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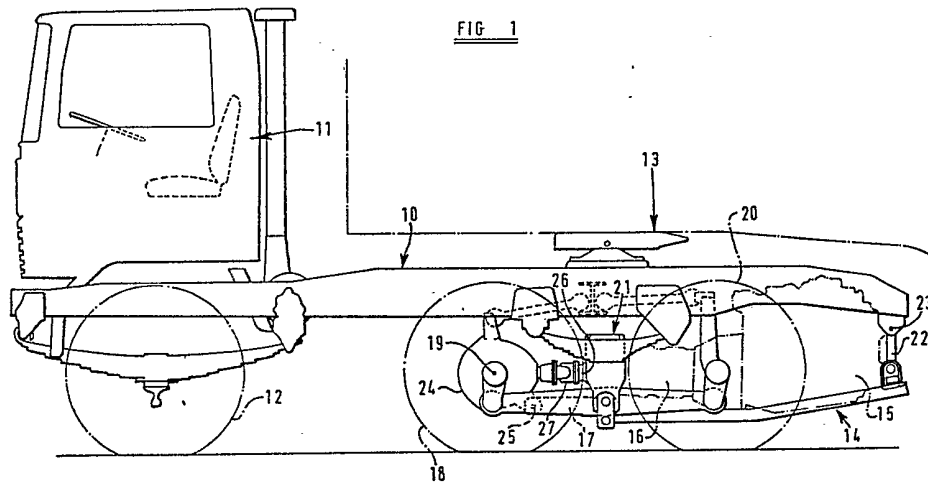
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(58) Field of search
B7D
B7H

(54) Tractor unit of an articulated freight-carrying road vehicle

(57) The unit has two rear axles, one (24) of which is driven by an engine (15) mounted rearwardly of the driven axle. The axis of the fifth wheel coupling (13) to the trailer is situated forwardly of the driven axle so that the centre of gravity of the tractor unit is in the vicinity of or is to the rear of the fifth wheel axis.

The engine (15) and gear box (16) are mounted on a sub-frame (17) which is pivotably connected at its front end to axle casing 24 and is connected at its rear end to chassis (10) by means of a swinging link 22. Thus as wheels 18 and 20 move up and down relative to the chassis (10) over an uneven surface, the sub-frame (17), gearbox (16) and engine (15) participate in that movement.



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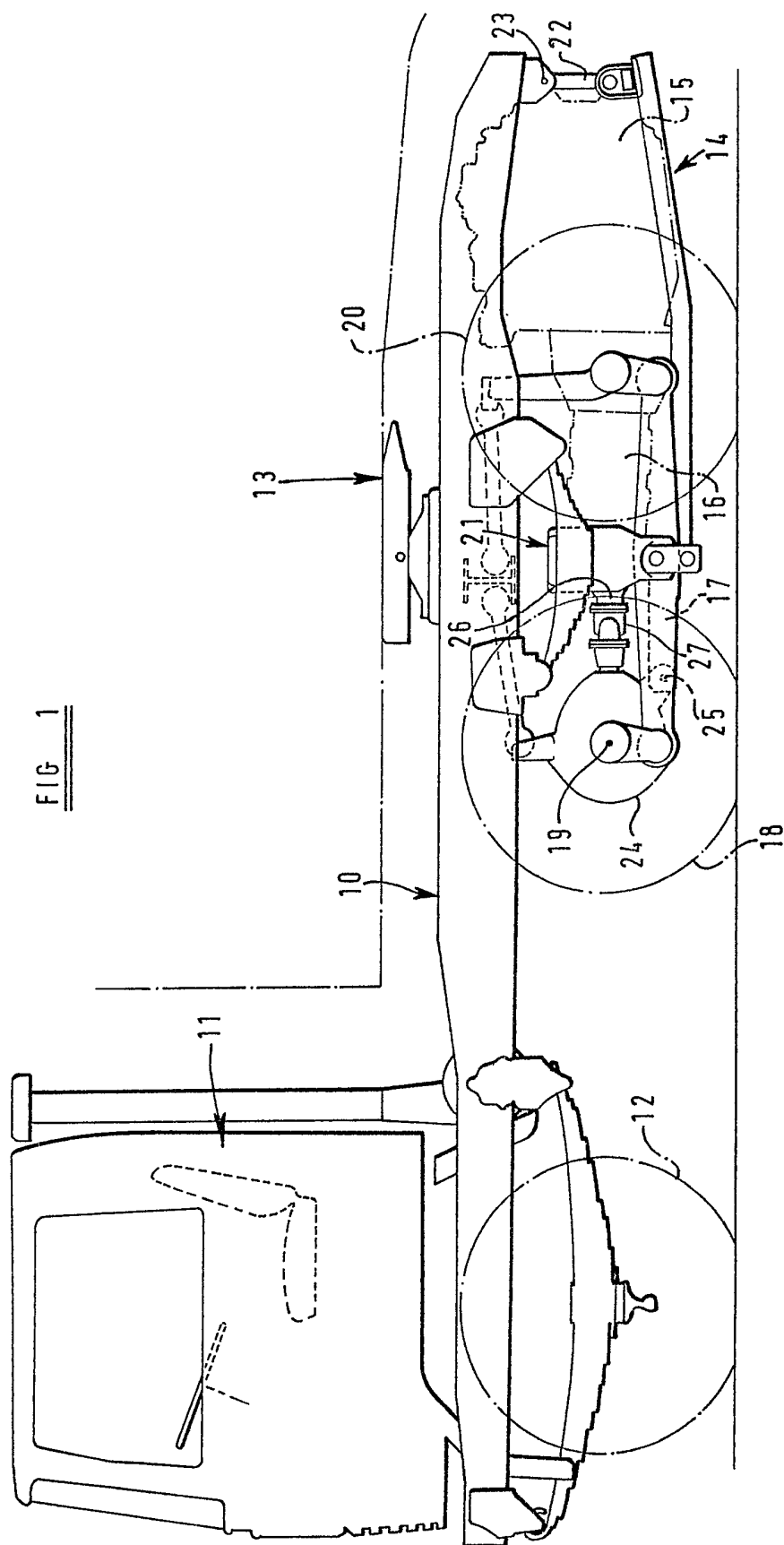


FIG. 1

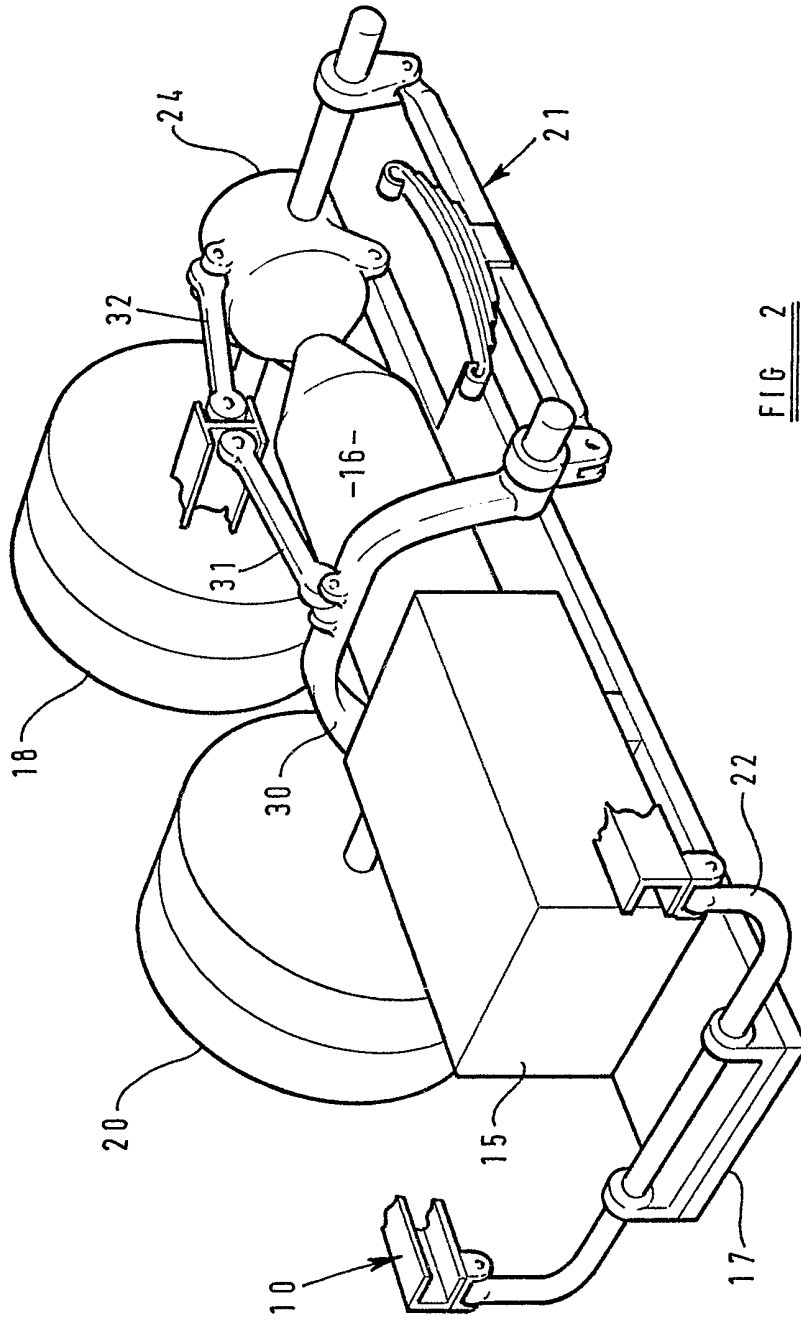


FIG. 2

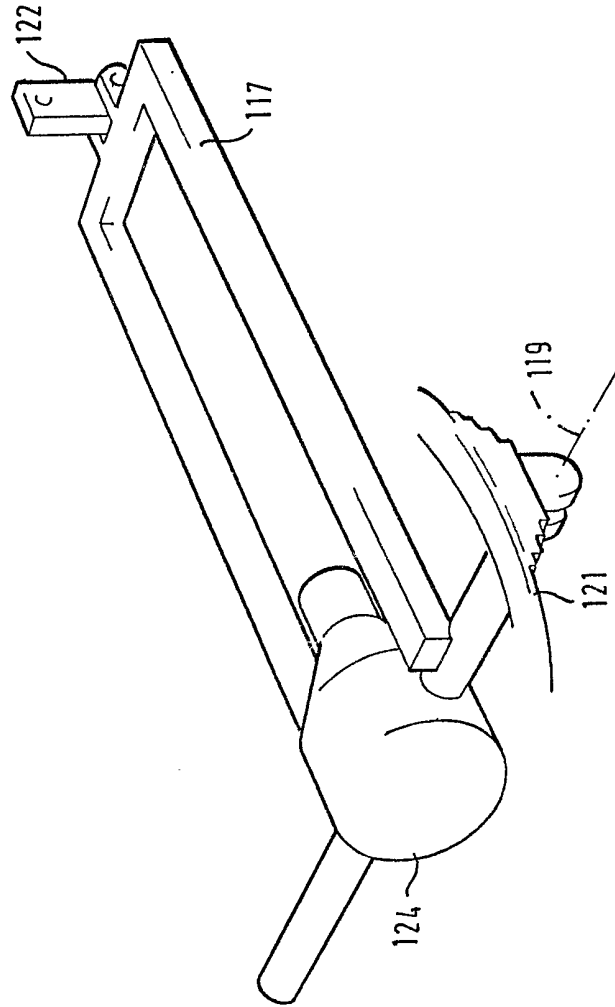


FIG 3

SPECIFICATION

Improvements relating to road vehicles

5 The present invention relates to articulated road vehicles comprising a tractor and a semi-trailer coupled with the tractor by a fifth wheel coupling assembly. In G.B. 1,475,822B, there is disclosed a tractor of an articulated vehicle wherein the engine is mounted to the rear of the axis defined by a king-pin of the fifth wheel coupling. The present invention concerns the mounting of the engine in the tractor.

According to a first aspect of the present invention, there is provided a tractor of an articulated road vehicle having a fifth wheel coupling assembly for coupling the tractor with a semi-trailer of the vehicle, the tractor comprising a chassis which bears the fifth wheel coupling assembly, steerable wheels mounted on the chassis, a set of driven wheels having a common axis, an engine, transmission means for transmitting drive from the engine to the driven wheels and suspension means for transmitting a downwardly directed force from the chassis to the set of driven wheels whilst permitting limited upwards and downwards movement of said common axis relative to the chassis, the tractor being characterised in that the engine is so associated with the set of driven wheels that, when said common axis moves upwardly and downwardly relative to the chassis under the control of the suspension means, the engine also necessarily moves relative to the chassis.

There is further provided in the preferred tractor a sub-frame on which the engine is mounted and there are provided between the sub-frame and the chassis first and second connections at respective positions spaced apart along the tractor, the first connection being via the suspension means.

According to a second aspect of the invention, there is provided an assembly comprising an engine, a gearbox, a frame, a universal joint and a drive shaft extending from the gearbox to the universal joint, wherein the engine and gearbox are mounted on the frame, the engine is adjacent to one end of the frame, the universal joint is adjacent to an opposite end of the frame and the frame is adapted for pivotal connection adjacent to said ends with further parts of a vehicle.

Preferably, the steerable wheels are the front wheels on the chassis however, it envisaged that additionally or alternatively the rear wheels may be the steerable wheels and the steerable wheels may also comprise the driven wheels.

An example of a tractor embodying the present invention will now be described, with reference to the accompanying drawings wherein:-

Figure 1 shows a side elevation of the tractor;

Figure 2 illustrates diagrammatically certain parts of the tractor; and

Figure 3 illustrates a modification of the tractor. The tractor illustrated in *Figure 1* and *2* comprises a chassis 10 which extends from one end of the tractor to the other. A cab 11 is mounted on the chassis adjacent to a front end thereof and a set of steerable front wheels 12 is mounted on the chassis

beneath the cab. A fifth wheel coupling assembly 13 is mounted on the chassis 10 at a position between the cab and a rear end of the chassis. These parts may be constructed and arranged in a known manner.

The tractor also includes an assembly 14 comprising an engine 15 and a gearbox 16.

The assembly 14 preferably includes also a sub-frame 17, on which the engine and the gearbox are mounted. The engine and gearbox may constitute a single unit mounted on the sub-frame. Alternatively, this unit may be adapted to be supported directly on other components of the vehicle, without use of a structurally separate sub-frame.

The tractor also comprises a set of driven wheels 18 having a common axis of rotation 19 and a further set of rear wheels 20. Each of these sets may comprise two or four wheels. The wheels 18 and 20 are disposed beneath the chassis 10 and are connected with the chassis by suspension means 21 which transmits downwardly directed force from the chassis to respective axles associated with the sets of wheels. The suspension means includes one or more springs which may be arranged in a known manner. Conveniently, the suspension means and the wheels 18 and 20 are incorporated in a bogie in a known manner.

The assembly 14 is so connected with the chassis 10 that, when the axis 19 moves upwardly and downwardly relative to the chassis under the control of the suspension means 21, the engine 15 also necessarily moves upwardly and downwardly relative to the chassis. The engine participates in movement of the axis 19 upwardly and downwardly relative to the chassis but, in the particular arrangement illustrated, does not move through the same distance relative to the chassis as does the axis 19. The movement of the engine which accompanies a particular movement of the axis 19 is somewhat less than the movement of the axis.

The assembly 14 is connected with the chassis adjacent to the rear end of the sub-frame and adjacent to the front end of the sub-frame. The connection adjacent to the rear end of the sub-frame is provided by means which includes a link 22 suspended from the chassis 10 for pivoting relative thereto about a horizontal pivot axis 23 adjacent to the rear end of the chassis. The sub-frame 17 is connected with the link 22 at a position below the pivot axis 23 and in a manner which accommodates pivoting of the sub-frame relative to the link about a further axis parallel to the axis 23.

Adjacent to the front end of the sub-frame 17, the sub-frame is connected with an axle casing 24 associated with the driven wheels 18. The connection provides for relative pivoting about a horizontal axis 25. The axle casing 24 is connected with the chassis 10 in a known manner via the suspension means 21.

The load borne by the sub-frame 17, that is primarily the weight of the engine 15 and gearbox 16, is transmitted partly to the axle casing 24 adjacent to the axis 25 and is transmitted partly to the wheels 18 and 20 via the link 22, chassis 10 and suspension means 21.

The sub-frame 17 is conveniently rectangular, as viewed in plan and the link 22 may comprise respective substantially vertical parts adjacent to opposite sides of the sub-frame and connected together by a transverse bar. The connection which defines the axis 25 may be on the longitudinal centreline of the tractor and sub-frame.

The engine 15 and gearbox 16 are preferably mounted on the sub-frame 17 by means of resilient engine mounts (not shown) of a known kind. A drive shaft 26 extends from the gearbox in a direction away from the engine 15 to a universal joint 27, by means of which the drive shaft is coupled with an input shaft carried by the axle casing 24. The universal joint 27 accommodates movement of the engine on its resilient mounts relative to the axle casing. It will be understood that any such movement will be small. There is no direct connection between the sub-frame 17 and an axle on which the wheels 20 are mounted. These wheels can move up and down relative to the axis 19 independently of the sub-frame and engine.

When the tractor is driven over an uneven surface, the driven wheels 18 and the rear wheels 20 are caused to move upwardly and downwardly relative to the chassis 10. The sub-frame 17, gearbox 16 and engine 15 participate in this movement. A front end portion of the sub-frame moves through the same distance as does the axle casing 24. The gearbox moves through a somewhat shorter distance and the engine moves through a still shorter distance. An end portion of the engine adjacent to the link 22 is not displaced significantly relative to the chassis 10.

A modification of the tractor is illustrated in Figure 3. The sub-frame 117 of the modified tractor is rectangular but has a connection with the chassis (not shown) adjacent to the rear end of the chassis provided by a link 122 which lies on the longitudinal centreline of the chassis. The sub-frame is rigid with the driven axle casing 124, being welded to the axle casing at two positions lying on opposite sides of the longitudinal centreline of the tractor. The engine and gearbox of the modified tractor may be mounted on the sub-frame in the same manner as hereinbefore described.

The suspension means of the modified tractor illustrated in Figure 3 comprises a pair of springs (one of which is indicated at 121) mounted on the axle casing 124 adjacent to respective ends of the axle casing. These mountings provide for pivoting of the axle casing relative to the springs and relative to the chassis of the tractor about the axis 119 of the driven axle. A further set of wheels (not shown) may be disposed rearwardly of the axle casing 124, this further set of wheels having an axle connected with the chassis of the tractor by further springs but not directly connected with the sub-frame 117. Alternatively, the wheels associated with the axle casing 124 may be the rearmost wheels of the tractor.

The gearbox and axle casing may be incorporated in a single unit. Furthermore, the engine, gearbox and axle casing may be rigid with one another and form a single unit.

It will be appreciated that the rear wheels 20 of the tractor of Figure 1 may be omitted, the driven wheels

18 then being the rearmost wheels of the tractor. The driven wheels would then occupy a position somewhat nearer to the rear end of the chassis than in the tractor shown in Figure 1. In the particular example illustrated in Figure 1, the engine is adjacent to a rear end of the sub-frame and the sub-frame is connected adjacent to its front end with the axle casing. The engine may alternatively be spaced from the rear end of the sub-frame.

Whereas the above described embodiments illustrate the engine mounted rearwardly of the driven wheels, it is envisaged that the engine and/or the gearbox may be mounted forwardly of the driven wheels or, if more than one pair of driven wheels are provided, it is envisaged that the engine and gearbox, which may be an integral assembly, may be mounted between such pairs of driven wheels.

CLAIMS

1. A tractor of an articulated road vehicle having a fifth wheel coupling assembly for coupling the tractor with a semi-trailer of the vehicle, the tractor comprising a chassis which bears the fifth wheel coupling assembly, steerable wheels mounted on the chassis, a set of driven wheels having a common axis, an engine, transmission means for transmitting drive from the engine to the driven wheels and suspension means for transmitting a downwardly directed force from the chassis to the set of driven wheels whilst permitting limited upwards and downwards movement of said common axis relative to the chassis, the tractor being characterised in that the engine is so associated with the set of driven wheels that, when said common axis moves upwardly and downwardly relative to the chassis under the control of the suspension means, the engine also necessarily moves relative to the chassis.

2. An assembly comprising an engine, a gearbox, a frame, a universal joint and a drive shaft extending from the gearbox to the universal joint, wherein the engine and gearbox are mounted on the frame, the engine is adjacent to one end of the frame, the universal joint is adjacent to an opposite end of the frame and the frame is adapted for pivotal connection adjacent to said ends with further parts of a vehicle.

3. A vehicle according to Claim 1 wherein there is provided at the rear of the engine means for so connecting the engine with the chassis that relative up and down movement of a front of the engine relative to the chassis is permitted but rocking of the engine relative to the chassis about an axis extending longitudinally of the chassis is restrained and wherein limited rocking of said axis of the set of driven wheels relative to the engine about an axis extending longitudinally of the chassis is permitted.

4. A vehicle according to Claim 1 or Claim 3 further comprising a set of rear wheels mounted on an axle, the axle having the form of an arch and extending over a unit comprising the engine and a gearbox.