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(71) Applicants
George Neville Truck Equipment Limited, (Great Britain), Lindleys Lane, Kirkby-in-Ashfield, Nottinghamshire.
(72) Inventors
Michael Douglas Neville
(74) Agent and/or Address for Service
Eric Potter and Clarkson, 14 Oxford Street, Nottingham NG1 5BP.

(54) **Tipping vehicles**

(57) The vehicle has a body (17) capable of being swung through 90° by a turntable (14) to extend laterally of the centreline of the vehicle. The body can be tipped in this position. This effectively moves the centre of gravity of the body from a central position to a position spaced from the centreline. To maintain stability compensating sideways movement of the body is effected as the body is tipped, so that the centre of gravity remains near the centreline, as shown at 19*e*.

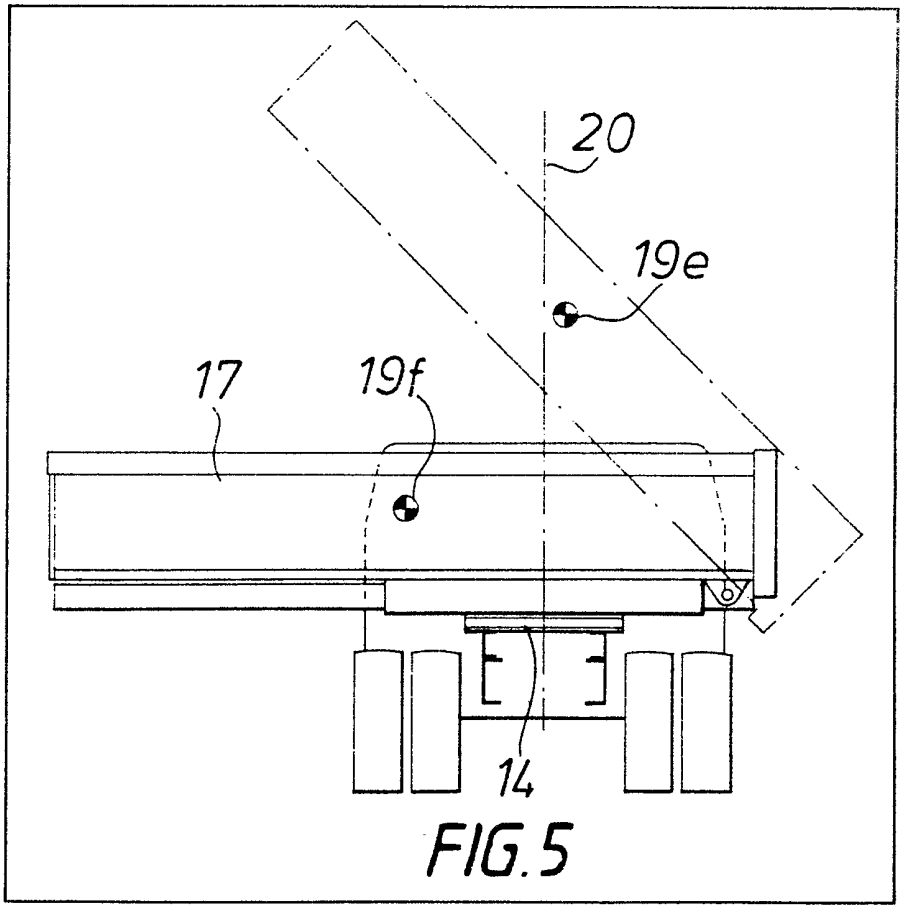

FIG.5

GB 2 114 517 A

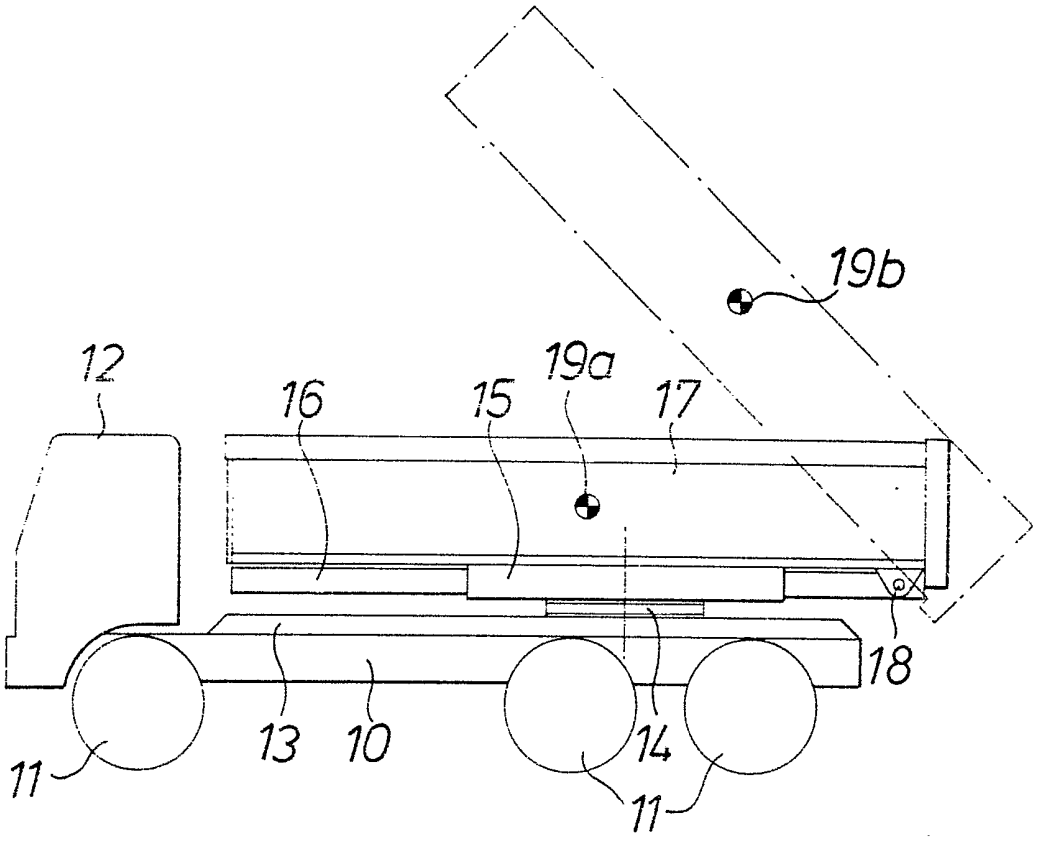

FIG. 1

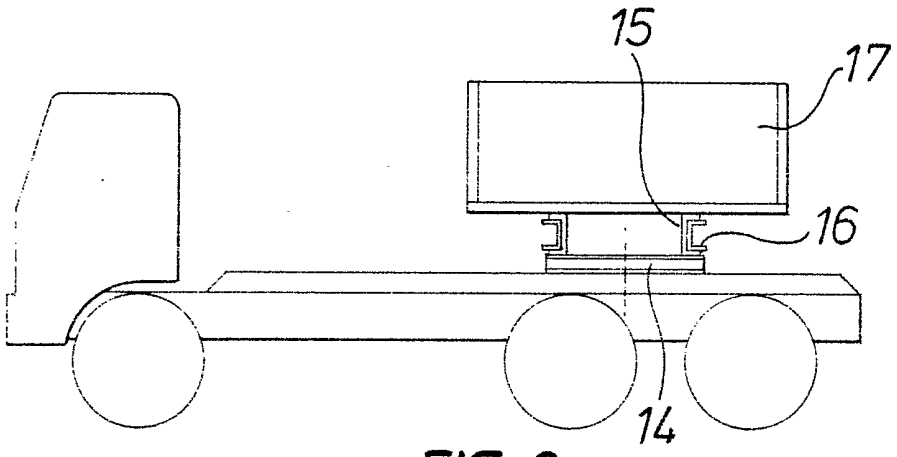

FIG. 2

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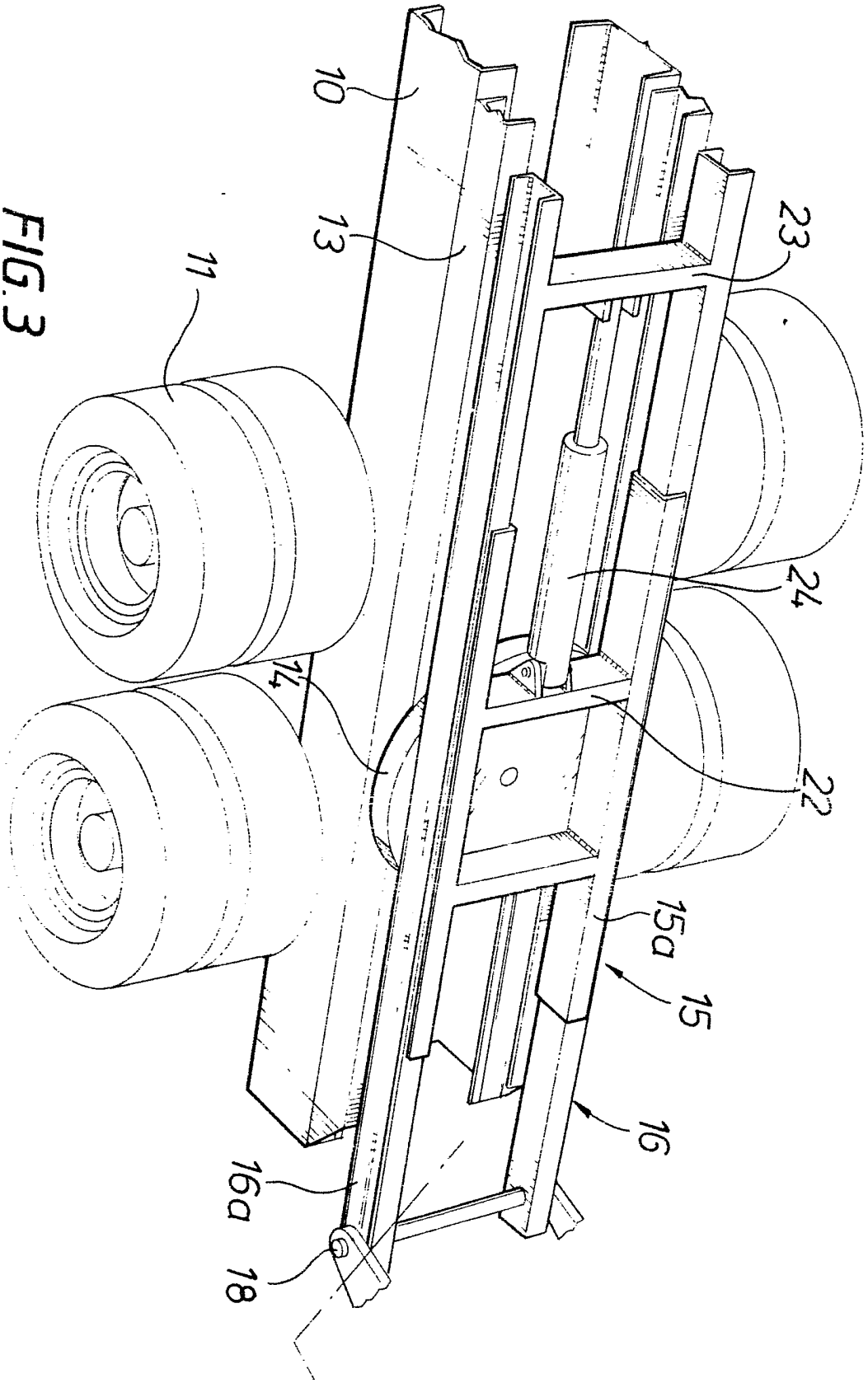
FIG.3



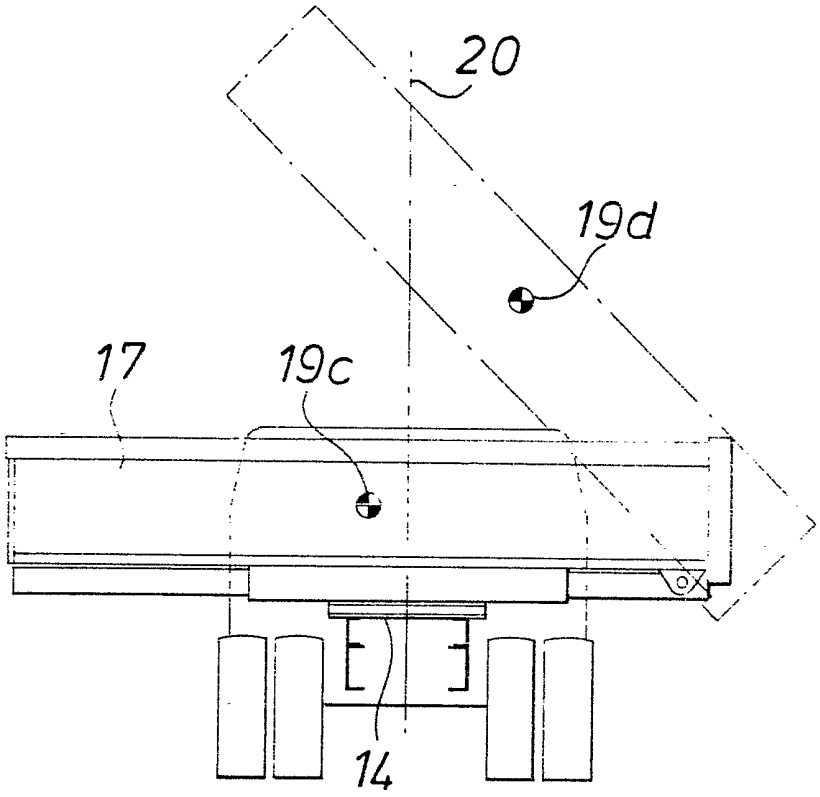


FIG. 4

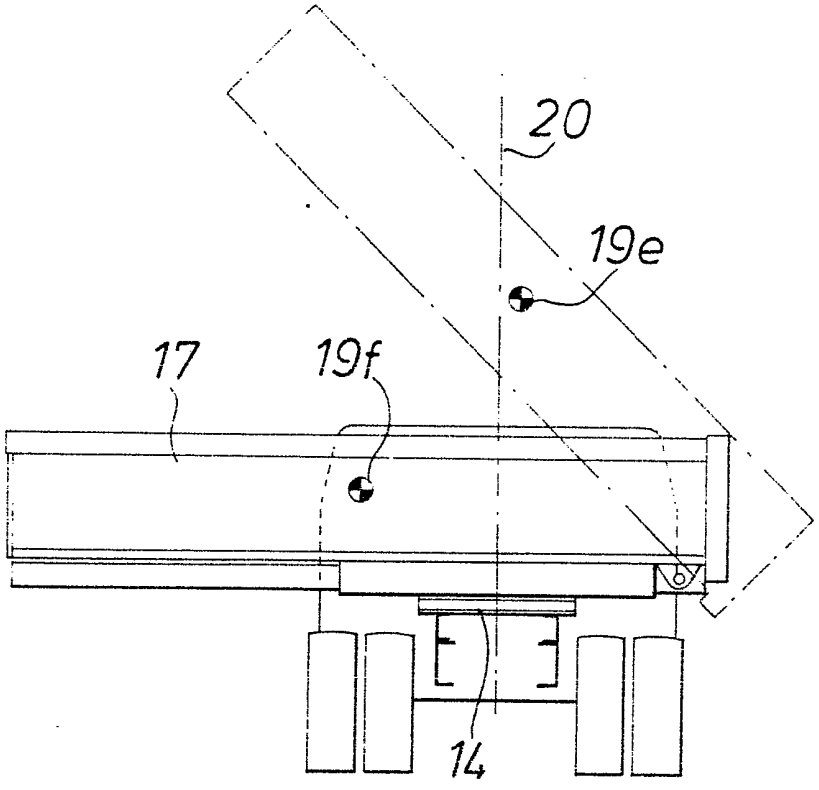


FIG. 5

SPECIFICATION

Tipping vehicles

This invention relates to tipping vehicles.

In a tipping vehicle, it is usual for a body of the vehicle to be tippable relative to the chassis about a rearwardly positioned lateral pivot axis. There are also so-called three-way tipping vehicles, in which the body is additionally tippable about pivots parallel to the longitudinal centreline of the vehicle in order that the body may be tipped towards either side of the vehicle.

There are vehicles with a turntable arrangement about which the body can be rotated from its normal travelling position to a situation where the body is then at 90° to the longitudinal centreline of the vehicle in order to discharge the load on either side of the vehicle.

In both of these types of vehicles, there is a problem, in that, when discharging the load to the side of the vehicle, the vehicle can become unstable due to the centre of gravity of the load mass moving during the tipping operation to a position too far to one side of the longitudinal centreline of the vehicle, thus inducing overturning moments.

The object of the present invention is to provide a vehicle which allows tipping to the side of the vehicle in a stable manner.

In accordance with this invention, there is provided a tipping vehicle comprising a chassis and a body tippable relative to the chassis about an axis lateral to the centreline of the chassis and near the rearward end of the vehicle, means for turning the body through approximately 90° relative to the vehicle to permit tipping to the side of the vehicle and means for moving the body laterally of the chassis in said turned position.

Preferably, a first piston-cylinder device is provided for effecting tipping of the body and a second piston-cylinder device is provided for effecting lateral movement of the body relative to the chassis and fluid control means is provided to permit simultaneous actuation of the devices.

Reference will now be made to the accompanying drawings wherein:

Figure 1 is a side elevation iof a vehicle according to the invention, shown with the body in normal running position and also in dash-dot lines in a rearward tipping position;

Figure 2 is a side elevation with the body rotated through 90°;

Figure 3 is a perspective detail view;

Figure 4 is a rear elevation showing the body rotated through 90° and also showing in dash-dot lines 4*a* sideways tipping position; and

Figure 5 is a similar rear elevation showing the body rotated through 90°, but also moved in relation to the axis of the vehicle.

The vehicle shown comprises a chassis 10 provided with wheels 11 and a driving cab 12. This particular vehicle has six wheels. A subframe 13 is mounted on the chassis 10 and is fitted with a turntable 14. The turntable 14 carries a support frame 15 which carries a body frame 16. A load carrying container body 17 is carried by the body frame 16 and is pivotally secured thereto by pivot pin 18 whose axis extends laterally of the body near the rear of the vehicle. An extensible and retractable pressure-operated cylinder device 19 is connected between the body 17 and the body frame 16 for tipping the body about the pivot pin 18 axis. This device is conventional and is not shown in the drawings. The tipped position of the body, for discharging to the rear of the vehicle, is illustrated in dash-dot lines in Figure 1.

The subframe 15 can be turned through an angle of 90° in either direction by means of the turntable 14, so that the body extends perpendicularly to the longitudinal centreline of the chassis. This position is shown in Figures 2, 4 and 5. The body can be tipped in this turned position, as shown in Figures 4 and 5, for discharging to the side of the vehicle.

The centre of gravity of the loaded body 17 is shown at 19*a* in Figure 1 where the body is in the road-travelling position, and at 19*b* in the same figure in the rearward tipping position. The position of the centre of gravity is determined by the vehicle design so that the correct amount of load is distributed to the various wheels of the vehicle for travelling.

When the body 17 is turned perpendicularly to the longitudinal centreline of the chassis by means of the turntable 14, the centre of gravity 19*c* remains close to the centreline 20 (Figure 4). However, when the body 17 is raised to its discharge position, the centre of gravity moves laterally away from the centreline to the position 19*d* making the vehicle unstable.

Referring now to Figure 5, it can be seen that longitudinal movement of the body 17 relative to the turntable 14 moves the centre of gravity in the discharge position back towards the centreline 20 at 19*e*. This movement, however, moves the centre of gravity in the untipped position away from the centreline 19*f*, so that the vehicle is unstable in this position.

To prevent instability, the body 17 is moved relative to the turntable as the body is being tipped.

Referring to Figure 3, the subframe 15 comprises elongate members 15*a* and crossmembers 22 secured to the turntable 14. The body frame 16 has elongate members 16*a* slidably engaged with the elongate members 15*a* of the subframe. These members 16*a* are interconnected by a crossmember 23. A further extensible and retractable pressure cylinder device 24 is positioned between one of the crossmembers 22 on the subframe 15 and the crossmember 23 on the body frame 16. This device is double acting and is actuable to move the body frame 16 longitudinally in relation to the subframe 15.

A valve arrangement (not shown) controls fluid flow to the two pressure cylinder devices, so that, with the body in the sideways extending position relative to the chassis, the body frame 16 is moved as the body is tipped, so that the centre of gravity remains near the centreline of the chassis. Valve switching means may be operated by turning of the turntable 14, so that the valve arrangement is

automatically put in the mode for simultaneous actuation of the cylinder devices. The body frame 16 will remain stationary during rearward tipping of the body. The construction of a suitable valve arrangement is not disclosed, since it could, be readily constructed by any competent hydraulic engineer.

CLAIMS

1. A tipping vehicle comprising a chassis and a body tippable relative to the chassis about an axis lateral to the centreline of the chassis and near the rearward end of the vehicle, means for turning the body through approximately 90° relative to the chassis to permit tipping of the side of the vehicle and means for moving the body laterally of the chassis in said turned position.

2. A tipping vehicle according to Claim 1, wherein the means for tipping the body relative to the chassis effects a tipping action simultaneously with said movement of the body laterally of the chassis, so as to maintain the centre of gravity of the body in the region of the centreline of the vehicle.

3. A tipping vehicle according to Claim 2, comprising a first piston-cylinder device for effecting tipping of the body, a second piston-cylinder device for effecting lateral movement of the body relative to the chassis and a fluid valve arrangement to permit said simultaneous action of the devices.

4. A tipping vehicle according to Claim 3, comprising a turntable mounted on the chassis and carrying a support frame and a body frame slidably mounted on the support frame, the body being tippably mounted on the body frame and the second piston-cylinder device being mounted between the support frame and the body frame.

5. A tipping vehicle constructed substantially as herein described with reference to the accompanying drawings.

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