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GB 1325979 A EP 0649772 A1 US 4635742 A
US 4230334 A

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(54) Abstract Title
Semi-trailer assembly

(57) A semi-trailer assembly comprising a trailer chassis extendable between contracted and extended positions, and two or more sets of wheels 17 supporting the chassis, wherein the assembly includes means for automatically controlling the lowering and/or raising at least one of the pairs of wheels, upon retraction and/or extension of the length of the trailer chassis. The automatic means could disable and/or override any manual lift axle system on the semi-trailer assembly.

In one embodiment the means comprises a roller valve means 18 or similar electronic means adapted to lower the forward pair of wheels 17a upon extension of the trailer chassis length beyond a predetermined, e.g. legally set, distance. This eliminates the possibility of the vehicle being moved with the front axle 1 raised if the trailer is over a certain length.

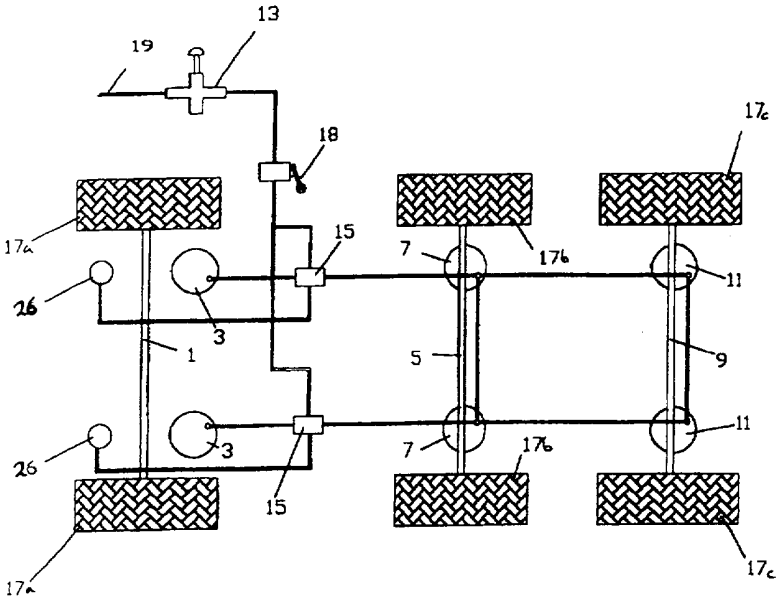

FIG. 1

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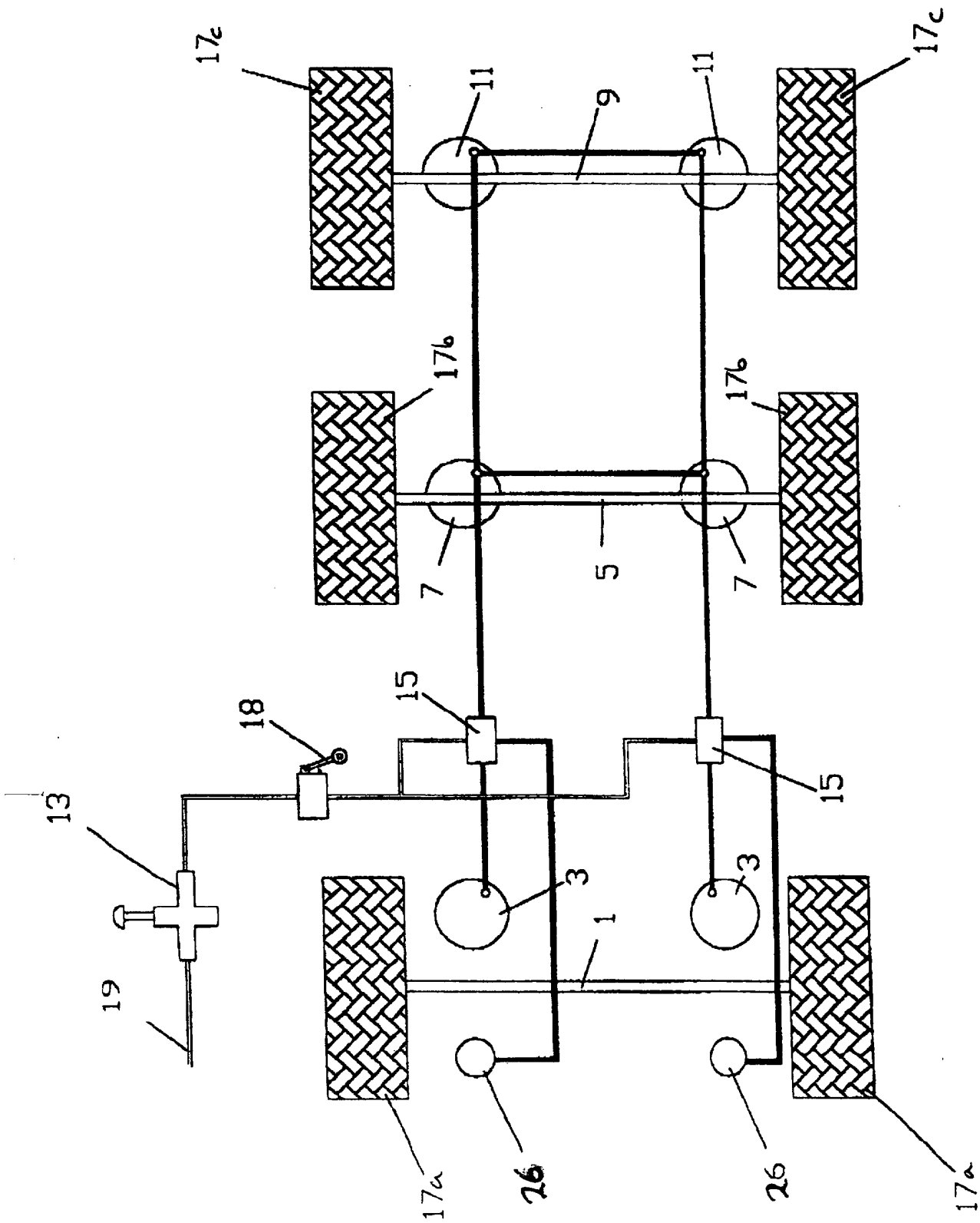

FIG. 1

SEMI-TRAILER ASSEMBLY

This invention relates to a semi-trailer assembly which is adapted to be towed by a prime mover.

In the case of extending skeletal trailers, the trailer can be extended and retracted in the longitudinal direction of the trailer in order to accommodate a range of standard containers.

One problem with extending skeletal trailers is that under certain circumstances, e.g. during loading or unloading, the centre of gravity of the load can be to the rear of the centre of support of the wheels of the trailer, with the result that the trailer tends to lift the rear of the prime mover. This can, for example, render the prime mover difficult to start or render it difficult for the trailer to be extended or retracted.

It is conventional for such trailers to incorporate three pairs of wheels. Previously, it has been common practice to overcome the problems referred to above by providing means for lifting the forward pair of wheels of such trailers clear of the ground, with the result that the trailer is supported by the remaining two pairs of wheels. The effect of raising the forward pair of wheels is to move the centre of support for the trailer rearwardly, hence increasing the load on the prime mover.

This is currently achieved by a manual pneumatic push/pull valve to raise the front axle.

However, one disadvantage of raising the forward pair of wheels of a standard extending trailer unit clear of the ground is that the vehicle combination of trailer and drawing unit may not then conform to present legal requirements for turning circle in this configuration. It would then be illegal to drive an extended trailer on a public highway without the forward pair of wheels in use. This situation can easily occur if the user had forgotten to lower these wheels after loading or unloading.

It is an object of the present invention to provide an arrangement to maintain the legal requirements of axle loading and turning circle requirements when the trailer is extended.

According to one aspect of the present invention, there is provided a semi-trailer assembly comprising a trailer chassis extendable between contracted and extended positions, and two or more sets of wheels supporting the chassis, wherein the assembly includes means for automatically controlling the lowering and/or raising at least one of the pairs of wheels, upon retraction and/or extension of the length of the trailer chassis.

Preferably, the automatic means also disables and/or overrides any manual lift-axle system on the semi-trailer assembly. More preferably, the automatic means is adapted to automatically lower any raised pair of wheels upon extension of the trailer beyond a pre-determined length.

The multi-wheeled trailer may involve two, three, four or more sets, generally 'pairs' of wheels. Preferably, the trailer is a semi-trailer assembly comprising a trailer chassis and three pairs of wheels arranged as a forward pair and two rearward pairs for supporting the chassis and any load thereon.

In one embodiment of the present invention there are means for raising and/or lowering one pair, preferably the forward pair, of wheels. More preferably the means comprises a roller valve means or similar electronic means adapted to lower the forward pair of wheels upon extension of the trailer

chassis length beyond a pre-determined, e.g. legally set, distance. This eliminates the possibility of the vehicle being moved with the front axle raised if the trailer is over a certain length.

Locking pins or other catches are provided for locking the moveable portions of the chassis in one of a number of alternative positions.

The controlling means could act on fluid pressure means generally used to lower and/or raise the pair of wheels, which means could be separate or integral with the main pressurised fluid system of the trailer assembly.

Preferably, the means for lowering and/or raising the relevant pair of wheels from the ground actuates a separate container for pressurised air attached to the axle beam, and is activated either by manual operation or electrical valve. Such a valve could be actuated to cause air flow to a pair of suspension bags to be cut off and to exhaust to atmosphere, and to divert air to the axle lifting bag(s), as the trailer retracts in a longitudinal direction, leaving the other pair(s) of wheels to support the load.

The means may be any suitable switch or trigger, being either electronic, mechanical, magnetic or optical, or a combination of one or more of these. The means may be separate or integral with any pressured fluid system on the chassis.

A valve system could also be provided for supplying pressurised air to the pressurised fluid system of the present invention for axle raising and/or lowering.

The valve means for the present invention could comprise one or more valves such as a pilot valve, especially a 3/2 pilot valve, a push-pull valve, a roller valve, an electrical solenoid valve, or an electrical in-pulse valve.
Preferably, pressurised air is allowed to flow to valve means such as a solenoid valve and a pull valve. The pull valve can then be operated to divert the air to valves which isolate the front air bags and allows them to deflate without affecting any other air bags.

According to a second aspect of the present invention, there is provided a kit for application to an extendable trailer chassis of a semi-trailer assembly comprising means for automatically controlling the lowering and/or raising of at least one, e.g. the forward, pair of wheels supporting the chassis, upon retraction and/or extension of the trailer chassis.

The particular embodiments and features described hereinbefore for the control means apply equally to means for the kit. The kit should be useable with any existing trailer chassis.

For a better understanding of the present invention and to show more clearly how it may be carried into effect reference will now be made, by the way of example, to the accompanying diagrammatic drawing in which:

Figure 1 shows one embodiment of a semi-trailer assembly according to the present invention.

Semi-trailer assemblies of the extendible skeletal type are well known in themselves and will not be described in detail herein.

Such trailer assemblies all include a trailer chassis for supporting a load in the form of one or more conventional containers and (generally) three pairs of wheels (17a,b,c) disposed towards the rear of the trailer for supporting the chassis and any load. The wheels are provided with braking mechanisms, conventionally operated by compressed air, and with suspension systems, again conventionally incorporating containers for pressurised air.

Figure 1 is a diagrammatic illustration of a three axle semi-trailer incorporating a forward axle (1) supported by forward air bags (3), a mid axle (5) supported by mid air bags (7) and a rear axle (9) supported by rear air bags (11).

Pressurised air is supplied to brakes (not shown) for

the wheels (17a,b,c) by way of conventional couplings (not shown) and also to the air bags (3, 7, 11) to maintain the air pressure therein. When the source of pressurised air is turned off the drop in pressure causes the brakes to be applied, but the air bags (3,7,11) generally remain inflated.

Transverse locking pins (not shown) are provided to lock the two portions of the chassis in one of a number of alternative positions in order to adapt the trailer for a particular container configuration to be carried.

Previously, it has been conventional practice to provide operating means, such as a push button, on the side of the chassis for lifting and lowering forward wheels. However, as discussed hereinbefore, this does not comply with current legal requirements.

The pressurised air system again provides pressurised air to the pressurised air containers on each axle (3, 7, 11). These containers are interconnected together, and a 3/2 pilot valve (15) is fitted between the front containers (3) and the others (7, 11) as illustrated. To lift the axle (1) and front wheels (17a), the push button valve (13) is operated. This allows pressurised air to flow to the 3/2 pilot valve (15). The pilot slides to isolate the air bags (7 and 11) of the rearward two pairs of wheels (which remain pressurised) and to allow the forward pair of air bags (3) to vent to atmosphere. It also allows a

lift axle system to pressurise two further air containers (26) and so lift the forward pair of wheels (17a). The locking pins can then be disengaged to allow for the extension or retraction of the trailer chassis.

The front axle (1) will then be lowered automatically as the trailer extends beyond the legal length requirements for such a vehicle. This automatic lowering is achieved by a roller valve (18). As the trailer extends, the roller valve (18) comes into contact with part of the chassis frame. This cuts off the pressurised air supply to the 3/2 valves (15), allowing the pilot to return to its original position. This reconnects the front axle pressurised air containers (3) to the rearward two axle air containers (7, 11), and causes the lift-axle pressurised air containers (26) to exhaust to atmosphere. This ensures that as soon as the trailer reaches the legal length requirements for a turning circle, all three axles and tyres are on the ground.

The invention is not limited to the embodiments herein described which may be varied in construction and detail.

CLAIMS

1. A semi-trailer assembly comprising a trailer chassis extendable between contracted and extended positions, and two or more sets of wheels supporting the chassis, wherein the assembly includes means for automatically controlling the lowering and/or raising at least one of the pairs of wheels, upon retraction and/or extension of the length of the trailer chassis.

2. A semi-trailer assembly as claimed in Claim 1 which includes a manual lift-axle system, wherein the automatic means disables and/or overrides the manual lift-axle system.

3. A semi-trailer assembly as claimed in Claim 1 or Claim 2 wherein the means is adapted to automatically lower any raised pair or pairs of wheels upon extension of the length of the trailer chassis beyond a predetermined length.

4. A semi-trailer assembly as claimed in Claim 3 wherein the means controls the most forward pair of wheels.

5. A semi-trailer assembly as claimed in any one of Claims 1-4 having two, three or four pairs of wheels.

6. A semi-trailer assembly as claimed in Claim 5 wherein the trailer has three pairs of wheels.

7. A semi-trailer assembly as claimed in any one of Claims 1-6 wherein the means comprises an electronic, mechanical, magnetic, optical, or combination thereof, switch or trigger.

8. A semi-trailer assembly as claimed in Claim 7 wherein the means comprises a roller valve means.

9. A semi-trailer assembly as claimed in any one of the preceding Claims wherein the means act on a fluid pressure system for supporting one or more of the pairs of wheels.

10. A semi-trailer assembly as claimed in Claim 9 wherein the pressurised fluid system is the main pressurised fluid system of the trailer assembly.

11. A semi-trailer assembly as claimed in any one of the preceding Claims wherein the means for lowering and/or raising each pair of wheels actuates a separate container for pressurised air at each relevant axle beam.

12. A semi-trailer assembly as claimed in any one of the preceding Claims wherein the means causes air flow to a pair of suspension bags supporting the relevant pair of wheels to be cut off and exhaust to atmosphere and to divert air to one or more axle lifting bags, as the trailer retracts in a longitudinal direction.

13. A semi-trailer assembly as claimed in any one of the Claims 9-12 which includes a valve system for supplying pressurised fluid to the pressurised fluid system of the trailer assembly for the axle raising/lowering means.

14. A semi-trailer assembly as claimed in Claim 13 wherein the valve means comprises one or more of the group comprising: pilot valve, push-pull valve, roller valve, electrical solenoid valve, or electrical in-pulse valve.

15. A kit for application to an extendable trailer chassis of a semi-trailer assembly comprising means for automatically controlling the lowering and/or raising of at least one pair of wheels supporting the chassis, upon retraction and/or extension of the trailer chassis.

16. A kit as claimed in Claim 16 wherein the means acts on the most forward pair of wheels.

17. A semi-trailer assembly as substantially herein described with reference to Figure 1.

Application No: GB 0024758.5
Claims searched: 1 to 17

Examiner: Colin Thompson
Date of search: 12 January 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): B7D (DAGA, DFAA, DFAB, DFAC, DFAX, DTL)

Int Cl (Ed.7): B62D 53/06

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 1325979 A	(Fearon) Whole document relevant	1,5
X	EP 0649772 A1	(Strien) Whole document relevant	1,4,5
X	US 4635742 A	(Bertolini) Whole document relevant	1,4-7
X	US 4230334 A	(Mabry) Whole document relevant	1,4-7

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.