports a bathroom 214 and the second elevated section preferably supports a bedroom 216. The primary distinction between the chassis 302 and the chassis 202 is that the elevated sections 308, 310 do not extend outward from the main section 306 of the chassis 302. Specifically, in the embodiment shown in FIG. 6, two main side chassis members 230a, 230b are respectively attached to two first vertical chassis members 342a, 342b. Hence, the width of the first elevated section 308 of the chassis 302 is the same as the width of the main section 306 of the chassis 302.

However, in some circumstances it may be desirable that the floor of the bathroom 214 be wider than the actual chassis. To accomplish this, a plurality of outriggers 320 are mounted on the outer surfaces of the first elevated chassis members 344a, 344b. The outriggers 320 are basically comprised of triangular pieces of metal that provide a flat surface 322 co-planar with the surface formed from the elevated chassis members 344a, 344b and a plurality of floor support struts 352. The floor can then be built on top of the floor support struts 352 and the flat surface 322 of the outriggers 320. Hence, the outriggers can extend the width of the trailer in the first elevated section 308. The tanks 220, 222 can then be mounted underneath the floor of the first elevated section 308 of the chassis 302 in the same manner as described above.

The foregoing description has described a chassis wherein the chassis itself is vertically elevated to define a first elevated section that is configured to support the gray- and black-water tanks. This allows for the tanks to be positioned immediately underneath the bathroom fixtures in a trailer which minimizes the amount of space occupied by the plumbing for these fixtures. Further, since the tanks are mounted above the bottom level of the trailer chassis, the user has significantly easier access to the draining control valves which facilitates drainage of the tanks. Additionally, since the drain pipe assembly is enclosed in the storage trunk, fluid in the drain pipe assembly is less likely to freeze in cold weather. Finally, it can also be appreciated that, since the trunk space is located underneath the trailer chassis and underneath the sewage tanks, it is easier to load the storage trunk as the storage trunk is closer to the ground than the storage trunk in the typical prior art fifth wheel trailer and, hence, heavy objects don't need to be lifted as high.

Although the foregoing description of the preferred embodiments of the present invention has shown, described and pointed out the fundamental novel features of the invention, it will be understood that various omissions, substitutions, and changes in the form of the detail of the apparatus as illustrated, as well as the uses thereof, may be made by those skilled in the art, without departing from the spirit of the present invention. Consequently, the scope of the invention should not be limited to the foregoing discussion, but should be defined by the appended claims.

What is claimed is:

1. An improved fifth wheel travel trailer having a set of trailer wheels and a chassis overlying said trailer wheels, wherein the chassis has a raised floor and defines a bathroom sitting on said raised floor, whereby at least one plumbing drainage control is located above the bottom of said chassis, and at least one sewage holding tank is located immediately beneath said raised floor, said fifth wheel trailer comprising;

a main chassis section that is coupled to said wheels to allow for rolling motion of said trailer and so that said main chassis section is positioned at a first height above said ground wherein said main chassis section is configured to support a main section of said trailer;

a first elevated chassis section beneath said bathroom, said first elevated section having one end coupled to a first end of said main chassis section so that said chassis section is positioned at a second height above said ground;

one or more of said sewage holding tanks mounted to said first elevated section of said chassis;

a second elevated chassis section beneath the bedroom of said travel trailer, said second chassis section having an end connected to said first elevated chassis section;

a fifth wheel hitch attached to the bottom of said second elevated chassis section;

a storage compartment located below said first elevated section, the bottom of said storage compartment being located approximately in the plane of the bottom of said main chassis section; and

said plumbing drainage controls connected to said sewage holding tanks so that the user can drain said sewage tanks into an external sewage receptacle, said plumbing drainage controls being located within said storage compartment above the plane of the bottom of said main chassis section.

2. An improved fifth wheel travel trailer having a raised floor that defines a bathroom sitting on the raised floor, whereby at least one sewage holding tank is located immediately beneath said raised floor, said fifth wheel trailer comprising;

a main chassis section that is coupled to wheels to allow for rolling motion of said trailer and so that a main chassis section is positioned at a first height above said ground wherein said main chassis section is configured to support a main section of said trailer;

a first elevated chassis section beneath said bathroom, said first elevated section having one end coupled to a first end of said main chassis section so that said chassis section is positioned at a second height above said ground;

one or more of said sewage holding tanks mounted to said first elevated section of said chassis;

a second elevated chassis section beneath a bedroom of said travel trailer, said second chassis section having an end connected to said first elevated chassis section;

a fifth wheel hitch attached to the bottom of said second elevated chassis section; and

a storage compartment located below said first elevated section, the bottom of said storage compartment being located approximately in the plane of the bottom of said main chassis section.

3. An improved fifth wheel travel trailer having a set of trailer wheels and a chassis overlying said trailer wheels, wherein the chassis has at least one plumbing drainage control is located above the bottom of said chassis, said fifth wheel trailer comprising;

a main chassis section that is coupled to said wheels to allow for rolling motion of said trailer and so that said main chassis section is positioned at a first height above said ground wherein said main chassis section is configured to support a main section of said trailer;

a first elevated chassis section beneath a bathroom, said first elevated section having one end coupled to a first end of said main chassis section so that said chassis section is positioned at a second height above said ground;

a second elevated chassis section beneath a bedroom of said travel trailer, said second chassis section having an end connected to said first elevated chassis section;

a fifth wheel hitch attached to the bottom of said second elevated chassis section;

a storage compartment located below said first elevated section, the bottom of said storage compartment being located approximately in the plane of the bottom of said main chassis section; and

said plumbing drainage controls being located within said storage compartment above the plane of the bottom of said main chassis section.

4. A chassis for a trailer that is mounted on at least a pair of wheels comprising;

a main chassis section that is coupled to said wheels to allow for rolling motion of said trailer and so that said main chassis section is positioned at a first height above said ground wherein said main chassis section is configured to support a main section of said trailer;

a first elevated section that is configured to support a bathroom and is coupled to a first end of said main chassis section so that said first elevated section is elevated above said main chassis section so as to be positioned at a second height above said ground wherein a trunk space is defined within the space immediately beneath said first elevated section;

one or more sewage tanks mounted on said first elevated section of said chassis adjacent said trunk space; and

a drain assembly connected to said sewage tanks which allows a user to drain said sewage tanks into an external sewage receptacle, wherein said drain assembly includes one or more control valves which are located within said trunk space that said user manipulates to drain said sewage tanks.

5. The chassis of claim 4, wherein said first elevated section is configured to support a floor and one or more fixtures of a bathroom in said trailer.

6. The chassis of claim 5, wherein said first elevated section is configured to support a toilet and a shower positioned on said floor.

7. The chassis of claim 6, wherein said one or more sewage tanks comprises a black water tank that is mounted on said chassis so as to be immediately beneath and substantially adjacent a position where said toilet is to be mounted on said floor built on said chassis.

8. The chassis of claim 7, wherein said one or more sewage tanks also comprises a grey water tank that is mounted on said chassis so as to be immediately beneath and substantially adjacent a position wherein said shower is to be mounted on said floor built on said chassis.

9. The chassis of claim 4, wherein said first elevated section of said chassis includes two spaced apart elevated chassis members that extend longitudinally along said chassis and are interconnected by one or more transverse floor support struts which extend transversely across said chassis between said two elevated chassis members.

11

10. The chassis of claim 9, wherein said elevated chassis members are respectively connected, at a first end, to two first vertical chassis members that interconnect said elevated chassis members and said main chassis section.

11. The chassis of claim 10, wherein said first elevated section also includes two second vertical chassis members that are respectively connected to a second end of said elevated chassis members and extend downward to substantially said first height of said main chassis section.

12. The chassis of claim 11, wherein two longitudinal trunk support members are respectively connected between said ends of said first and said second vertical chassis members at substantially said first height of said main chassis section.

13. The chassis of claim 12, wherein said trunk space is defined by said elevated chassis members, said first and said second vertical chassis members and said longitudinal trunk support members.

14. The chassis of claim 13, wherein said one or more tanks extend transversely across said chassis between said elevated chassis members so as to be supported at substantially said second height.

15. The chassis of claim 14, wherein said one or more tanks are configured to have one or more lips and said elevated section includes one or more support brackets which extend transversely between said elevated chassis members so that said one or more lips on said tanks rest on said one or more support brackets to retain said one or more tanks in a position adjacent said second height.

16. The chassis of claim 4, wherein said first height is approximately 20 inches above said ground and said second height is approximately 50 inches above the ground and said one or more control valves of said drain assembly are approximately 30 inches of said ground.

17. A chassis for a trailer that is configured to be towed behind a vehicle comprising:

an axle assembly interconnecting a pair of wheels;

a main chassis section having a first and a second end wherein the main chassis section is supported by said axle assembly at a first height above the ground;

a first elevated section having a first and a second end wherein said first end is connected to said second end of said main chassis section so as to be supported at a second height above the ground wherein said second height is elevated above said first height and wherein a trunk space is defined in the space immediately beneath said first elevated section;

one or more sewage tanks mounted on said first elevated section of said chassis adjacent said trunk space; and

a drain assembly connected to said sewage tanks and extending downward therefrom, wherein said drain assembly includes control valves that are mounted within said space immediately beneath the first elevated section of the chassis.

18. The chassis of claim 17, further comprising a second elevated section attached to a second end of said first elevated section so as to be supported at a third height above said ground wherein said third height is greater than said second height.

19. The chassis of claim 18, wherein said second elevated section is comprised of a pair of spaced second vertical chassis members having a first and a second end and a top and bottom edge.

20. The chassis of claim 19, wherein said pair of spaced second elevated chassis members are interconnected by one or more struts which extend transversely across said chassis

12

and a hitch assembly can be connected to said struts so as to be positioned at said second end of said second elevated section substantially underneath said second elevated section.

21. The chassis of claim 20, wherein a lip is attached to both of said second elevated chassis members substantially adjacent said bottom edge of said second elevated members wherein said lip is configured to receive a floor for a bedroom to be built on said second elevated section of said chassis.

22. The chassis of claim 21, wherein said first elevated section of said chassis includes two spaced apart elevated chassis members that extend longitudinally along said chassis and are interconnected by one or more transverse floor support struts which extend transversely across said chassis between said two elevated chassis members.

23. The chassis of claim 22, wherein said elevated chassis members are respectively connected, at a first end, to two first vertical chassis members that interconnect said elevated chassis members and said main chassis section.

24. The chassis of claim 23, wherein said first elevated section also includes two second vertical chassis members that are respectively connected to a second end of said elevated chassis members and extend downward to substantially said first height of said main chassis section.

25. The chassis of claim 24, wherein two longitudinal trunk support members are respectively connected between said ends of said first and said second vertical chassis members at substantially said first height of said main chassis section.

26. The chassis of claim 25, wherein said trunk space is defined by said elevated chassis members, said first and said second vertical chassis members and said longitudinal trunk support members.

27. The chassis of claim 26, wherein said one or more tanks extend transversely across said chassis between said elevated chassis members so as to be supported at substantially said second height.

28. The chassis of claim 27, wherein said one or more tanks are configured to have one or more lips and said elevated section includes one or more support brackets which extend transversely between said elevated chassis members so that said one or more lips on said tanks rest on said one or more support brackets to retain said one or more tanks in a position adjacent said second height.

29. The chassis of claim 17, wherein said first height is approximately 20 inches above said ground and said second height is approximately 50 inches above the ground and said one or more control valves of said drain assembly are approximately 30 inches of said ground.

30. A chassis for a trailer that is configured to be towed behind a vehicle comprising:

an axle assembly interconnecting a pair of wheels;

a main chassis section having a first and a second end wherein said main chassis section is supported by said axle assembly at a first height above the ground;

a first elevated section having a first and a second end wherein a first end is connected to said second end of said main chassis section so as to be supported at a second height above the ground wherein said second height is elevated above the first height and wherein the space immediately beneath said first elevated section defines a trunk space;

a second elevated section attached to a second end of said first elevated section so as to be supported at a third height above said ground wherein said third height is greater than said second height;

one or more sewage tanks mounted on said first elevated section of said chassis so as to extend transversely across said chassis; and

a drain assembly connected to said sewage tanks and extending downward therefrom, through said trunk space, wherein said drain assembly includes control valves that are mounted within said trunk space.

31. The chassis of claim 30, wherein said first elevated section of said chassis includes two spaced apart elevated chassis members that extend longitudinally along said chassis and are interconnected by one or more transverse floor support struts which extend transversely across said chassis between said two elevated chassis members.

32. The chassis of claim 31, wherein said elevated chassis members are respectively connected, at a first end, to two first vertical chassis members that interconnect said elevated chassis members and said main chassis section.

33. The chassis of claim 32, wherein said first elevated section also includes two second vertical chassis members that are respectively connected to a second end of said elevated chassis members and extend downward to substantially said first height of said main chassis section.

34. The chassis of claim 33, wherein two longitudinal trunk support members are respectively connected between said ends of said first and said second vertical chassis members at substantially said first height of said main chassis section.

35. The chassis of claim 34, wherein said trunk space is defined by said elevated chassis members, said first and said second vertical chassis members and said longitudinal trunk support members.

36. The chassis of claim 35, wherein said one or more tanks extend transversely across said chassis between said elevated chassis members so as to be supported at substantially said second height.

37. The chassis of claim 36, wherein said one or more tanks are configured to have one or more lips and said elevated section includes one or more support brackets which extend transversely between said elevated chassis members so that said one or more lips on said tanks rest on said one or more support brackets to retain said one or more tanks in a position adjacent said second height.

\* \* \* \* \*

# Tab Z

# United States Patent [19]

Avery

[11] Patent Number: 4,767,132

[45] Date of Patent: Aug. 30, 1988

- [54] ENCLOSED TRAILER FOR BOATS  
[76] Inventor: W. Burl Avery, P.O. Box 256,  
Onalaska, Tex. 77360  
[21] Appl. No.: 91,117  
[22] Filed: Aug. 31, 1987  
[51] Int. Cl.<sup>4</sup> ..... B60P 3/10  
[52] U.S. Cl. .... 280/414.1; 280/423 R;  
280/789; 296/100; 296/181  
[58] Field of Search ..... 280/414.1, 414.2, 414.3,  
280/401, 403, 423 R, 785, 789, 47.13 B;  
296/100, 181; 414/529, 542

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*Primary Examiner*—John J. Love  
*Assistant Examiner*—Charles R. Watts  
*Attorney, Agent, or Firm*—Peter L. Klempay

[57] **ABSTRACT**

A trailer which provides full enclosure for a boat during transport while permitting direct launch of the boat therefrom includes a floor with a sliding panel at the rear thereof, side walls, a top wall the forward portion of which is fixed and the rear portion thereof slidable between a forward, open position and a rear, closed position, and a rear door.

8 Claims, 4 Drawing Sheets

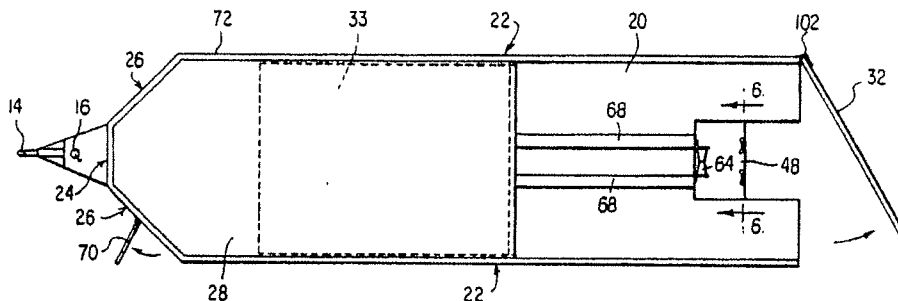




FIG. 1

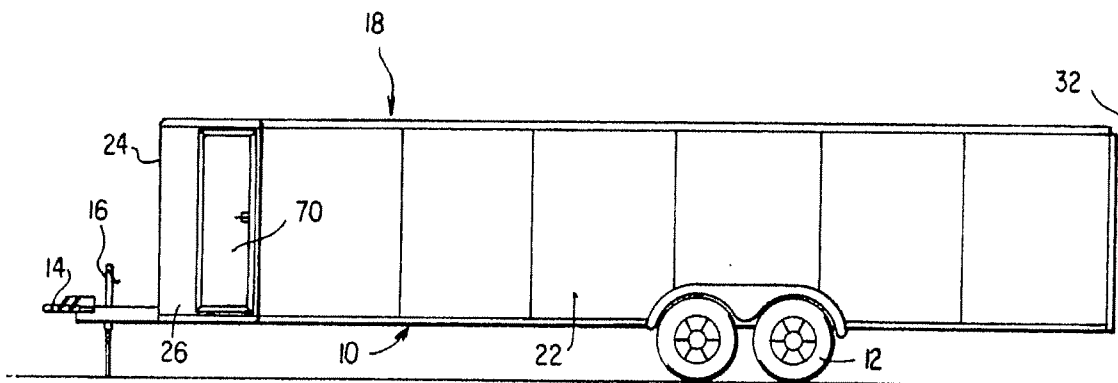


FIG. 2

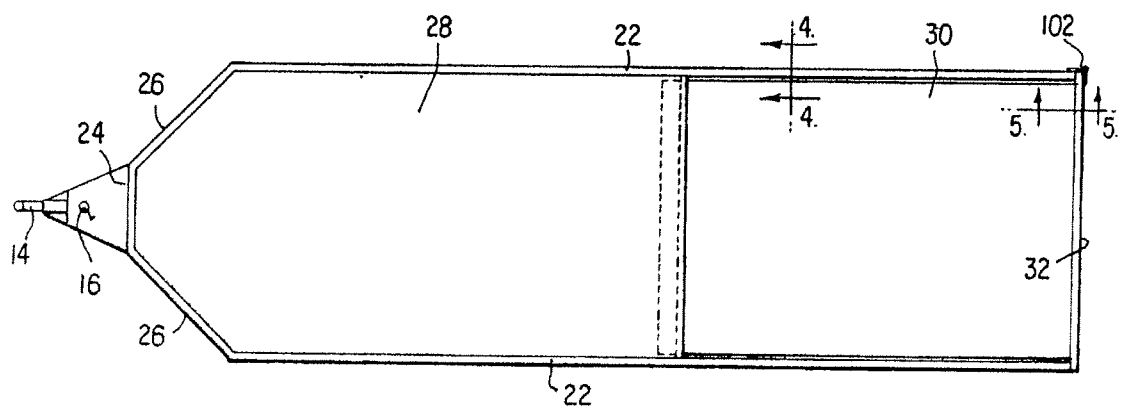


FIG. 3

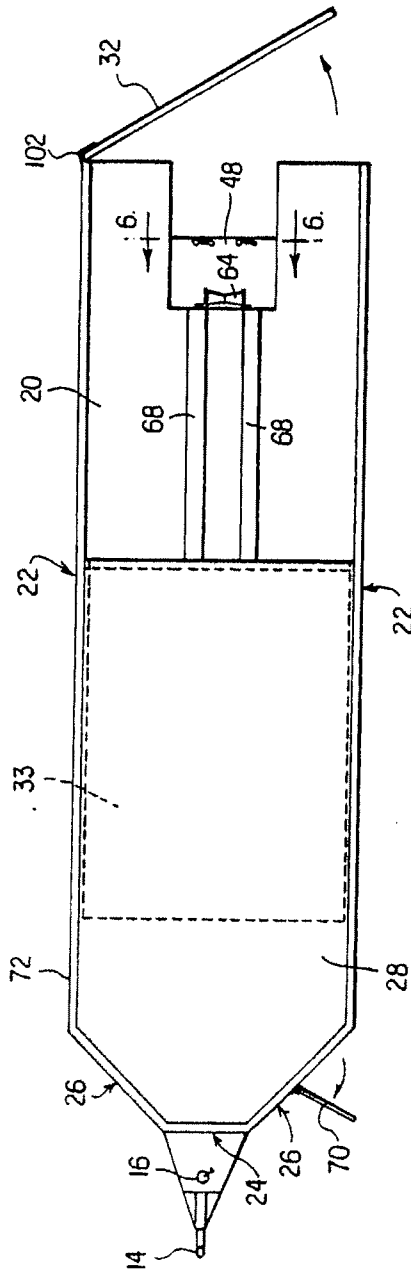


FIG. 4

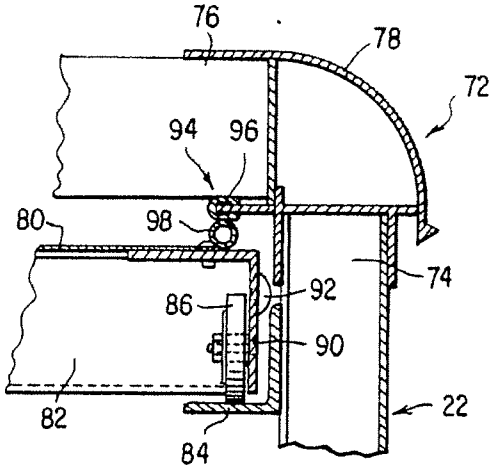


FIG. 5

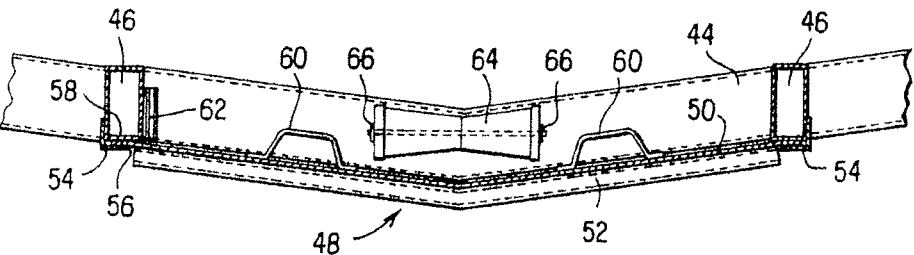
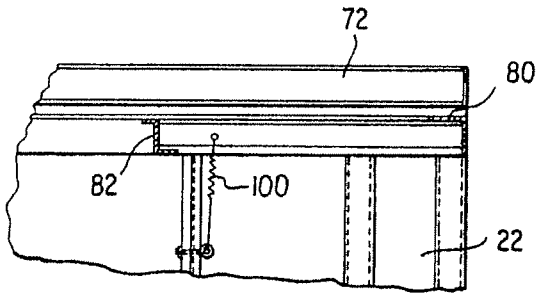


FIG. 6

FIG. 7

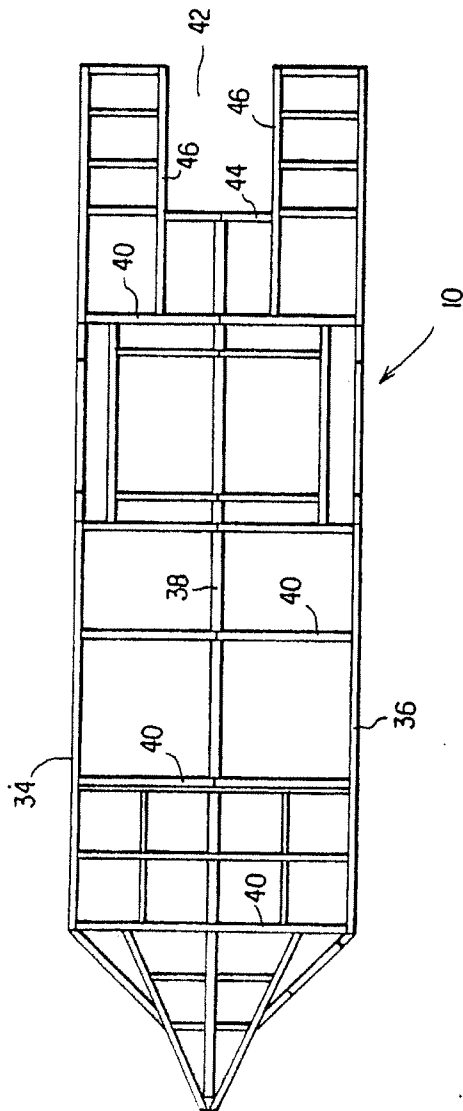
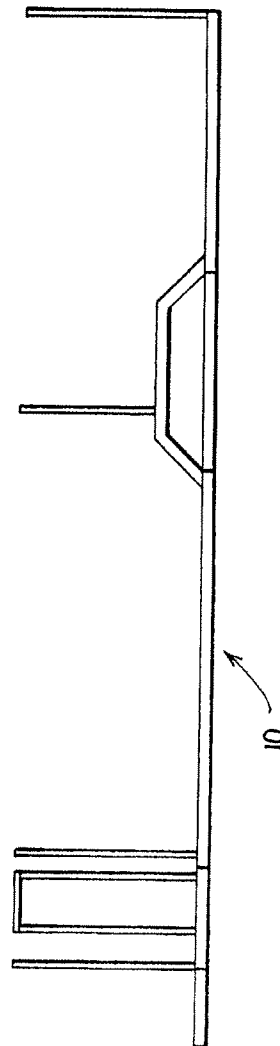


FIG. 8



## ENCLOSED TRAILER FOR BOATS

The present invention pertains to trailers for transporting boats and, more particularly, to such trailers which fully enclose the boat during transportation and from which the boat may be directly launched.

## BACKGROUND OF THE INVENTION

The most commonly used boat trailer consists of a chassis with road wheels, a hitch at the forward end thereof for connection to the towing vehicle, and means, such as rollers and/or skids, on the upper side of the chassis for cradling the hull of the boat. With a trailer of this type, the boat is exposed during transport and storage and, accordingly, subject to damage, as from traffic thrown stones, for example, and from vandalism.

While enclosed boat trailers offer protection against such damage, existing enclosed trailers have found only limited acceptance, due, at least in part, to the additional labor required in loading and unloading the boat. U.S. Pat. No. 3,448,875, Robinson, Jr., discloses an enclosed trailer for carrying a boat, the trailer being provided with a rearwardly telescoping overhead support mechanism and hoist for moving the boat between the housed position within the trailer and a body of water in which the boat is launched. This arrangement, while providing for the handling of the boat, involves an expensive trailer construction.

It is the primary object of the present invention to provide an enclosed trailer for a boat which trailer facilitates the maneuvering of the boat between the housed and launched positions.

It is also an object of the present invention to provide such an enclosed trailer for a boat which, in addition to providing full protection for the boat, provides readily accessible auxiliary storage.

A further object of the present invention is the provision of such an enclosed trailer for a boat which has a compact and aerodynamic external configuration.

## SUMMARY OF THE INVENTION

The above and other objects of the invention which will become apparent hereinafter are achieved by the provision of an enclosed trailer for a boat which includes a chassis mounting an axle with road-engaging wheels and, at the forward end thereof, a hitch for connection to a towing vehicle; a body supported on the chassis and including a floor, opposed side walls, a front wall, and a top wall; boat hull engaging rollers and/or skids mounted on the floor to define a boat receiving cradle; and a tail gate assembly for closing the rear of the body; the rearmost portion of the top wall being movable between a closed position and a forward position to furnish access and the floor including, in the rear central portion thereof, a movable panel to provide clearance for an outboard motor during launching. Preferably, the front wall of the body is of angled configuration for improved aerodynamics and includes a door providing access to the forward portion of the trailer.

For a more complete understanding of the invention and the objects and advantages thereof, reference should be had to the accompanying drawings and the following detailed description wherein a preferred embodiment of the invention is illustrated and described.

## DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a side elevational view of the boat trailer of the present invention;

FIG. 2 is a top plan view thereof with the access doors and roof panel in the closed positions;

FIG. 3 is a top plan view with the doors and roof panel moved to the open positions;

FIG. 4 is a fragmentary transverse cross sectional view taken on the line 4—4 of FIG. 2;

FIG. 5 is a fragmentary longitudinal cross sectional view taken on the line 5—5 of FIG. 2;

FIG. 6 is a fragmentary transverse cross sectional view taken on the line 6—6 of FIG. 3;

FIG. 7 is a plan view of the trailer frame; and

FIG. 8 is a side elevational view of the frame.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The enclosed boat trailer of the present invention includes a frame, designated generally by the reference numeral 10, supported by a wheel assembly 12 and, at the forward end of the frame, by a conventional trailer hitch 14 and tongue jack 16. As can be seen from the plan views, the frame is of rectangular configuration with a forwardly tapering front end. Mounted on the frame is the trailer body 18 consisting of a floor 20, vertical side walls 22, front wall assembly including a transverse central section 24 and angled side sections 26 joining the forward ends of the side walls, and a roof or top wall including a forward, fixed section 28 and a rear, movable section 30. The rear of the trailer body is closed by a door 32.

The frame 10 may be of any conventional construction, for example, being fabricated of steel tubing, channel and/or angle members. As is shown in FIGS. 7 and 8, the frame may include side rails 34 and 36, a center rail 38 and transverse framing members 40. In the forward or auxiliary storage section of the trailer, the upper surfaces of the side and center rails are level while, in the boat carrying section, the center rail is lowered thus providing an inwardly sloping floor for drainage of water carried into the trailer when loading a boat therein. At the rear of the frame, an unobstructed rearwardly open area 42 is provided, the center rail terminating at a transverse framing member 44 with longitudinal framing members 46 defining the sides of the open area and extending forwardly therefrom. With the exception of the open area 42, the frame is covered with a floor 20 such as aluminum treadplate.

A closure panel 48 is provided for the open area 42, the panel being formed, for example, of a rectangular aluminum treadplate piece 50 strengthened with steel tubing 52 secured to the underside thereof. Angle members 54 attached to the lower outer faces of the longitudinal frame members 46 define, with the framing members, inwardly opening channels 56 extending the length of the frame members 46 (see FIG. 6). The opposed lateral edges 58 of the closure panel 48 are slidably received in these channels 56 whereby the panel may be moved between a forward, open position and a rear position closing the floor of the trailer. Handles 60 are provided on the panel and a latch mechanism 62, which may be a conventional sliding door latch, is provided to secure the panel in either of the open and closed positions.

Completing the description of the trailer frame and floor configuration, a boat guide roller 64 is provided at the forward end of the open area 42, the roller being journaled in brackets 66 affixed to the rear face of the transverse framing member 44 with the roller being located above the closure panel 48. A pair of boat cradling bunks 68 extend forwardly of the open area, equally spaced on opposite sides of the longitudinal centerline of the trailer.

The side and front walls of the trailer may also be of conventional construction. Typically, the walls are formed of aluminum sheets supported by corner posts and intermediate vertical bracing members. A door 70 is provided in one of the wall sections 26 for access to the forward auxiliary storage section of the trailer. Mounted at the upper edges of the walls is a top rail 72 which may be an aluminum extrusion and, as is shown in FIG. 4, includes a downwardly opening channel 74 receiving the top of the wall structure, an inwardly opening channel 76 and a quarter round intermediate section 78.

As was mentioned above, the forward section 28 of the trailer roof is fixed. This section is, preferably, formed of aluminum sheets with suitable framing or stiffening members such as transversely extending Z-bars, the forward and lateral edges of this section being received within the channel 76 of the top rail. The rear section 30 of the roof is a rectangular panel formed of aluminum sheets 80 with framing or stiffening members 82, the panel width being slightly less than the distance between the inner faces of the trailer side walls. An angle member 84 is provided on each of the trailer side wall inner faces in downwardly spaced, parallel relation to the channel 76 of the top rail, the angle member 84 extending forwardly from the rear of the trailer by a distance approximately twice the length of the panel. The horizontal legs 86 of these angle members provide track surfaces for rollers 88 which are journaled on side framing members 90 of the roof panel, preferably two rollers being provided on each side. Each of the lateral edges of the panel is also provided with guide buttons 92. A gasket 94, preferably an elastomeric extrusion having a channel portion 96 and a compressible tube portion 98, is mounted on the lower flange of the top rail channels 76 extending from the rear edge of the fixed roof section 28 to the rear of the trailer with the tube portion bearing against the upper surface of the roof rear section panel when closed to create a water seal. A similar gasket is provided along the rear edge of the fixed roof section. In order to hold the panel in position, a latch mechanism 100 is provided, such as a spring loaded door latch.

The rear of the trailer is closed by a door 32 which, in the preferred embodiment, is a single panel door supported by a piano hinge 102 mounted at the rear corner post of the right side wall of the trailer. The door is movable through a 270° arc, i.e., from a closed position to an open position in which the door is parallel to the outer right side wall of the trailer. Any suitable latch mechanism may be employed with the door.

When either launching a boat from or loading a boat into the trailer from the water, the rear door 32 is swung to its fully open position, the floor closure panel 48 is slid forwardly to its open position and the roof panel section 30 is likewise slid to its fully open position. The forward door 70 provides access to the forward portion of the trailer where a winch (not shown) may be mounted. So configured, the trailer may be backed

partially into the water and the boat maneuvered into or out of the water in the same manner as would be done with an open boat trailer. The unobstructed rear open section of the trailer floor provided by the closure panel 48 provides clearance for the boat as it moves into or out of the water while the open rear roof section allows the operator to sit or stand in the boat as desired during the launching or loading procedure. After loading a boat into the trailer, the floor closure panel 48 and the roof panel section 30 are slide rearwardly to their closed positions and the rear door is closed. The boat is thus fully enclosed and protected. As was mentioned above, the forward portion of the trailer is available for storage of auxiliary equipment.

While a preferred embodiment of the invention has been shown and described in detail herein, it will be understood that changes and additions may be had therein and thereto without departing from the spirit of the invention. Reference should, accordingly, be had to the appended claims in determining the true scope of the invention.

I claim:

1. A boat trailer comprising:
  - a frame supporting a road wheel assembly and, at the forward end thereof, a trailer hitch;
  - a floor supported on said frame, said floor including a panel section extending forwardly from the rear end of said frame and symmetric about the longitudinal centerline thereof, means for moving said panel section between a rear position providing a closed floor and a forward position providing an opening in the floor at the rear of said trailer;
  - boat hull cradling means mounted on said floor and extending forwardly of said opening;
  - side and front walls extending upwardly from said frame;
  - a top wall spanning said side and front walls, said top wall including a forward, fixed section and a rear section longitudinally slidable between a rear position closing the top of said trailer and a forward position fully opening the rear portion of said trailer; and
  - a rear door constituting the back wall of said trailer.
2. The boat trailer of claim 1 further including an additional door in one of said side and front walls providing access to the forward portion of said trailer.
3. The boat trailer of claim 1 wherein said means for moving includes a pair of framing members extending forwardly from the rear end of said frame in spaced, parallel relation on opposite sides of the longitudinal centerline of said frame, the rear of said frame being open between said framing members, an inwardly opening channel being provided on the underside of each of said framing members, and the lateral edges of said floor panel section being slidably received in said channels.
4. The boat trailer of claim wherein a horizontal track surface is provided on the inner face of each of said side walls of said trailer extending forwardly from the rear thereof and said rear section of said top wall comprises a panel having rollers engaging the upper faces of said track surfaces.
5. The boat trailer of claim 4 further including a gasket mounted at the upper edge of said side walls and engaging the top face of said roof panel to form a water seal therewith.
6. The boat trailer of claim 1 wherein a horizontal track surface is provided on the inner face of each of said side walls of said trailer extending forwardly from

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the rear thereof and said rear section of said top wall comprises a panel having rollers engaging the upper faces of said track surfaces.

7. The boat trailer of claim further including a gasket mounted at the upper edge of said side walls and engaging the top face of said roof panel to form a water seal therewith.

8. A trailer for carrying and launching a boat which provides full protective enclosure or the boat during transport comprising:

a frame supporting a road wheel assembly and, at the forward end thereof, a trailer hitch said frame including a pair of framing members extending forwardly from the rear end thereof in spaced, parallel relation on opposite sides of the longitudinal centerline of said trailer, a channel extending along each of said framing members and opening toward the centerline, said frame having an open region between the rear portions of said framing members;

10  
15  
20

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a floor supported on said frame except in said open region;

a panel having lateral edges slidably received within said channels and movable between a forward, open position and a rear position closing said open region;

side and front walls extending upwardly from said frame, each side wall mounting, on the inner face thereof, a horizontal track surface extending forwardly from the rear of said trailer;

a top wall spanning said front and side walls, said top wall including a forward, fixed wall section and a rear panel section having rollers engaging said track surfaces, said rear panel section being movable between a forward position in which said panel underlies said fixed top wall section and a rear position closing the top of said trailer; and a rear door constituting the back wall of said trailer.

\* \* \* \* \*

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Tab AA





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(54) **TRAILER COUPLER**

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(57) **ABSTRACT**

A selectively remotely actuated coupler which comprises a coupler for trailers, automatic locking mechanism to secure said trailer to a towing vehicle ball, a remotely actuated release assembly for unlocking said automatic locking mechanism attached to said trailer and powered by a battery. The coupler comprising an automatic locking means connected to said trailer for locking said trailer to said ball hitch as said trailer is lowered onto said ball hitch, a selectively activated unlocking means connected to said trailer for releasing said ball hitch from said trailer, and a remote control in communication with said unlocking means for selectively activating said unlocking means. It is further contemplated that said locking mechanism provides a manual release handle.

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(22) Filed: **Jul. 3, 2001**

**Related U.S. Application Data**

(63) Non-provisional of provisional application No. 60/216,057, filed on Jul. 5, 2000.

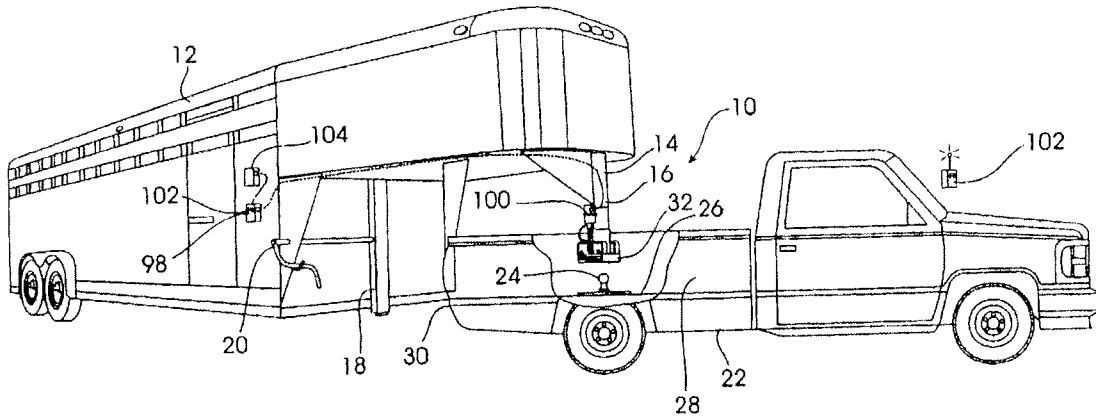
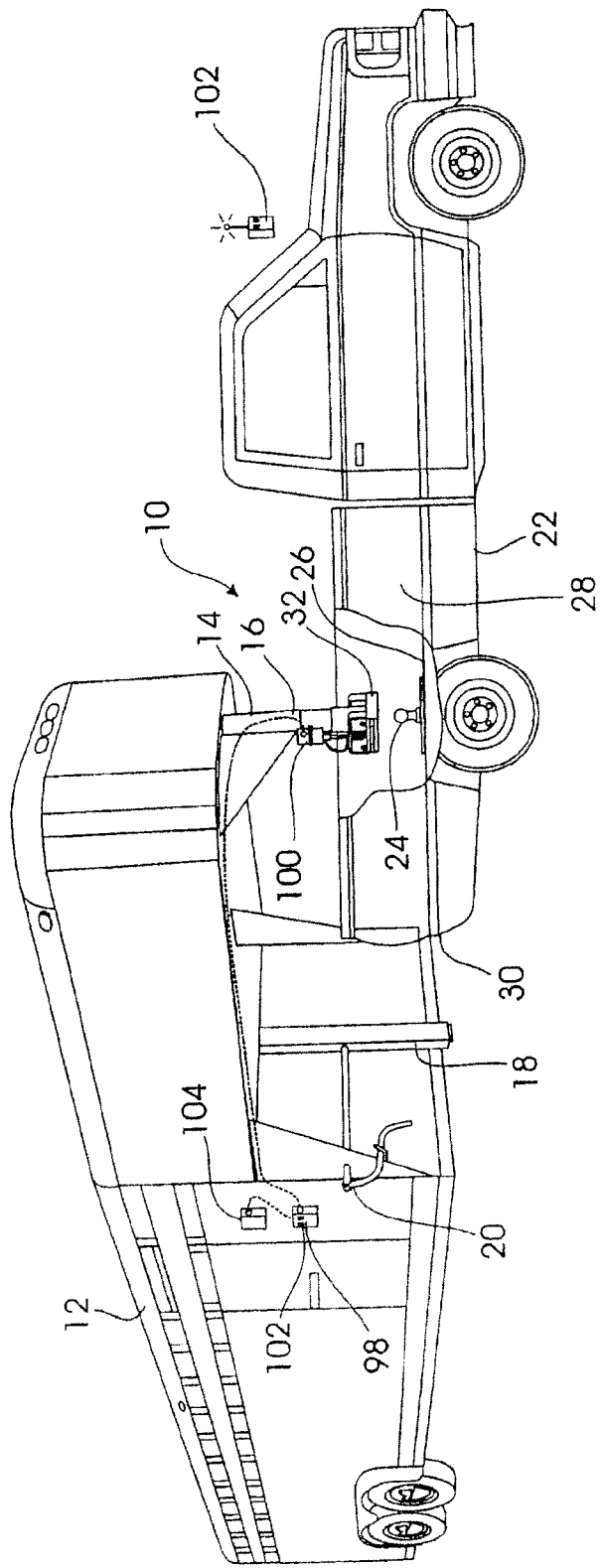


FIG. 1



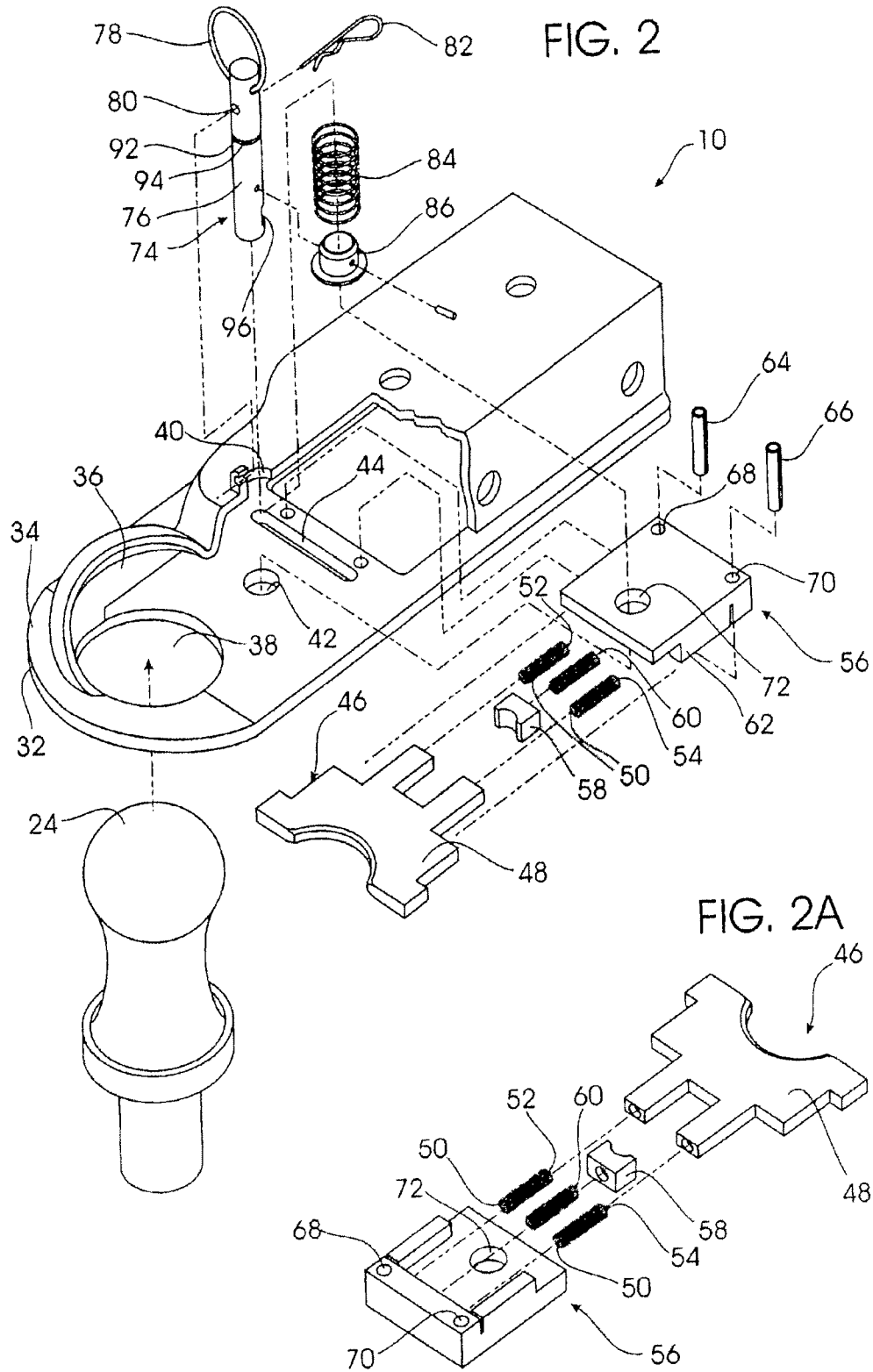


FIG. 3

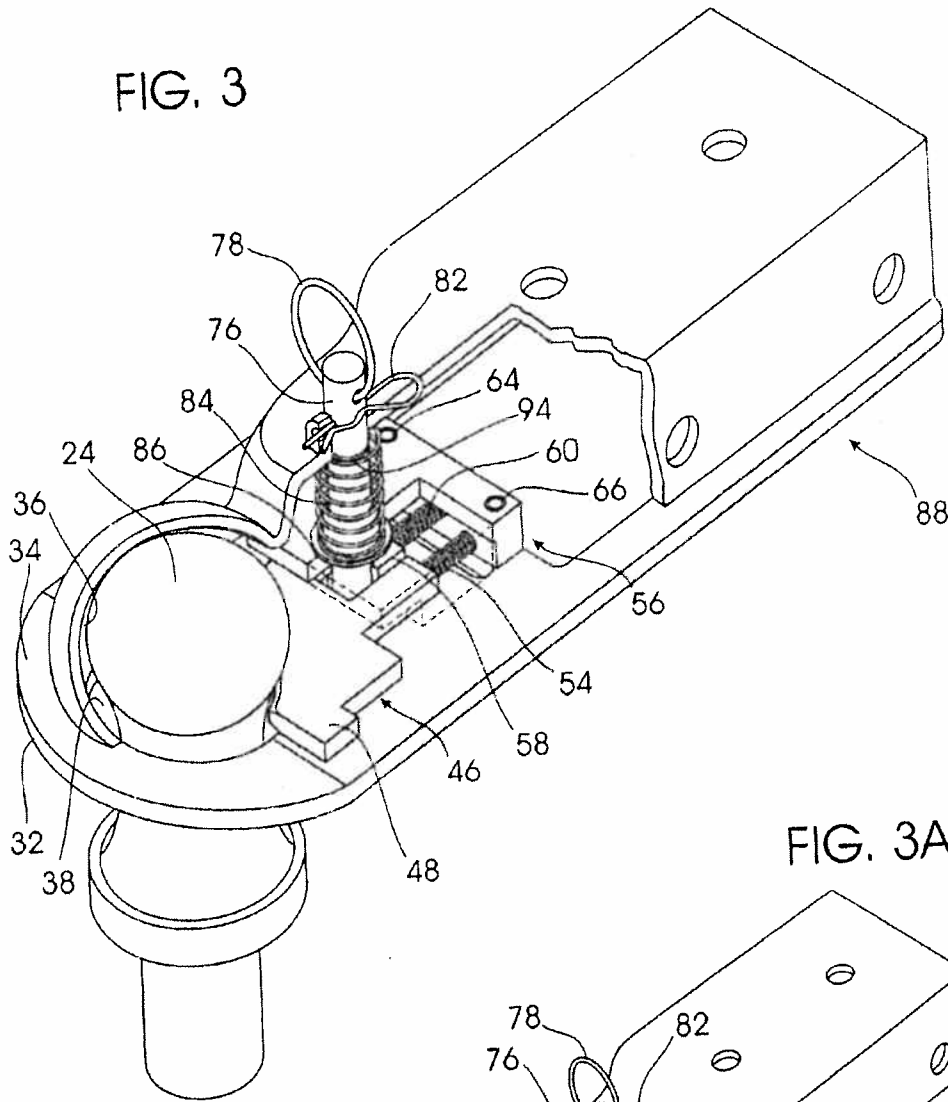
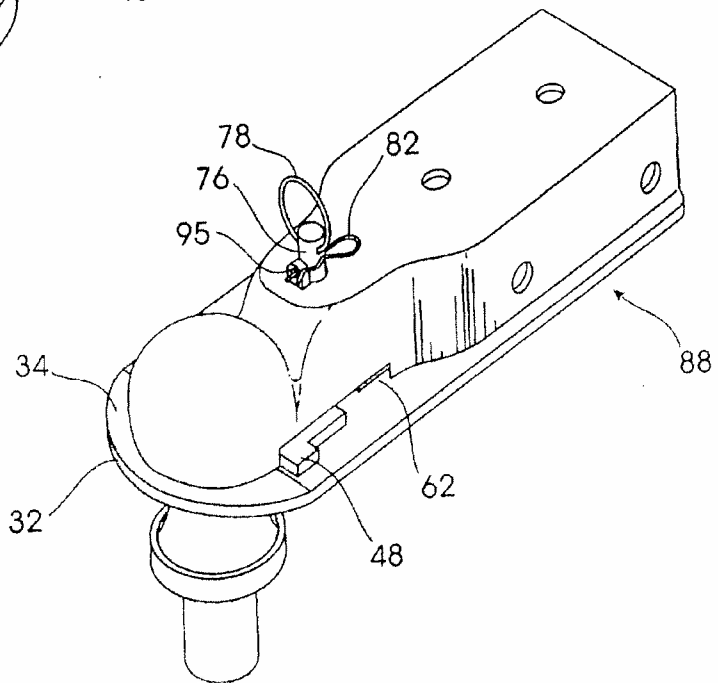


FIG. 3A



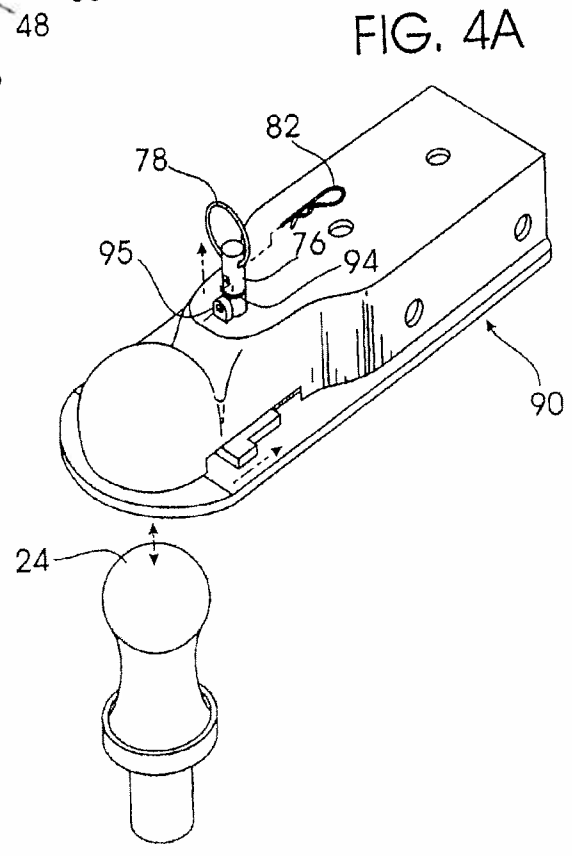
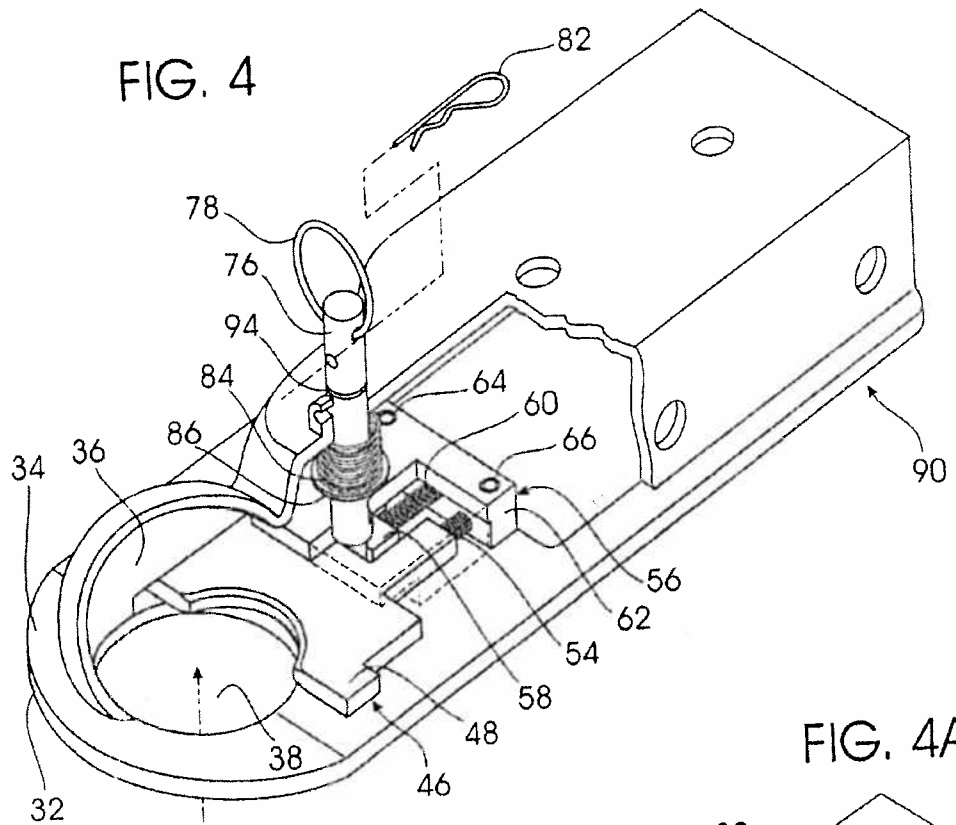
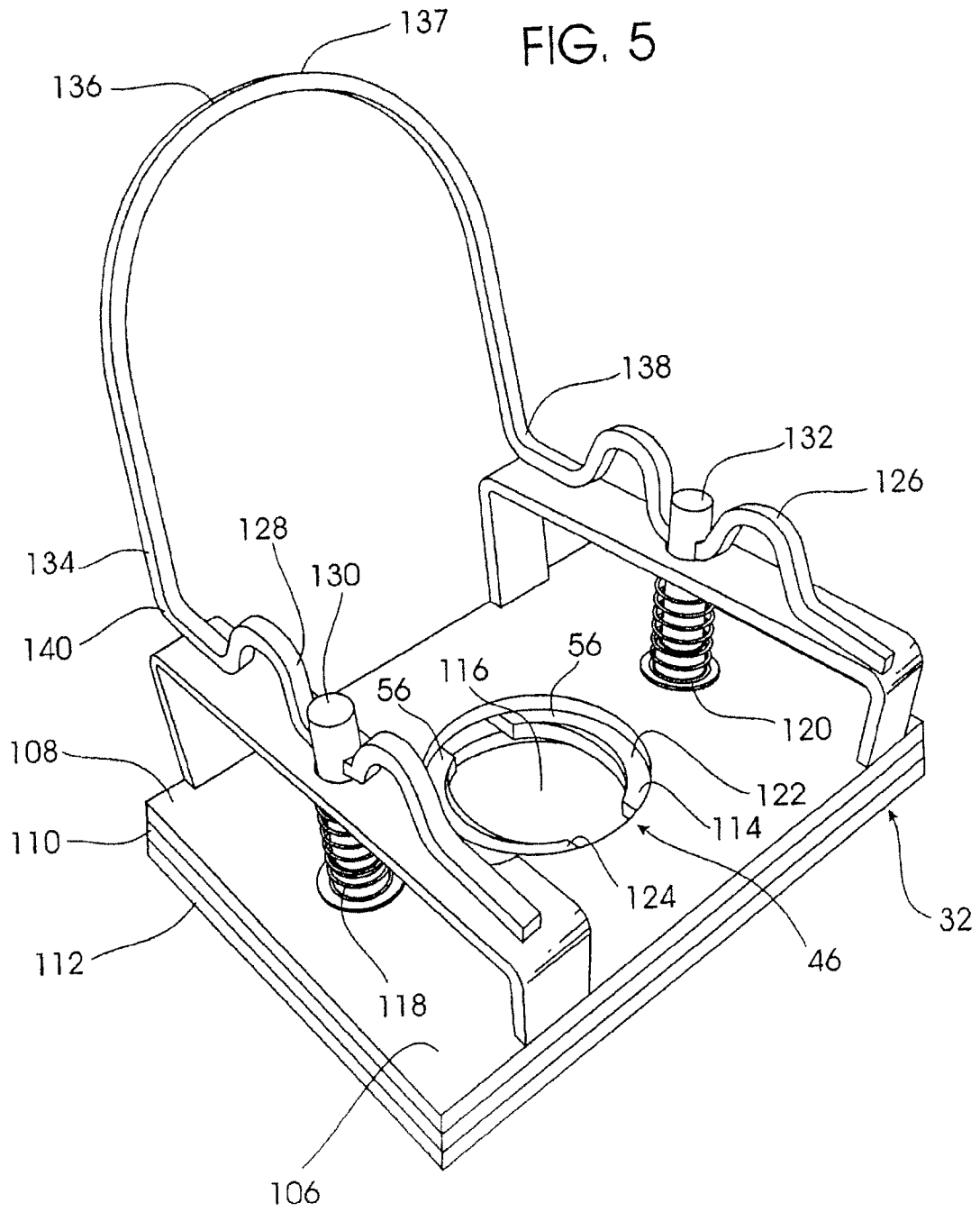


FIG. 5



## TRAILER COUPLER

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Priority is claimed from provisional application U.S. Ser. No. 60/216,057 filed on Jul. 5, 2000, and incorporated by reference herein.

### BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates generally to trailer couplers. More particularly, the present invention is a new and improved trailer coupler that automatically locks in place when attached, provides for a visual inspection that coupler is locked into position, and can be remotely unlocked for release.

[0004] 2. Description of the Known Prior Art

[0005] Many coupling devices have been developed for providing a connection between a towing vehicle and a trailer. Typically, a spherical ball is mated to a socket receiver in a male-female style trailer hitch. A popular variety uses a long, vertical sheathing attached to a female portion of the coupler, often referred to as gooseneck or neckover couplers. These types of couplers are often mated to a ball hitch mounted to a vehicle, such as pick-up trucks, in the middle of the vehicle's bed as opposed to a ball hitch generally located on the end of the vehicle near or on the rear bumper.

[0006] In operation, a trailer with a gooseneck attachment is positioned over the ball mounted in the bed of the vehicle and then lowered onto the ball. The socket receiver should, generally, have a slightly larger diameter than the ball so that the receiver fully engages or mates with the ball. Generally, once the trailer is mated to the vehicle, a separate manual operation must be performed to insure that the ball is locked into the receiving socket so that the receiver is no longer free to disengage from the ball.

[0007] In the prior art, when a ball is mounted in the middle of the bed of a pickup, the operator must get into the back of the vehicle to perform the manual operation of locking the coupler.

[0008] Due to the configuration of most towing vehicles, this requires the operator to climb over the side of the bed or attempt to climb up the back gated portion where the trailer is now positioned. This practice leads to potential for an injury to the operator. Furthermore, when the operator desires to remove the trailer from the towing vehicle, the operator must once again climb into the bed of the vehicle to unlock the coupler for disengagement.

[0009] Also, it is not uncommon in the prior art for the operator, who has lowered the receiver onto the ball, to believe that the coupler is locked in when the opposite is true. Unfortunately, this leads to potentially dangerous situations where the trailer disengages while being towed.

[0010] Some of these shortcomings in the prior art also similarly apply to conventional trailer hitches mounted on the rear of a vehicle without a gooseneck assembly. Furthermore, in the prior art standard trailer hitches that use a mating system of a ball attached to the rear of a vehicle such

as behind or on the rear bumper often require the locking mechanism to also act as a supporting function and sometimes even a pulling function. These configurations may be extremely difficult to operate and require substantial effort to lock or unlock.

[0011] Furthermore, many of these prior art hitches may be placed in a latched configuration but a separate manual operation is required to lock the device in the latched configuration. If a person fails to take the extra step of locking the device, then a potentially dangerous situation may exist.

[0012] Thus, there is a need for a self locking trailer coupler which provides for an automatic locking, a visual indicator that the coupler is locked in position, and a remote release for unlocking said coupler.

### SUMMARY OF THE INVENTION

[0013] In general, the present invention is a new and improved trailer coupler which is spring loaded so that, when the ball slides into the receiver socket, it is locked into position with a visual indicator that the receiver is locked onto the ball. The present invention also provides a means to remotely unlock the receiver from the ball.

[0014] In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in this application to the details of construction and to the arrangement so the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting. As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

[0015] Further, the purpose of the foregoing abstract is to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientist, engineers and practitioners in the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and essence of the technical disclosure of the application. The abstract is neither intended to define the invention of the application, which is measured by the claims, nor is it intended to be limiting as to the scope of the invention in any way.

[0016] It is therefore an object of the present invention to provide a new and improved trailer coupler which automatically locks in place on the receiver when the coupler is lowered on the receiver.

[0017] It is a further object of the present invention to provide a new and improved trailer coupler which may be easily and efficiently manufactured and marketed.

[0018] An even further object of the present invention is to provide a new and improved trailer coupler which is of a more durable and reliable construction than that of the existing known art.

[0019] Still another object to the present invention to provide a new and improved trailer coupler which is susceptible of a low cost of manufacture with regard to both materials and labor, which accordingly is then susceptible of low prices of sale to the consuming public, thereby making such economically available to the buying public.

[0020] Another object of the present invention is to provide a new and improved trailer coupler which provides some of the advantages of the prior art, while simultaneously overcoming some of the disadvantages normally associated therewith.

[0021] Yet another object of the present invention to provide a new and improved trailer coupler which is remotely actuated to release the coupler off the receiver without the need of the operator to physically access the coupler.

[0022] Still yet another object of the present invention is to provide a new and improved trailer coupler with a locking mechanism which may work on gooseneck couplers as well as standard ball hitches attached to the rear of a vehicle.

[0023] A further object of the present invention is to provide a new and improved trailer coupler which uses a mechanical advantage of spring loading and multiple plates for latching and locking hitches in place.

[0024] These together with other objects of the invention, along with the various features of novelty which characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference would be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. 1 is a perspective view of a preferred embodiment of the invention with a partial cut away of the bed of a towing vehicle.

[0026] FIG. 2 is an exploded perspective view with a partial cut-away showing a preferred embodiment of the invention.

[0027] FIG. 2A is a perspective view of a preferred embodiment of the invention showing the reverse side of a preferred embodiment of elements in FIG. 2.

[0028] FIG. 3 is a perspective view of a preferred embodiment of the invention in a locked configuration with a partial cutaway.

[0029] FIG. 3A is a perspective view of a preferred embodiment of the invention in a locked configuration.

[0030] FIG. 4 is a perspective view of a preferred embodiment of the invention in an unlocked configuration with a partial cutaway.

[0031] FIG. 4A is a perspective view of a preferred embodiment of the invention in an unlocked configuration.

[0032] FIG. 5 is a perspective view of a preferred embodiment of the invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] Referring now to the drawings, wherein like reference numerals designate corresponding structure throughout the views, and referring in particular to FIG. 1, reference numeral 10 designates a preferred embodiment of a new and improved trailer coupler system in accordance with the current invention. Coupler system 10 is generally adapted to be used with conventional trailers 12 including fifth wheelers. A preferred embodiment is for trailers 12 of the type including a gooseneck 14, possessing a generally substantially vertical extending column 16, and a generally vertically axially reciprocal jack 18 actuated by a manual hand crank 20 to selectively support the gooseneck 14 when the trailer is not engaged to a towing vehicle 22.

[0034] Towing vehicle 22 can be but is not limited to a pick-up truck. As in conventional trailer hitches of this type a standard substantially spherical trailer ball hitch 24 is mounted in an upstanding manner through a floor 26 of a cargo bed 28 of the towing vehicle 22.

[0035] It is further contemplated that coupler system 10 may also be used on trailers 12 without the gooseneck 14 that generally attach to rear 30 of the towing vehicle 22 with mounted ball hitch 24. It is also further contemplated that coupler system 10 could be retrofitted to existing trailers 12 as well as installed during the manufacture of trailer 12.

[0036] Referring to the drawings and FIGS. 2 and 2A in particular, coupler system 10 generally comprises a trailer coupler 32 generally comprising a housing 34 having a recessed socket 36 with a downwardly directed socket opening 38 for receiving ball hitch 24. Housing 34 generally includes top aperture 40, bottom aperture 42, and clean out access port 44 which will be discussed in greater detail below. Housing 34 may be attached to the gooseneck 14 by welding, bolting, or the like. Housing 34 may also be incorporated into trailer 12 or attached to trailer 12 without a gooseneck 14 such as but not limited to trailers 12 that attach to the rear 30 of the towing vehicle 22.

[0037] Coupler system 10 further includes an automatic locking means 46 which generally includes a retractable latching plate 48 in communication with a spring assembly 50. Plate 48 is spring biased such that plate 48 generally cooperates with socket 36 to couple or trap ball hitch 24 in socket 36 which will be discussed below in greater detail. Spring assembly 50 may generally include two springs 52 and 54, but may be constructed with one or more. Spring assembly 50 should allow for ball hitch 24 to pass and exit socket 36 when trailer 12 is lowered or raised such that springs 52 and 54 compress as ball hitch 24 passes. The force of ball hitch 24 pushes or retracts plate 48 and thereby compresses spring assembly 50 such that after the width of ball hitch 24 passes, spring assembly 50 pushes out such that plate 48 cooperates with socket 36 to hold ball hitch 24 in socket 36.

[0038] Automatic locking means 46 further includes locking mechanism 56 which generally includes tab 58 with spring 60 which may be positioned in member 62 along with spring assembly 50 and portion of latch plate 48. Member 62 may be removably attached to housing 34 by conventional means such as but not limited to pins 64 and 66 through apertures 68 and 70. Member 62 may further include aperture 72 which will be discussed in greater detail below.



[0039] Automatic locking means 46 may further include pin assembly 74 with pin 76 pull handle 78, aperture 80 for placing a safety pin 82 which will also be discussed in greater detail below, spring assembly 84 which biases pin 76 in a downward direction and further generally includes a retention positioning piece 86. Pin 76 is generally positioned in housing 34 top aperture 40 and member 62 aperture 72.

[0040] Referring to the drawings and FIGS. 3 and 3A in particular, locked configuration 88 generally refers to pin 76 passing through or entering housing 34 bottom aperture 42 such that plate 48 may not retract by limiting plate 48 travel direction and thus trapping ball hitch 24 in socket 36.

[0041] Again referring to then drawings and FIGS. 4 and 4A specifically, unlocked configuration 90 generally refers to pin 76 in an upward position such that pin 76 is blocked from entering housing aperture 42 by tab 58 thus allowing plate 48 to move freely back and retract. In the unlocked configuration 90, pin 76 may not enter housing 34 bottom aperture 42 while tab 58 blocks the passageway of pin 76. In FIGS. 4 and 4A, plate 48 is generally shown in a retracted position for purposes of illustration although the ball hitch 24 is not entered into socket 36.

[0042] Pin assembly 74 may further include a visual indicator 92 which may be color coded, such as but not limited to green, for a visual confirmation that the coupler 32 is in locked configuration 88. Pin 76 may further include groove or grooves 94 which may be colored coded in the recessed area of groove 94 so that the color will not be scraped off as pin 76 travels from the locked configuration 88 to the unlocked configuration 90.

[0043] Furthermore, housing 34 may further include safety pin 82 receiver 95 such that as the coupler 32 is in the locked configuration 88, safety pin 82 may thread through pin 76 and housing 34 so that pin 76 is trapped in a locked configuration 88. Pin 76 may also further include indenture 96 for adding further structural integrity when pin 76 is in the locked configuration 88. Coupler 32 is preferably constructed from metal or other durable material capable of handling associated forces with towing trailer 12.

[0044] Another preferred embodiment includes clean out access port 44 in housing 34 which allows dirt, grit, water and other foreign debris to be drained, blown out or removed from locking mechanism 56 member 62. Still another preferred embodiment adds a theft deterrent assembly (not depicted) wherein a separate lock may be added such as but not limited to threading a bolt of a lock through pin 76 and into to receiver 95. Other such theft deterrent assemblies may include locking pins or travel restrictor which prevent pin 76 from disengaging housing 34 bottom aperture 42.

[0045] Once again referring to FIG. 1, still another preferred embodiment of coupler system 10, coupler 32 is in communication with remote control assembly 98 for moving pin 76 from a downward locked configuration 88 to an upward unlocked configuration 90. Remote control assembly 98 generally includes a motor 100 or other device such as but not limited to an air cylinder, solenoid or vacuum cylinder which mechanically lifts pin 76. A remote control activator 102 is in communication with motor 100 and may be positioned on trailer 12 or towing vehicle 22. Communication may be hard wired or wireless. Power source 104

for motor 100 may be wired from towing vehicle 22 or attached to trailer 12 and may be a car battery or other such conventional battery.

[0046] Once again referring to the drawings and FIG. 5 in particular, in another preferred embodiment not fully depicted, coupler 32 generally comprises a dual pin construction 106 with a top plate 108, a middle plate assembly 110, a bottom plate 112, and a locking mechanism 114.

[0047] Top plate 108 is generally planar with a preferred embodiment of a rectangular shape but not limited to such. A preferred embodiment of top plate 108 has multiple apertures. In the center of top plate is aperture 116 for engaging ball hitch 24. Aperture 118 is generally located between first corner and second corner and aperture 120 is likewise generally located between third corner and fourth corner. Apertures 118 and 120 are provided for a preferred embodiment of locking mechanism 114.

[0048] Top plate 108 is generally attached to the gooseneck 14 at attachment point where receiver ball cap is provided to form the socket 36. Ball cap may be attached to top plate 108 or attached to interior of gooseneck 14. Ball cap generally carries the weight of the trailer 12 and is positioned to fit firmly onto ball hitch 24.

[0049] The middle plate assembly 110 generally comprises two locking mechanisms 56 such that as previously described above in a preferred embodiment. Plates 122 and 124 generally perform the same function as plate 48 but work in conjunction to trap ball hitch 24 from two opposing points.

[0050] A preferred embodiment of locking mechanism 114 generally comprises a first bracket 126, a second bracket 128, a first spring loaded locking pin 130, a second spring loaded locking pin 132, and a release assembly 134. Locking mechanism 114 first bracket 126 and second bracket 128 each generally comprise a "U" shape attached to top plate 108 such as but not limited to by welding. First bracket 126 and second bracket 128 generally include apertures.

[0051] Release assembly 134 generally comprises a manual release lever 136 with a preferred embodiment attached to first spring loaded locking pin 130 and second spring loaded locking pin 132. Release lever 136 extracts the locking pins 130 and 132 from engaging the bottom plate 112 by pulling locking pins 130 and 132 generally upward which in turn moves locking pins 130 and 132 into the unlocked position. In a preferred embodiment, release lever 136 generally has a handle portion 137, a first rocking point 138 generally resting on or near first bracket 126 and a second rocking point 140 generally resting on or near on second bracket 128. Rocking points 138 and 140 provide leverage when handle portion 137 is depressed. Manual release lever 136 generally attaches with first spring loaded locking pin 130 at a pivot and attaches with second spring loaded locking pin 132 at a pivot.

#### IN OPERATION

[0052] As trailer 12 is desirably positioned behind towing vehicle 22, coupler 32 is aligned over receiver ball hitch 24 positioned on the floor 26 in cargo bed 28 of towing vehicle 22 or rear 30 of towing vehicle for non-gooseneck 14 trailers 12. Trailer 12 is generally lowered so that coupler 32

engages receiver ball hitch 24 in socket 36, such as but not limited to lowering trailer 12 by hand crank 20.

[0053] As coupler 32, in the unlocked configuration 90, engages ball hitch 24 through socket opening 38, ball hitch 24 pushes or retracts plate 48 by compressing spring assembly 50. After ball hitch 24 passes plate 48, plate 48 spring assembly 50 pushes out such that plate 48 cooperates with socket 36 to hold ball hitch 24 in socket 36.

[0054] During the pushing back or retracting of plate 48, tab 58 is also pushed backward freeing pin assembly 74 such that pin 76 drops and is pushed downward by spring assembly 84 such that pin 76 may enter housing 34 bottom aperture 42. In this position, plate 48 is no longer able to freely retract.

[0055] To reset coupler 32 back to an unlocked configuration 90, user manually lifts pin 76 from housing 34 bottom aperture 42 compressing spring assembly 84 of pin assembly 74. As pin 76 moves upward, spring 60 of tab 58 slides across bottom aperture 42 such that pin 76 is resting on tab 58. The locking mechanism 56 is now loaded such that pushing back or retracting plate 48 will then automatically activate and lock when ball hitch 24 enters socket 36.

[0056] The lifting of pin 76 may also be remotely accomplished by remote control assembly 98 such that user activates remote control activator 102 which communicates to motor 100 to retract pin 76.

[0057] Whereas, the present invention has been described in relation to the drawings attached hereto, it should be understood that other and further modifications, apart from those shown or suggested herein, may be made within the spirit and scope of this invention.

What is claimed is:

1. A new and improved trailer coupler for connecting a trailer to a ball hitch on a towing vehicle comprising:

- (a) a housing and having a recessed socket with a downwardly directed socket opening for receiving said ball hitch;
- (b) a retractable latching plate connected to said housing and having a spring assembly wherein said plate may retract when said spring assembly is compressed for allowing said ball hitch to enter and exit said recessed socket and wherein said plate may further cooperate with said recessed socket such that said ball hitch is trapped in said socket;
- (c) a locking mechanism connected to said housing for automatically positioning said plate and cooperates with said plate to provide:
  - (1) an unlocked configuration wherein said plate may freely retract when said spring assembly is compressed allowing for said ball hitch to enter and exit said recessed socket, and
  - (2) a locked configuration wherein said plate may not retract thereby confining said ball hitch in said recessed socket.

2. The trailer coupler of claim 1 wherein said housing further defines a passageway for communicating with a spring loaded pin that passes through said passageway and communicates with said locking mechanism when said locking mechanism is in a locked configuration.

3. The trailer coupler of claim 2 wherein said pin further includes an indentation that communicates with said latching plate when said locking mechanism is in a locked configuration.

4. A coupler system for connecting a gooseneck trailer to a ball hitch on a towing vehicle, comprising:

- (a) an automatic locking means connected to said gooseneck trailer for locking said gooseneck trailer to said ball hitch as said gooseneck trailer is lowered onto said ball hitch,
- (b) a selectively activated unlocking means connected to said gooseneck trailer for releasing said ball hitch from said gooseneck trailer, and
- (c) a remote control in communication with said unlocking means for selectively activating said unlocking means.

5. The coupler system of claim 4 wherein said automatic locking means further includes a visual indicator that said gooseneck trailer is locked to said ball hitch.

6. The coupler system of claim 4 wherein said selectively activated unlocking means further includes a motor in communication with a power source for releasing said ball hitch from said gooseneck trailer.

7. The coupler system of claim 6 wherein said power source is attached to said towing vehicle.

8. The coupler system of claim 4 wherein said remote control is attached to said gooseneck trailer.

9. The coupler system of claim 4 wherein said remote control is attached to said towing vehicle.

10. The coupler system of claim 4 wherein said selectively activated unlocking means further includes a backup manual release for releasing said ball hitch from said gooseneck trailer.

11. A new and improved trailer coupler system for connecting a trailer to a ball hitch on a towing vehicle comprising:

- (a) a housing and having a recessed socket with a downwardly directed socket opening for receiving said ball hitch;
- (b) a first retractable latching plate having a first spring assembly and a second retractable latching plate having a second spring assembly, whereby said first plate and said second plate are connected to said housing and wherein said first plate and said second plate may retract in opposite directions when said first spring assembly and said second spring assembly are respectively compressed for allowing said ball hitch to enter and exit said recessed socket and wherein said first plate and said second plate may further cooperate with said recessed socket such that said ball hitch is trapped in said socket;
- (c) a first locking mechanism connected to said housing and a second locking mechanism connected to said housing for automatically positioning said first plate and said second plate respectively that cooperates with said first plate and said second plate respectively to provide:
  - (1) an unlocked configuration wherein said first plate and said second plate may retract when respective said first spring assembly and said second spring

assembly are compressed allowing for said ball hitch to enter and exit said recessed socket, and

(2) a locked configuration wherein said first plate and said second plate may not retract thereby confining said ball hitch in said recessed socket.

12. The trailer coupler system of claim 11 wherein said trailer is a gooseneck trailer.

13. The trailer coupler system of claim 12 further including a visual indicator for said locked configuration.

14. The trailer coupler system of claim 13 which further includes a remote activation means for respectively posi-

tioning said first locking mechanism and said second locking mechanism to said unlocked configuration.

15. The trailer coupler system of claim 14 wherein said remote activation means is in communication with said towing vehicle.

16. The trailer coupler system of claim 14 wherein said first locking mechanism and said second locking mechanism further respectively include a clean out access port.

\* \* \* \* \*

# Tab BB

PUB-NO: DE003321306A1

DOCUMENT-IDENTIFIER: DE 3321306 A1

TITLE: Motor vehicle trailer, preferably caravan

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**Abstract Text - FPAR (1):**

CHG DATE=19990617 STATUS=O> A motor vehicle trailer, preferably a caravan, is described, having a rounded vehicle front, cover strips which are constructed as weather strip rails laterally covering the joints between the essentially plane side walls of the trailer, its arched front wall and the roof. The weather strip rails serve for the retraction of an awning or the like. The weather strip rails are of continuous construction for the purpose of inserting the awning or the like without difficulty.

**Title of Patent Publication - TTL (1):**

Motor vehicle trailer, preferably caravan

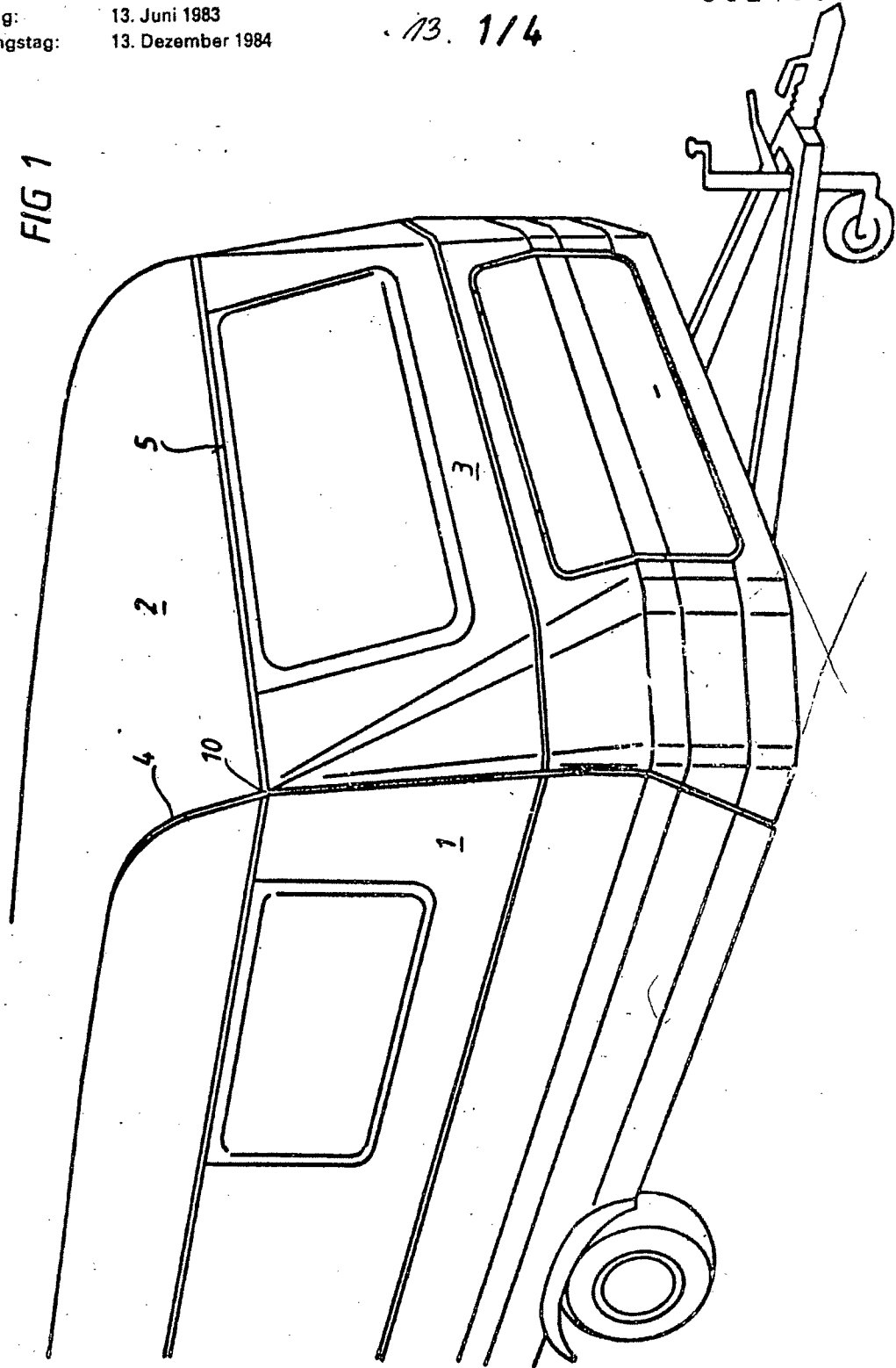
Nummer:  
Int. Cl. 3:  
Anmeldetag:  
Offenlegungstag:

33 21 306  
B 60 P 3/32  
13. Juni 1983  
13. Dezember 1984

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13. 1/4

FIG 1



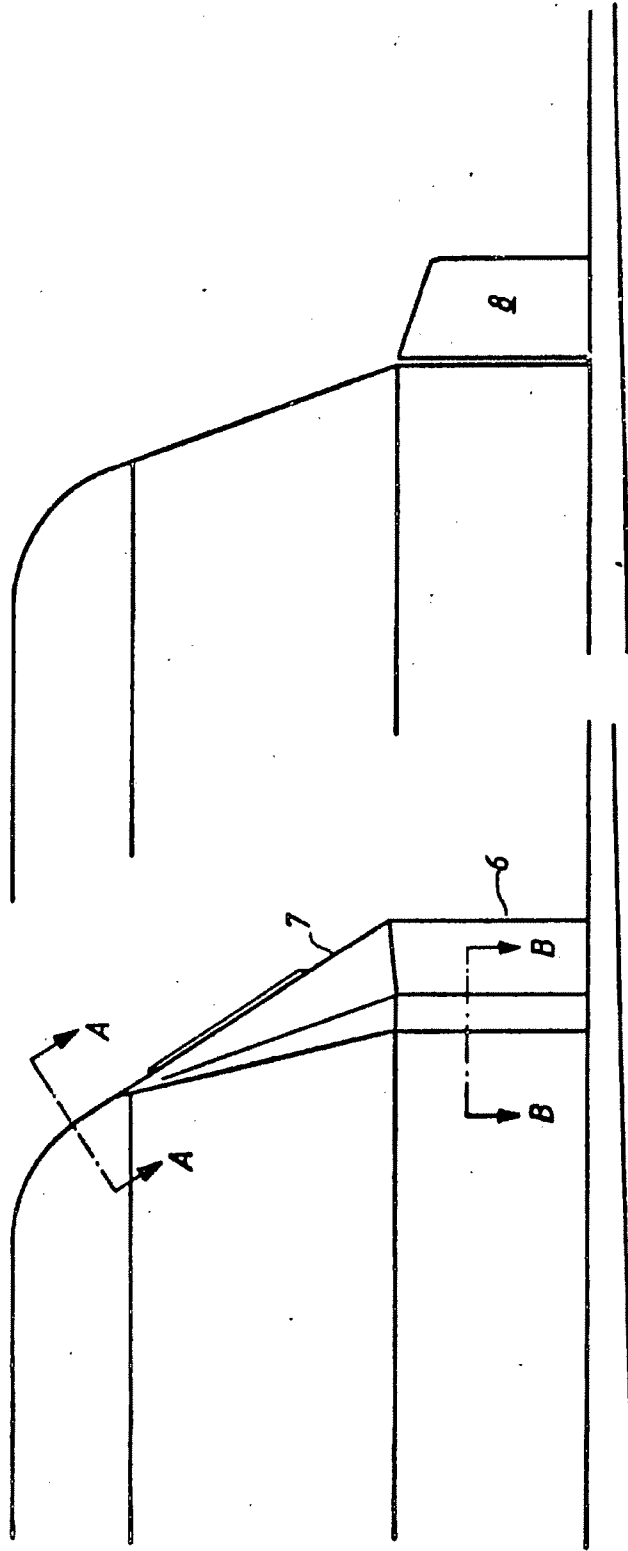


FIG 3

FIG 2

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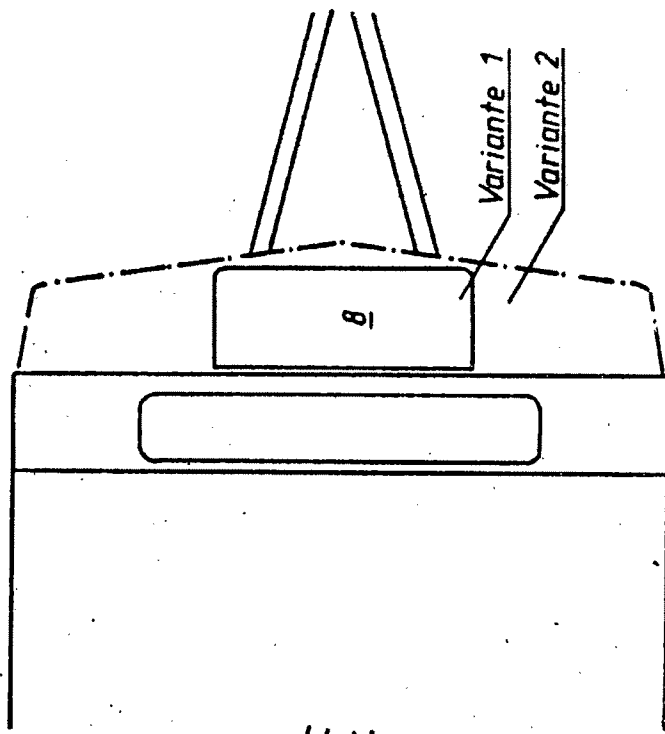


FIG 5

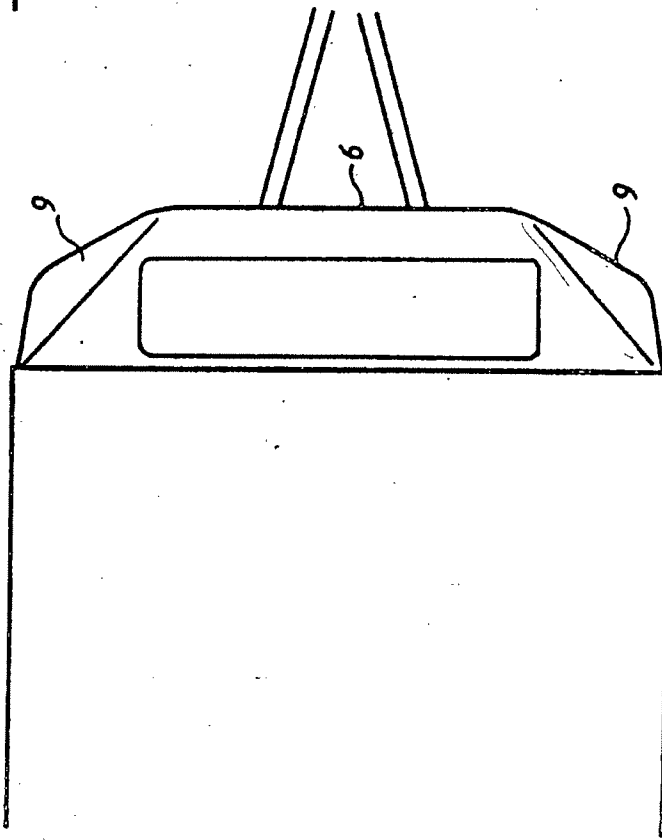


FIG. 4



12 4/4

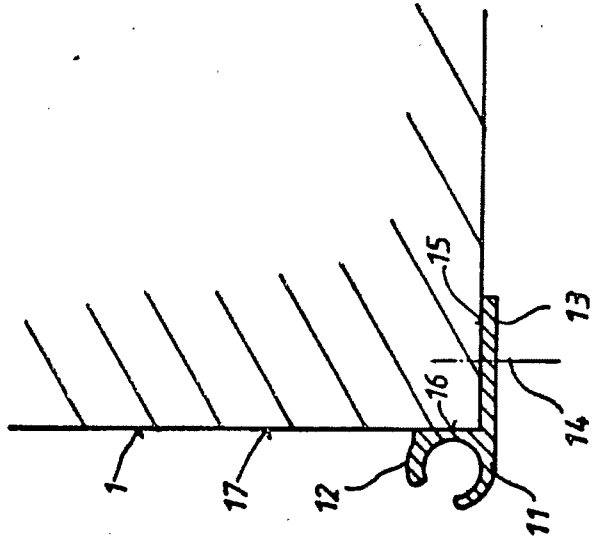


FIG 7

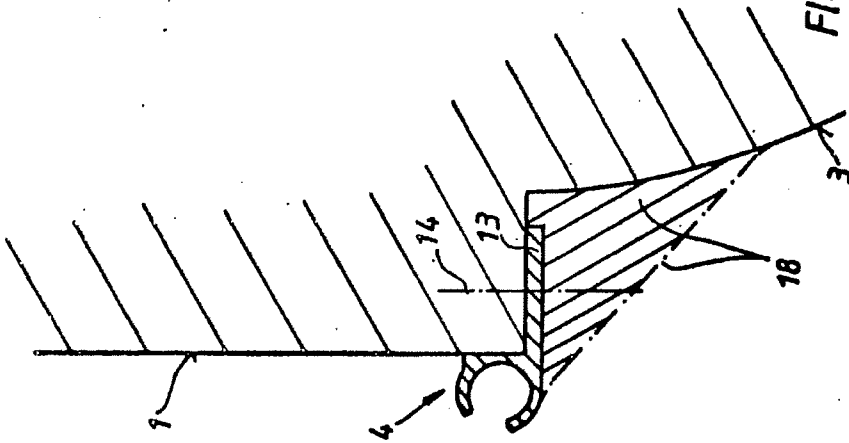


FIG 6