

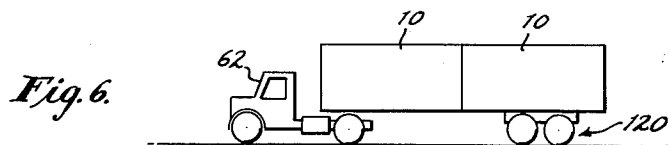
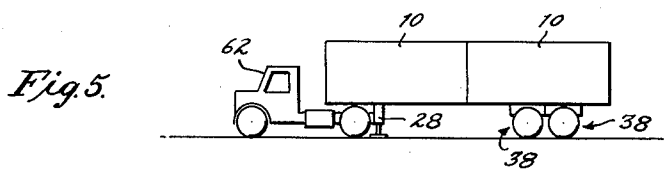
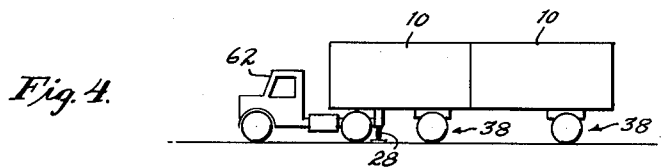
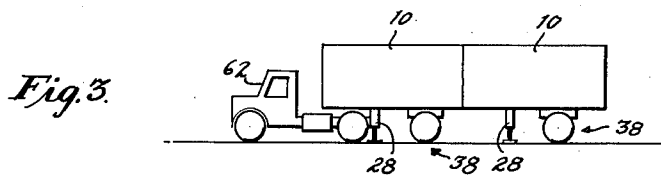
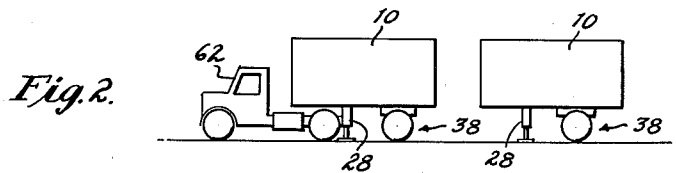
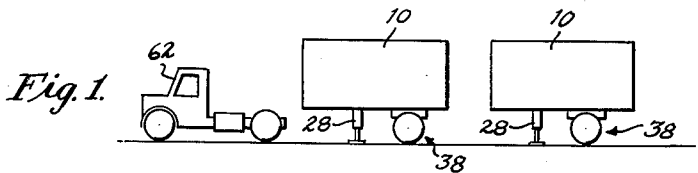
Oct. 17, 1961

C. I. BOHLEN ET AL
TANDEM AXLE SEMI-TRAILER CONVERTIBLE TO SINGLE
AXLE SEMI-TRAILERS AND VICE VERSA

3,004,772

Filed May 18, 1959

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

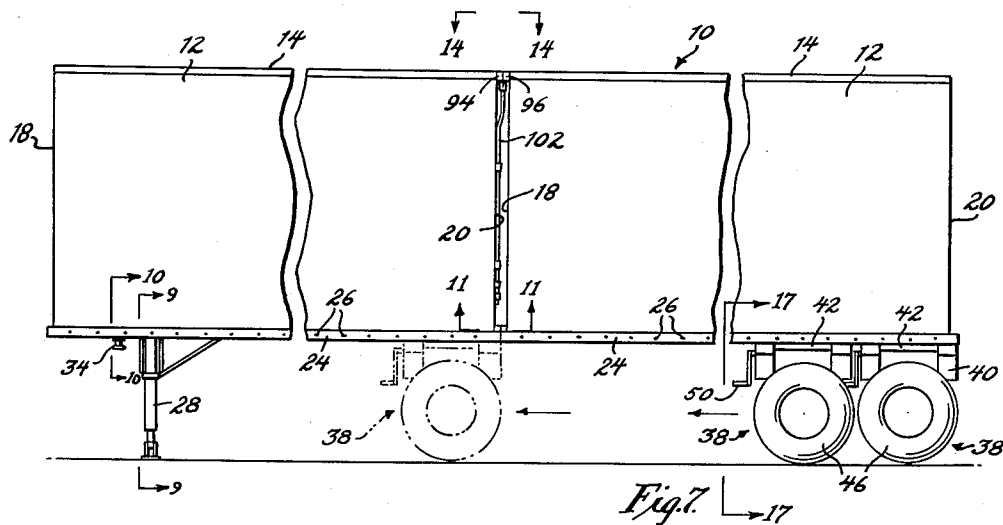


Fig. 7

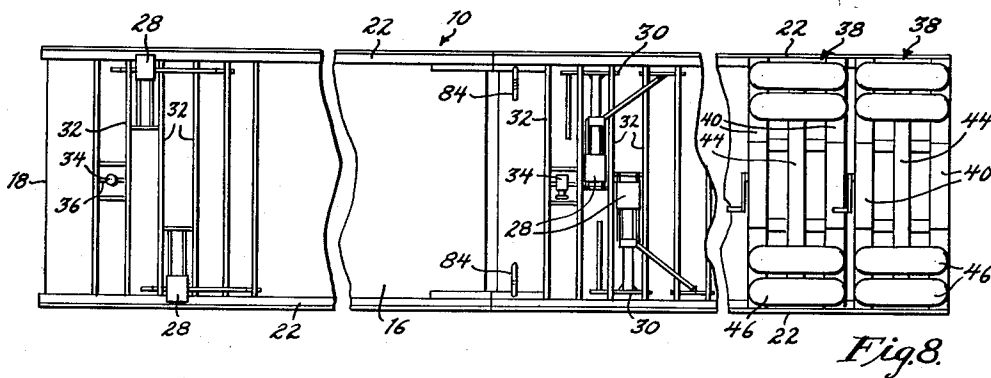


Fig. 8

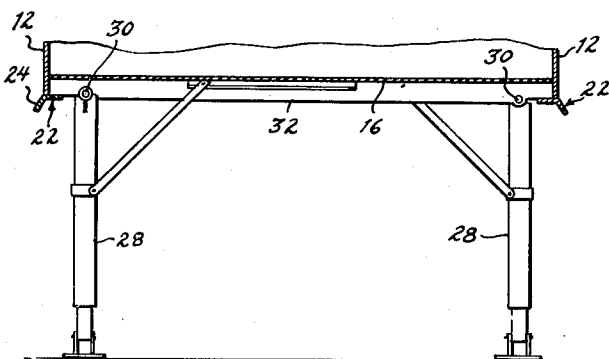


Fig. 9

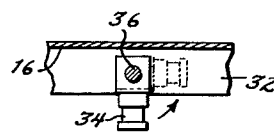


Fig. 10

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C. I. BOHLEN ET AL **3**
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5 Sheets-Sheet 3

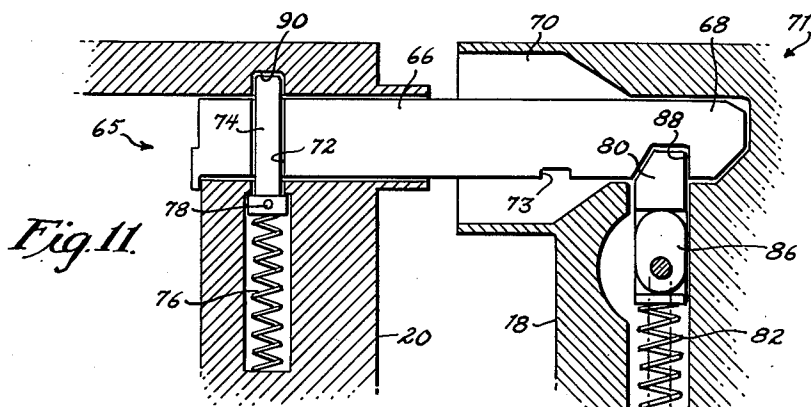


Fig. 11.

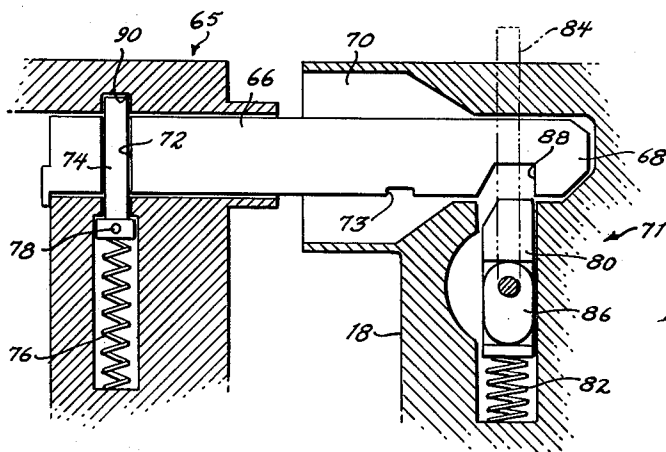


Fig. 12.

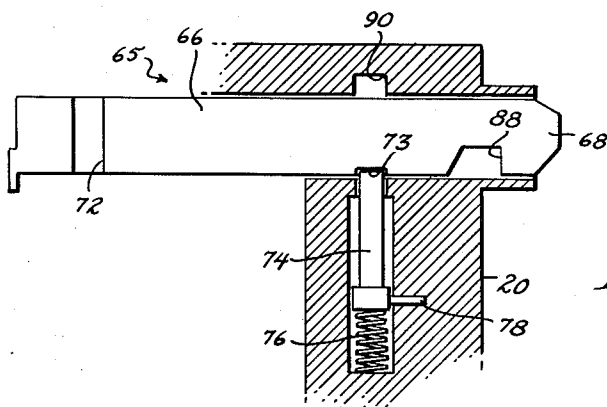


Fig. 13.

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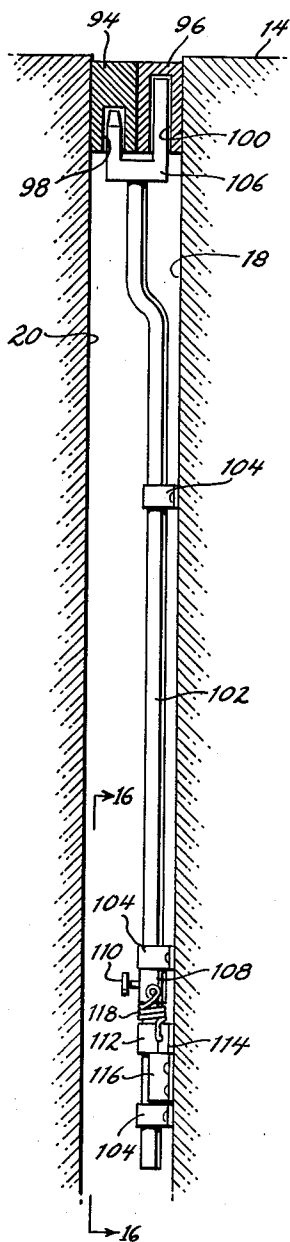


Fig. 15.

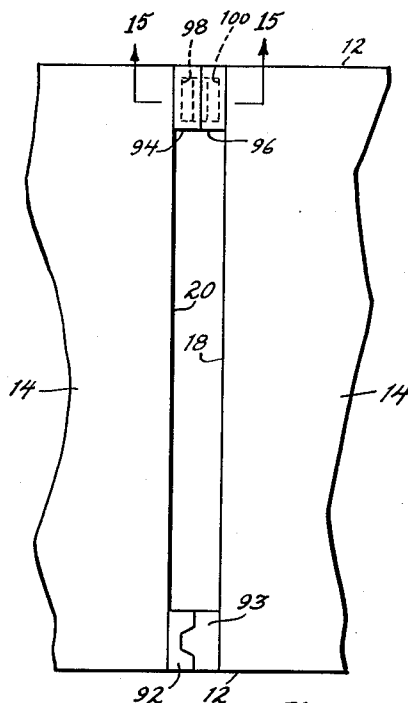


Fig. 14.

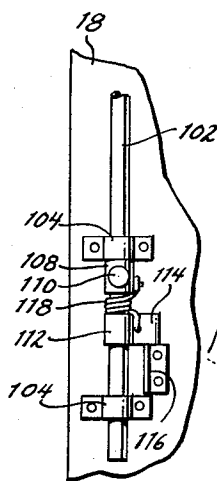


Fig. 16.

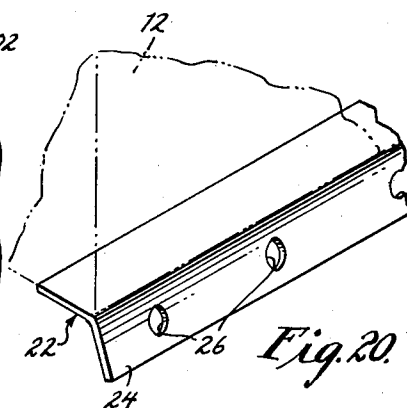


Fig. 20.

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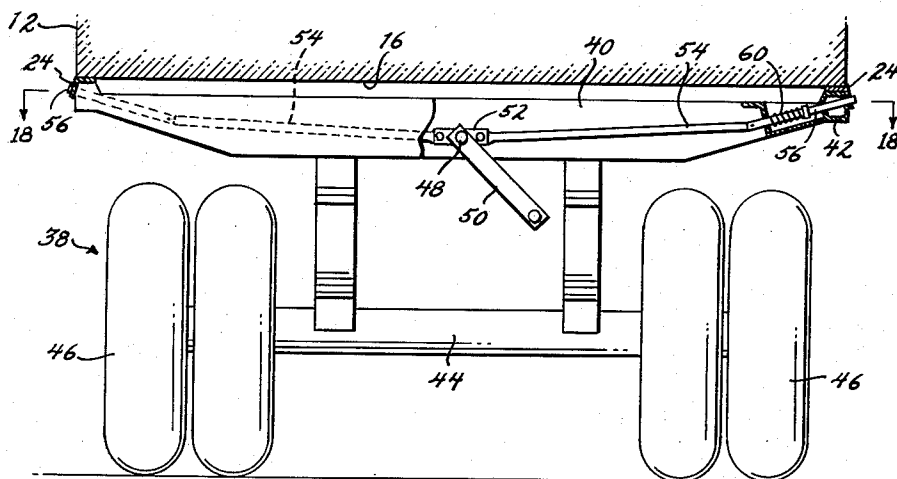


Fig. 17

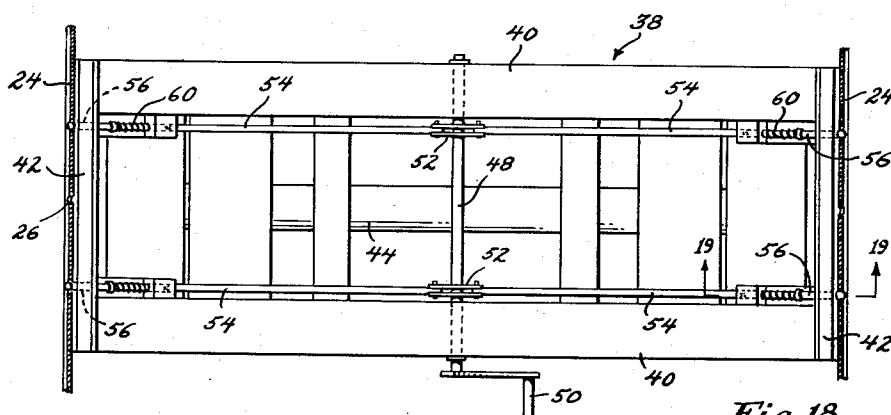


Fig. 18

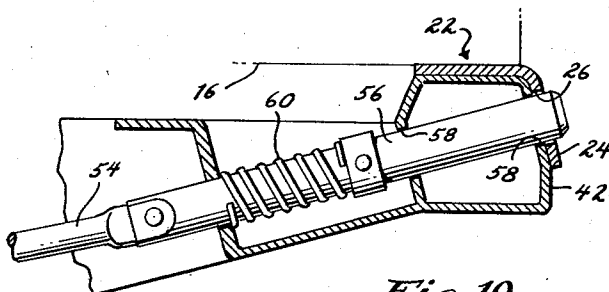


Fig. 19

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TANDEM AXLE SEMI-TRAILER CONVERTIBLE TO SINGLE AXLE SEMI-TRAILERS AND VICE VERSA

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Filed May 18, 1959, Ser. No. 813,856

8 Claims. (Cl. 280-415)

This invention relates to an over-the-road semi-trailer and has for its primary object to provide a structurally sound multi-body tandem axle vehicle which is readily convertible to individual single axle vehicles.

Another object of the invention is to provide two or more van size cargo bodies which are frameless and separably but rigidly coupled horizontally to produce a unitary structure in which tension, compression, vertical and lateral shear forces are transmitted from body to body so that the connected bodies can be supported by removable and/or shiftable wheel bogies and drawn by a tractor without the need for running gear which will contribute to the strength and weight of the connected bodies. Thus the vehicle with the connected bodies can serve as a single large semi-trailer having desirable weight requirements and at the same time, by a relatively simple procedure, the vehicle can readily be converted to individual single body, single axle semi-trailers when necessary or desired.

Another object of the invention is to provide horizontally coupled separable van size frameless cargo bodies, to the rearmost body of which is removably coupled a pair of single axle bogies, one of which may be uncoupled and moved to the forward body and there coupled so that the bodies when separated become individual single axle trailers.

Another object of the invention is to provide a vehicle of the character described wherein the conversion of the same from one tandem axle trailer to several individual single axle trailers and vice versa can be effected with relative ease and speed.

These and other objects of the invention will become more apparent as the following description proceeds in conjunction with the accompanying drawings, wherein:

FIGURES 1-5 are diagrammatic side elevational views illustrating the manner of converting two single axle van size cargo bodies to a tandem axle semi-trailer;

FIGURE 6 is a diagrammatic side elevational view of a modified form of tandem axle semi-trailer;

FIGURE 7 is a side elevation of horizontally coupled bodies;

FIGURE 8 is a bottom plan view of the coupled bodies with the landing gear and king pin of the rearmost body shown retracted to allow for bogie passage;

FIGURE 9 is an enlarged sectional view taken on the line 9-9 of FIGURE 7;

FIGURE 10 is an enlarged sectional view taken on the line 10-10 of FIGURE 7;

FIGURE 11 is an enlarged sectional view taken on the line 11-11 of FIGURE 7 and showing the couplers locked;

FIGURE 12 is a view similar to FIGURE 11 showing the coupler extended but not locked;

FIGURE 13 is a view similar to FIGURE 11 showing the coupler retracted;

FIGURE 14 is a plan view looking down from line 14-14 of FIGURE 7;

FIGURE 15 is an enlarged sectional view taken on the line 15-15 of FIGURE 14;

FIGURE 16 is a view looking from line 16-16 of FIGURE 15;

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FIGURE 17 is an enlarged sectional view taken on the line 17-17 of FIGURE 7;

FIGURE 18 is a sectional view taken on the line 18-18 of FIGURE 17;

FIGURE 19 is an enlarged sectional view taken on the line 19-19 of FIGURE 18; and

FIGURE 20 is a fragmentary enlarged perspective view of the body track angle.

Specific reference is now made to the drawings wherein similar reference characters are used for corresponding elements throughout.

The bodies referred to herein are van size cargo containers which, by accepted definition in the trade, have an area greater than 64 sq. ft. and a height of generally 8 ft. Each body 10, which is preferably rectangular, comprises side walls 12, an upper wall or roof 14, a bottom wall 16, a front wall 18 and a rear wall 20. The walls are preferably made of sheet metal and the body has no frame. Welded or otherwise secured to the bottom wall and extending longitudinally of the body at the side edges are tracks 22, preferably in the form of angle irons having depending flanges 24 with longitudinally spaced apertures 26 therethrough.

In the preferred form of the invention each body is provided with a retractable landing gear and king pin although it should be understood that the invention can be carried out with other equivalent devices separable or separate from the bodies but serving the same function. The landing gear 28 is conventional and is pivoted as at 30 to depending ribs 32 carried by the bottom wall of the body. In the retracted or inoperative position the landing gear is folded against the bottom wall, as shown on the right side of FIGURE 8, and occupies the recess or space between the ribs 32 and the bottom wall. The same is true of the king pin 34 which is also pivoted as at 36 to the ribs 32 and retractable into the recess formed by said ribs and the bottom wall, both the landing gear and king pin being associated with the body adjacent its front end.

Coming now to the bogies 38, each includes a relatively small rectangular frame having transverse members 40 interconnected at their ends by longitudinal, preferably hollow box-like members 42. The frame supports, in an appropriate and conventional manner, a single axle 44 mounting tired wheels 46.

Each bogie can be removably or detachably coupled to each body by any suitable means. One of such means is shown more particularly in FIGURES 17-19 and consists simply of a longitudinal shaft 48 rotatably mounted centrally of the bogie frame with a suitable handle 50 at one end thereof. Bell cranks 52 are secured to the shaft to which are terminally pivoted transversely extending links 54 which are in turn operatively connected to spring urged coupling pins 56. The longitudinal box-like members 42 of the bogie frame engage the tracks 22 which guide the longitudinal movement of the bogie to any desired position where the apertures 58 in the members 42 align with the track apertures 26 transversely of the body 10. At this position, the springs 60 urge the pins 56 through the track apertures 26, as shown in FIGURE 19, thereby coupling the bogie directly to the body at a desired position. Rotation of the handle 50 in a given direction will retract the coupling pins and allow the bogie to be slid longitudinally of the body with the tracks 22 serving as guides or to be removed entirely from beneath the body. Any suitable safety lock (not shown) may be associated with the coupler.

The frameless bodies are coupled horizontally by a means, the combined effect of which is to transmit tension, compression, vertical and horizontal shear forces from container to container so that when mounted as such on the bogies and drawn by a tractor 62 no heavy

underframes or other supports are required. A number of such means may be employed.

The means separably coupling the lower corners of the rear wall 20 of the forward body to the front wall 18 of the rear body must transmit tension, horizontal and vertical shear forces from container to container. One such means 64 is shown in FIGURES 11-13 although other equivalent means may be used. This comprises a member 65 operatively connected to the rear wall 20 of one body adjacent the lower corner thereof in which is slidably mounted a horizontally extending latch bar 66 having a hook 68 at its outer end adapted to enter an open socket 70 in a member 71 operatively connected to the front wall 18 of the second body adjacent the lower corner thereof. The latch bar 66 includes an aperture 72 therethrough adjacent its inner end and a notch 73 adjacent its hooked end.

Slidably mounted in the member 65 is a plunger 74 normal to the latch bar 66 which is urged by a spring 76 towards the latch bar, there being a handle 78 for operation of said plunger. Slidably mounted in the member 71 is a keeper bar 80 normal to the latch bar and urged thereagainst by a spring 82, the keeper bar pivotally mounting a handle 84 equipped with a locking cam 86. In operation, when the walls 20 and 18 are adjacent each other and the bodies are in substantial horizontal alignment, the plunger 74 is retracted by the handle 78 and the latch bar is slid into the socket 70, in the position shown in FIGURE 12 with the handle 84 of the keeper bar 80 in the non-camming position, whereupon the keeper bar 80 is urged into positive engagement with the hook 68. Rotation of the handle 84 to the position shown in FIGURE 11 will cam the keeper bar 80 and positively lock the same in the notch 88 of the hook end of the latch bar. In this position, the plunger 74 will also extend through the aperture 72 in the latch bar and will, at its free end, engage in a notch 90 in the corner member 65. To uncouple the bodies, the handle 84 is moved to its non-camming position, as shown in FIGURE 12, and the latch bar 66 is retracted while the plunger 72 is also retracted, until the hook end 68 of the latch bar is free of the corner member 71 and attains a position where the plunger 74 is urged into engagement with the notch 73 to releasably retain the latch bar in its retracted position as shown in FIGURE 13.

The means horizontally coupling the rear wall 20 of the forward body to the front wall 18 of the rear body adjacent their upper corners must transmit compression and some lateral shear forces from container to container. While many such means may be employed, one such means is shown, for illustrative purposes only, in FIGURES 14-16. Operatively connected to the rear wall 20 of the forward body adjacent one upper corner thereof is a grooved member 92 which receives the tongue member 93 associated with the forward wall 18 of the rear body adjacent one upper corner thereof. At the remaining upper corners of the rear walls 18 and 20 are members 94 and 96 having downwardly opening slots 98 and 100. A vertical rod 102 is mounted by suitable brackets 104 upon one of the walls, the upper end of the rod 102 carrying a yoke 106 the legs of which are adapted to enter the slots 98 and 100 as shown in FIGURE 15.

Secured to the rod 102 beneath one of the brackets 104 adjacent its lower end is a collar 108 carrying a handle 110. Rotatably mounted on the rod beneath the handle is a collar 112 having a radially extending lug 114. Above the lower bracket 104 there is secured to the wall panel 20 an angle member having a keeper portion 116 extending generally perpendicular to the wall panel. A torsion spring 118 interconnects collars 108 and 112 normally urging the lug 114 against the wall panel. To effect coupling between the upper corner members 94 and 96, the rod 102 is raised by the handle 110 until the legs of the yoke 106 engage in the corner member

slots 98 and 100 as shown in FIGURE 15. During the upward vertical movement of the rod 102 the lug 114 bears against the free edge of the keeper portion 116. In the coupled position, the lug 114 clears the keeper portion 116 and the spring 118 urges the lug against the wall panel so that the lug engages the upper edge of said keeper portion 116 as shown in FIGURE 16. To uncouple, the lug 114 is rotated out of engagement with the upper edge of the keeper portion 116 and the rod 120 is moved downwardly via the handle 110.

It should be understood that other means may be employed to couple the bodies horizontally including semi-automatic and automatic means operative in response to the movement of the bodies towards each other, end to end.

The system of converting single axle trailers to a tandem axle trailer is illustrated in FIGURES 1-5. With the forward body removably coupled to one bogie 38 and further supported at its forward end by the landing gear 28 or other suitable support, the tractor 62 is coupled thereto via the king pin carried by the trailer body. The landing gear is retracted or removed and the trailer is then backed up so that the rear end thereof is placed adjacent the front end of the second trailer body which has already been removably coupled to its bogie 38 and which has been supported on its landing gear as shown in FIGURES 1 and 2. The two bodies are then rigidly coupled together horizontally and the landing gear on the second or rearmost is retracted or removed. The brakes on the bogie of the forward body are locked and those on the bogie of the rearmost body are released and then the bogie under the foremost body is released from its connection to the body. The tractor then pulls both bodies forward until the bogie of the foremost body is adjacent the rear bogie and is there locked in position.

To reverse the system and convert the multi-body tandem axle trailer to individual single axle trailers, the brakes are applied to the forward bogie of the rearmost body and said bogie is uncoupled from the body. The tractor is driven backwards until the forward bogie is underneath the rear of the forward trailer where said forward bogie is then coupled to the forward body. Thereafter when the bodies are uncoupled, the rearmost body can be coupled to another tractor.

It is to be understood that the principles of the invention are also applicable to a structure in which a single bogie frame mounting a pair of axles, as shown at 120 in FIGURE 6, is removably coupled to the rearmost body. In this case the single bogie dual axle unit may be removed and replaced by a single axle bogie at the rearmost body and an additional single axle bogie may be coupled to the forward body to produce individual single axle trailers. It should also be understood that the term "pair of" when used to refer to the bodies means two or more.

While a preferred embodiment of the invention has been shown and described, skilled artisans may make minor variations without departing from the spirit of the invention and the scope of the appended claims.

We claim:

1. An over-the-road semi-trailer comprised of a pair of frameless van size cargo bodies each including a means to removably receive bogies, means separably and rigidly coupling said bodies together horizontally, said means transmitting tension, compression and shear forces from body to body in magnitudes sufficient to produce a unitary structure, and a pair of single axle bogies removably coupled adjacent each other to the rearmost body whereby any one of said bogies when uncoupled can be moved and removably coupled to the forward body so that after the bodies are uncoupled a pair of individual single axle trailers are produced.

2. An over-the-road semi-trailer comprised of a pair of frameless van size cargo bodies, means separably and rigidly coupling said bodies together horizontally, said means transmitting tension, compression and shear forces

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from body to body in magnitudes sufficient to produce a unitary structure, a pair of single axle bogies removably coupled adjacent each other to the rearmost body adjacent its rear end, and means carried by said bodies and engaging portions of said bogies whereby anyone of said bogies when uncoupled is guided in its sliding movement from body to body.

3. The combination of claim 2 wherein said guide means includes tracks running lengthwise of said bodies, said bogies being removably coupled to said tracks.

4. An over-the-road semi-trailer comprised of a pair of frameless van size cargo bodies, means separably and rigidly coupling said bodies end to end, said means transmitting tension, compression and shear forces from body to body in magnitudes sufficient to produce a unitary structure, open-ended guide tracks extending lengthwise of each body, the tracks of one body being in substantial longitudinal alignment with the tracks of the other body, a pair of single axle bogies, and means removably coupling the bogies adjacent each other to the tracks of the rearmost body adjacent its rear end, said bogies having portions engaging said tracks whereby one of said bogies may be uncoupled, slid from the rearmost body to the forward body and there removably coupled to the tracks of said forward body adjacent its rear end so that after the bodies are uncoupled a pair of individual single axle trailers are produced.

5. An over-the-road semi-trailer comprised of a pair of frameless van size cargo bodies, means separably and rigidly coupling said bodies together horizontally to produce a unitary structure, a pair of single axle bogies removably coupled adjacent each other to the rearmost body, and means carried by said bodies and engaging portions of said bogies whereby any one of said bogies when uncoupled is guided in its sliding movement from body to body, said bodies including king pins pivoted thereto to retract to positions where they do not obstruct the sliding movement of any one of the bogies from body to body.

6. An over-the-road semi-trailer comprised of a pair of frameless van size cargo bodies, means separably and rigidly coupling said bodies together horizontally to produce a unitary structure, a pair of single axle bogies removably coupled adjacent each other to the rearmost body, and means carried by said bodies and engaging por-

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tions of said bogies whereby any one of said bogies when uncoupled is guided in its sliding movement from body to body, said bodies including landing gears pivoted thereto to retract to positions where they do not obstruct the sliding movement of any one of the bogies from body to body.

7. An over-the-road semi-trailer comprised of a pair of cargo bodies, means separably and rigidly coupling said bodies together horizontally to produce a unitary structure, a pair of single axle bogies removably coupled adjacent each other to the rearmost body, and means carried by said bodies and engaging portions of said bogies whereby any one of said bogies when uncoupled is guided in its sliding movement from body to body, said bodies including king pins so connected thereto as to be movable to positions where they do not obstruct the sliding movement of any one of said bogies from body to body.

8. An over-the-road semi-trailer comprised of a pair of cargo bodies, means separably and rigidly coupling said bodies together horizontally to produce a unitary structure, a pair of single axle bogies removably coupled adjacent each other to the rearmost body, and means carried by said bodies and engaging portions of said bogies whereby any one of said bogies when uncoupled is guided in its sliding movement from body to body, said bodies including landing gears so connected thereto as to be movable to positions where they do not obstruct the sliding movement of any one of said bogies from body to body.

References Cited in the file of this patent

UNITED STATES PATENTS

2,010,969	Soulis	Aug. 13, 1935
2,333,853	Fellabaum	Nov. 9, 1943
2,369,384	Zubatsky	Feb. 13, 1945
2,540,859	Birkin	Feb. 6, 1951
2,564,311	Rimailho	Aug. 14, 1951
2,731,276	Cross	Jan. 17, 1956
2,831,735	Bennett et al.	Apr. 22, 1958
2,841,094	Schumacher	July 1, 1958
2,867,450	Tenenbaum	Jan. 6, 1959
2,899,237	Nash	Aug. 11, 1959
2,976,051	Morey	Mar. 21, 1961