(12) UK Patent Application (19) GB (11) 2 128 942 A

(21) Application No **8325827**
(22) Date of filing
27 Sep 1983
(30) Priority data
(31) **8227677**
(32) **28 Sep 1982**
(33) **United Kingdom (GB)**
(43) Application published
10 May 1984
(51) **INT CL³ B60G 19/02**
(52) Domestic classification
B7D 2A2C 2A2F 2A6B 6F
B7H 4FX
(56) Documents cited
None
(58) Field of search
B7H
(71) Applicant
ERF Limited
(United Kingdom)
Sun Works
Sandbach
Cheshire CW11 9DN
(72) Inventors
Hugh Martin Harper
Ernest Sherratt
(74) Agent and/or Address for Service
Swindell & Pearson
44 Friar Gate
Derby DE1 1DA

(54) Improvements in or relating to steering arrangement for commercial vehicles

(57) A vehicle has two axles supporting steerable wheels one of said axles being located at or near the front of the vehicle, the other just in front of the rear driven axle of the vehicle. The driven axle 22 and the axle 20 adjacent to it are mounted on an equalising beam 44 which is so mounted to the chassis that it apportions the load carried by said axles in accordance with a predetermined ratio.

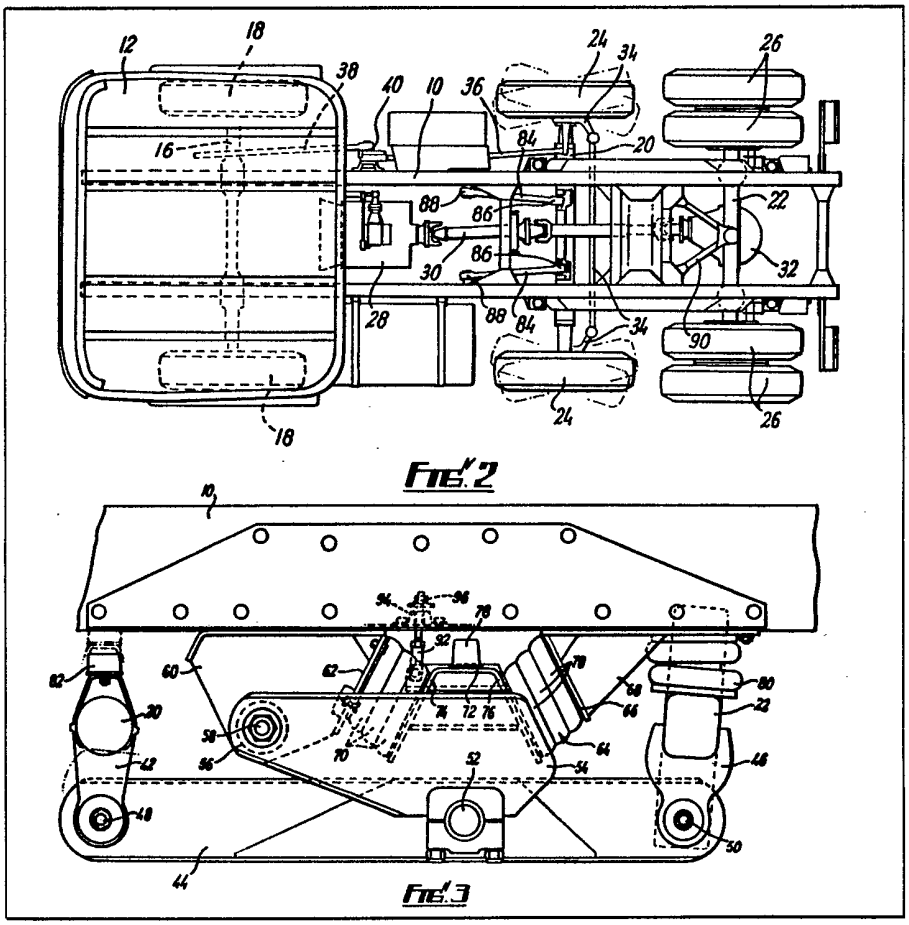
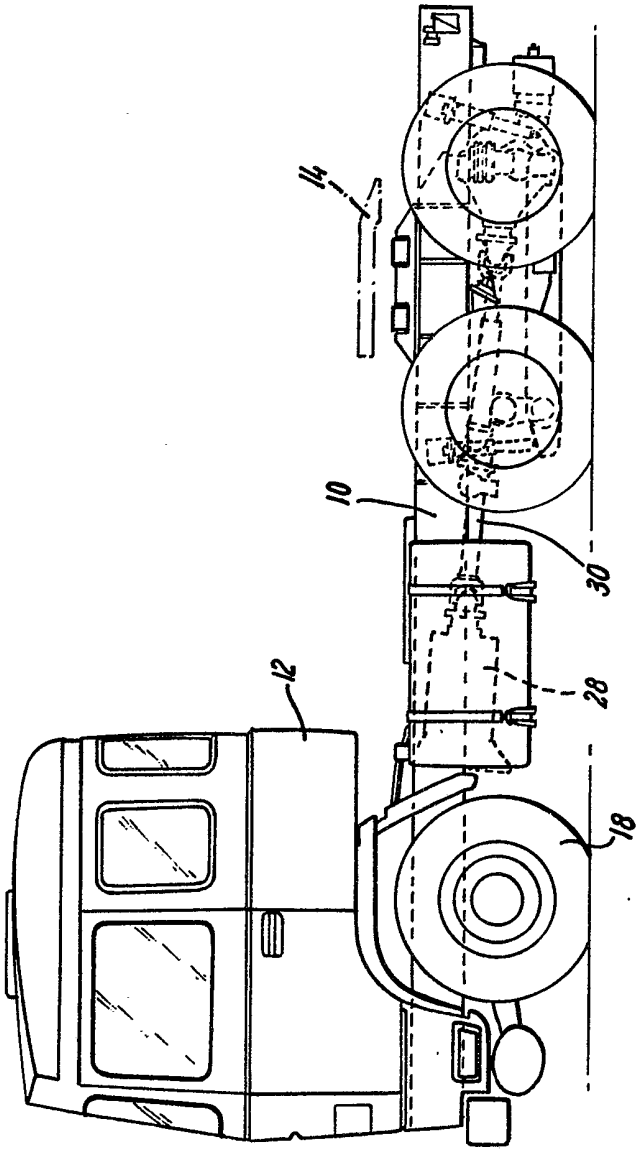


Fig.2

Fig.3

GB 2 128 942 A



ФИГ.1

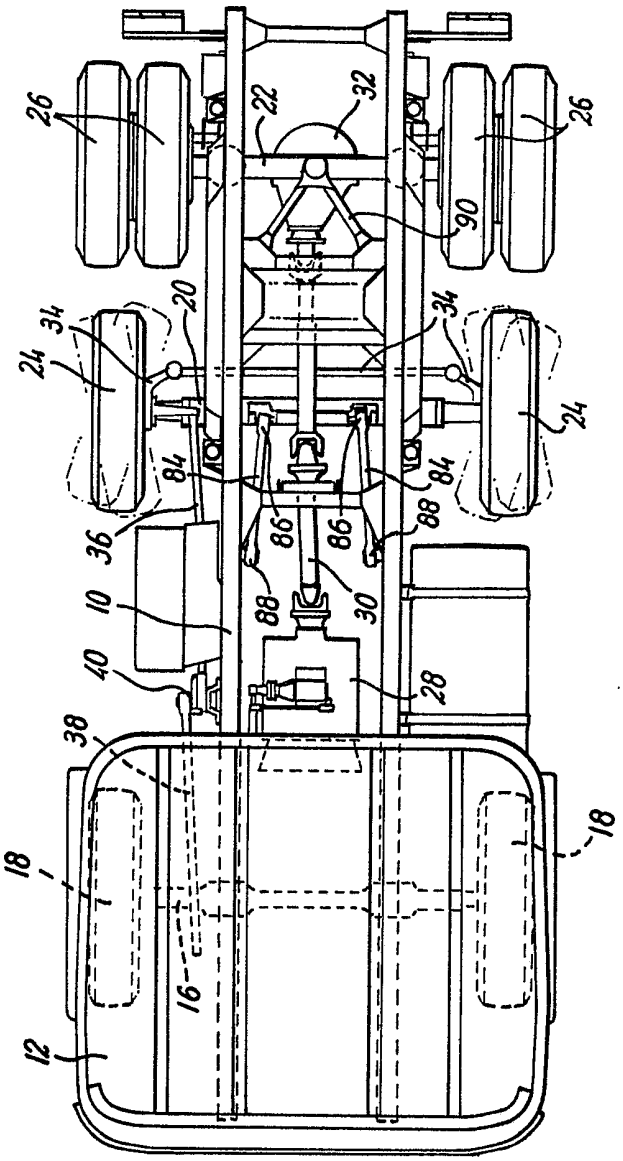

26
22
32
26
90
34
20
34
24
24
84
84
88
86
86
36
88
10
30
40
28
38
18
18
16
12

FIG. 2

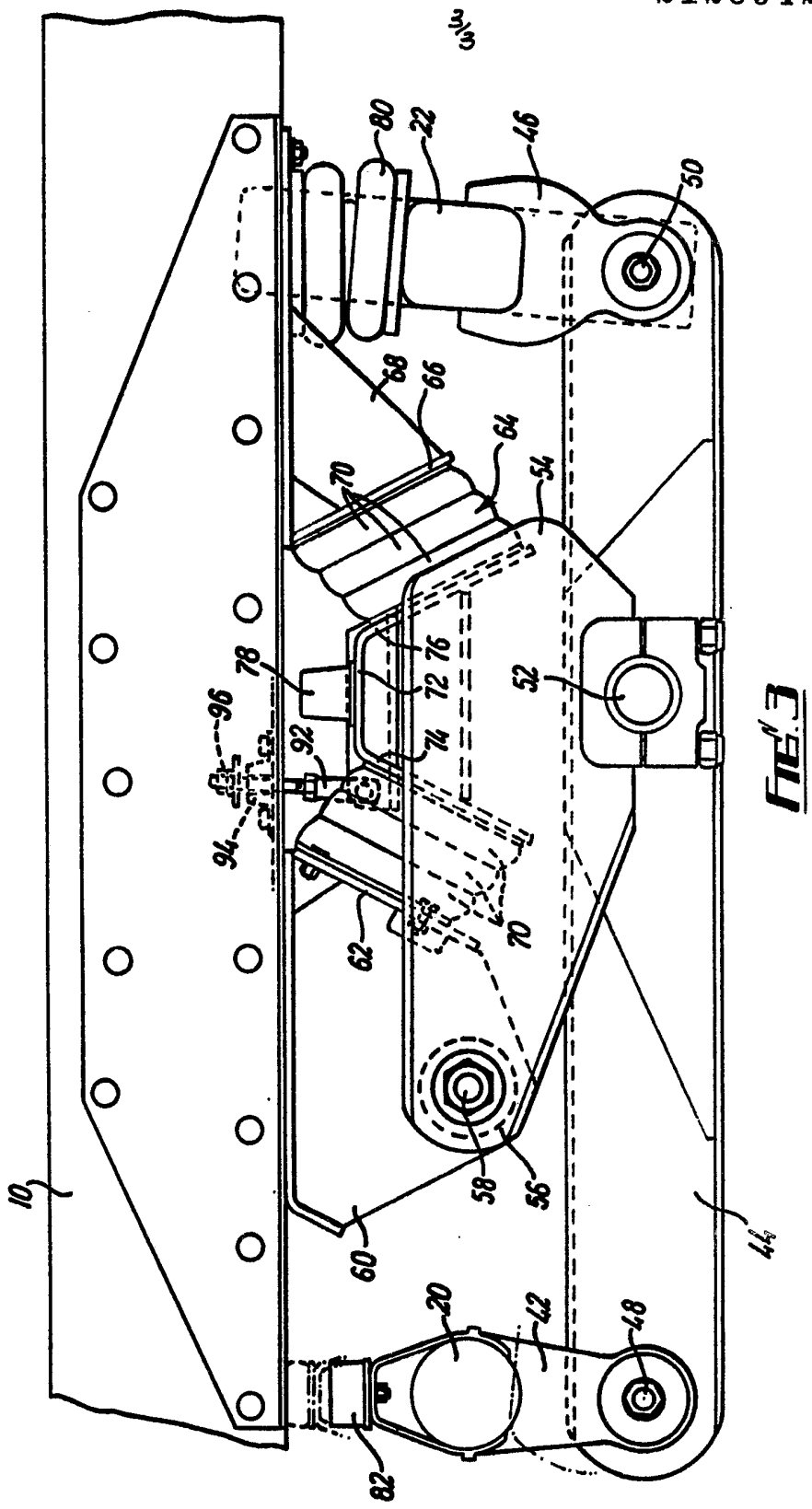

10
20
22
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
80
82
92
94
96

FIG. 3

SPECIFICATION

Improvements in or relating to steering arrangement for commercial vehicles

The present invention concerns commercial vehicles, especially lorries and more especially the tractor units of articulated vehicles designed to carry the maximum permitted load and having a plurality of axles to support said load.

The invention is particularly concerned with vehicles having two axles carrying steerable wheels.

According to one aspect of the present invention there is provided a vehicle having two axles supporting steerable wheels and at least one axle carrying drivable wheels and positioned towards the rear of the vehicle, one of said axles carrying steerable wheels being arranged at or near the front of the vehicle, the other being positioned immediately in front of the axle carrying driven wheels.

According to another aspect of the present invention there is provided a vehicle having a pair of spaced axles at or near the rear thereof the foremost of said axles carrying steerable wheels, the rearmost carrying drivable wheels said axles being mounted to the chassis of the vehicle by a pair of equalising beams designed to apportion the load carried by the axles in accordance with a predetermined ratio.

Preferably each equalising beam is pivotally mounted on a trailing arm which in turn is pivotally mounted to the chassis, the end of the trailing arm to which the beam is pivotted having its movement constrained by spring means.

Preferably the spring means between the said end of the trailing arm to which the beam is pivotted and the chassis comprises a solid rubber spring mounted in shear and compression.

Preferably tie means are provided between the trailing arm and the chassis to limit the movement of the end of the arm to which the beam is pivotted away from the chassis whereby the said spring means are always subjected to some compressive force.

Preferably the pivotal mounting for mounting the equalising beam to the trailing arm is located on the beam at a point spaced from the axle mountings thereon proportional to the load to be carried by said axles.

Preferably said pivotal mounting is arranged 6/10 of the length between the axles from the front axle.

Preferably a bump stop is provided on the leading axle for co-operation with the underside of the chassis. A further bump stop may be provided to act in association with the non-pivotted end of the trailing arm.

Preferably an air bellows arrangement is arranged between the rear axle and the chassis and is adjustable to vary the axle loads without moving the pivot point of the equalising beam to apply downward force to the driven axle whenever required.

Preferably torque rods extend from the upper side of the front axle to the chassis at the point on the chassis towards the front of the vehicle.

Preferably an A frame is provided extending between the chassis and the rear axle, the apex of the A frame being fixed to the rear axle.

Preferably a steering linkage connects the wheels on the front axle to the steering mechanism of the vehicle.

Preferably the rear axle includes a differential connected to the power unit of the vehicle by a transmission shaft.

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:—

Figure 1 shows a side elevation of a tractor unit of an articulated lorry, the trailer being omitted as it does not form part of the present invention.

Figure 2 shows a plan of the unit shown in Fig. 1, and

Figure 3 shows an elevation of the mounting arrangement for the rear axles of the unit.

A tractor unit for an articulated lorry as shown in Fig. 1 is conventional to the extent that it includes a chassis 10 having a cab 12, a "fifth wheel" trailer mounting arrangement 14 and a front axle 16 carrying a pair of steerable wheels 18. A pair of rear axles 20, 22 are arranged substantially under the fifth wheel 14 to support the load of the front end of the trailer transmitted to the unit by the fifth wheel 14.

The rear axles 20, 22, however, are not standard in that the wheels 24 on the front axle are steerable, the twin wheels 26 on the rear axle being the driven wheels, drive means being transmitted from the gear-box 28 of the unit by means of a transmission shaft 30 and a differential 32. A steering linkage generally shown by the reference 34 is connected by way of an additional steering arm 36 to the steering linkage 40 which operates the steering arm 38 of the steered front wheels 18.

It is desired that the loads carried by the rear pair of axles 20, 22 is not equal and that the maximum load carried by the front axle 20 is six tons while that carried by the rear axle is 10 tons. To correctly apportion the load between the rear axles 20, 22 the axle mounting arrangement, shown most clearly in Fig. 3, is employed. The arrangement shown in Fig. 3 illustrates that utilised on one side of the vehicle: a similar arrangement being used on the other side but not being described here in detail.

The front axle 20 is connected by an axle

hanger 42 rigidly fixed to the axle to an equalising beam 44 by means of a pivotal connection. In a similar manner the rear axle 22 is pivotally connected by a hanger 46 rigidly fixed thereto to the equalising beam 44. 6/10 of the length between the centre of the pivot pins 48, 50 there is provided a pivotal bearing 52 by which the equalising beam 44 is pivotally attached to the underside of a trailing arm 54 near the free end of said arm 54, the pivoted end 56 being pivotally mounted about a pin 58 carried in a bracket 60 rigidly mounted to the underside of the chassis 10. The bracket 60 has an inclined rear face 62 which mounts one end of a solid rubber spring arrangement 64 the other end being mounted on a correspondingly but oppositely inclined face 66 of a further bracket 68. The solid rubber spring comprises a plurality of disc-like members 70 arranged between the mounting bracket 66 and a central bracket 72 fixed to the trailing arm 54 above the pivot 52. The mounting faces 74, 76 of the bracket 72 and the rubber discs 70 are parallel to the plates 62, 66 respectively. A bump stop 78 is provided on the upper end of the mounting 72 and is adapted to abut the underside of the chassis 10 to limit the upwards pivotal movement of the trailing arm 54 about the pivot pin 58.

It will be realised that load from the chassis is transmitted to the axles 20, 22 by way of brackets 60, 68 the spring arrangement 64 the trailing arm 54 and the equalising beam 44. In view of the non-central position of the pivot 52 the load supported by the axles 20 and 22 respectively will be in proportion to the spacing of the pivot 52 between the pivot pins 48, 50. Thus the load ratio, rear axle: front axle will be 10:6 in the present embodiment. In certain instances it may be necessary to alter this ratio by a limited amount and to this end an air bellows arrangement 80 is provided between the rear axle and the chassis 10. By supplying compressed air to the bellows the load on the axles can be varied to apply downward force on the driven axle whenever required.

The bump stop 82 is provided on the upper side of the front axle 20.

To control the movement of the axles 20 and 22 connections are provided between them and the chassis 10. In the case of the front axle the connection comprises a pair of torque rods 84 (Fig. 2) pivotally mounted at one end 86 to the upper side of the axle 20 and at the other end 88 to the chassis 10 forward of the axles 20. The pivotal mountings for A frame 90 between the rear axle 22 and the chassis 10 do not form part of the present invention and means are provided to prevent the spring arrangement from being subject to tensile loading when the air bellows 80 are inflated to increase the load imposed on the rear axle. Said means comprises a tie rod 92 having one end fixed to the bracket 72 and the other movable through a yoke 94 fixed to the chassis, said other end carrying a nut 96 which provides an end stop on abutment with the yoke and means for adjusting the tie rod length.

Various modifications can be made without departing from the scope of the invention, for example the spring arrangement for the trailing arm need not be of solid rubber spring but could be any other form of spring.

CLAIMS

1. A vehicle having two axles supporting steerable wheels and at least one axle carrying drivable wheels and positioned towards the rear of the vehicle, one of said axles carrying steerable wheels being arranged at or near the front of the vehicle, the other being positioned immediately in front of the axle carrying driven wheels.

2. A vehicle as claimed in claim 1, in which said rearmost axles are mounted to the chassis of the vehicle by a pair of equalising beams designed to apportion the load carried by the axles in accordance with a predetermined ratio.

3. A vehicle having a pair of spaced axles at or near the rear thereof the foremost of said axles carrying steerable wheels, the rearmost carrying drivable wheels said axles being mounted to the chassis of the vehicle by a pair of equalising beams designed to apportion the load carried by the axles in accordance with a predetermined ratio.

4. A vehicle as claimed in claim 2 or claim 3, in which each equalising beam is pivotally mounted on a trailing arm which in turn is pivotally mounted to the chassis, the end of the trailing arm to which the beam is pivotted having its movement constrained by spring means.

5. A vehicle as claimed in claim 4, in which the spring means between the said end of the trailing arm to which the beam is pivotted and the chassis comprises a solid rubber spring mounted in shear and compression.

6. A vehicle as claimed in claim 5, in which tie means are provided between the trailing arm and the chassis to limit the movement of the end of the arm to which the beam is pivotted away from the chassis whereby the said spring means are always subjected to some compressive force.

7. A vehicle as claimed in any one of claims 4 to 6, in which the pivotal mounting for mounting the equalising beam to the trailing arm is located on the beam at a point spaced from the axle mountings thereon proportional to the load to be carried by said axles.

8. A vehicle as claimed in claim 7, in which said pivotal mounting is arranged 6/10 of the length between the axles, from the

front axle.

9. A vehicle as claimed in any one of the preceding claims, in which a bump stop is provided on the leading axle for co-operation with the underside of the chassis.

10. A vehicle as claimed in any one of claims 4 to 9, in which a bump stop is provided to act in association with the non-pivoted end of the trailing arm.

11. A vehicle as claimed in any one of claims 4 to 10, in which an air bellows arrangement is arranged between the rear axle and the chassis and is adjustable to vary the axle loads without moving the pivot point of the equalising beam to apply downward force to the driven axle whenever required.

12. A vehicle as claimed in any one of the preceding claims, in which torque rods extend from the upper side of the front axle to the chassis at the point on the chassis towards the front of the vehicle.

13. A vehicle as claimed in any one of the preceding claims, in which an A frame is provided extending between the chassis and the rear axle, the apex of the A frame being fixed to the rear axle.

14. A vehicle as claimed in any one of the preceding claims, in which a steering linkage connects the wheels on the front axle to the steering mechanism of the vehicle.

15. A vehicle as claimed in any one of the preceding claims, in which the rear axle inclues a differential connected to the power unit of the vehicle by a transmisson shaft.

16. A vehicle substantially as hereinbefore described with reference to the accompanying drawings.

17. Any novel subject matter or combination including novel subject matter herein disclosed, whether or not within the scope of or relating to the same invention as any of the preceding claims.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd.—1984.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.