

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
26 February 2009 (26.02.2009)

PCT

(10) International Publication Number  
**WO 2009/023931 A1**

(51) International Patent Classification:  
**B62D 59/04** (2006.01) **B62D 63/00** (2006.01)  
**B60K 8/00** (2006.01)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(21) International Application Number:  
PCT/AU2008/001230

(22) International Filing Date: 22 August 2008 (22.08.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
2007904533 23 August 2007 (23.08.2007) AU

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicants and  
(72) Inventors: **SCHMOLLING, Russell, Kenneth** [AU/AU]; 231 Coolgardie Road, Coolgardie, New South Wales 2478 (AU). **SHELLEY, Mark, Andrew** [AU/AU]; 231 Coolgardie Road, Coolgardie, New South Wales 2478 (AU).

(74) Agent: **GARDNER, John, R., G.**; Suite 398, 15 Albert Avenue, Broadbeach, Gold Coast, Queensland 4218 (AU).

Published:  
— with international search report

(54) Title: MOTORISED TRAILER

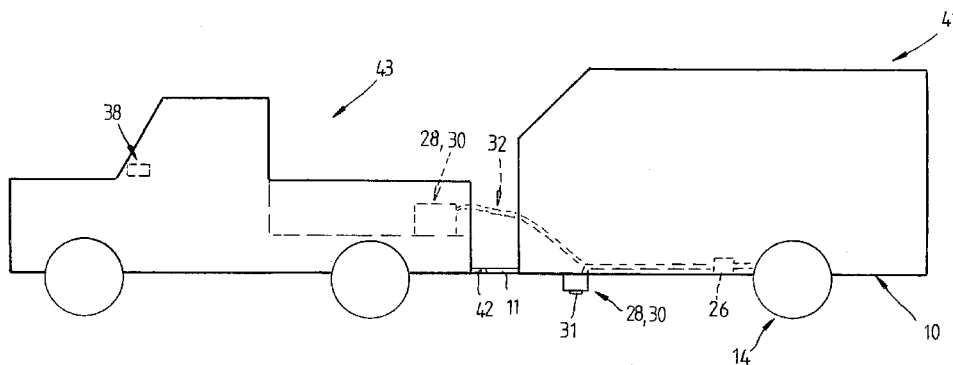


FIG. 3

(57) Abstract: A motorised trailer (41) for use with a towing vehicle (41), the trailer (41) having at least one pair of drivable wheels (14) which are adapted to be driven by an hydraulic drive motor (26) which is supplied with hydraulic fluid from an hydraulic pump (28) driven by a drive engine (30). The drivable wheels (14) are driven by the hydraulic motor (26) such as to maintain the trailer (41) operating at road speeds substantially the same as the road speeds of the towing vehicle (43) to provide assistance to the towing vehicle (43).



WO 2009/023931 A1

## MOTORISED TRAILER

### Technical Field

This invention relates to a motorised trailer and in particular to a motorised trailer for use with a towing vehicle to assist the motion of the towing vehicle. The present invention is particularly applicable to mobile accommodation trailers such as caravans however it may be applied to any other trailed vehicle.

### Background Art

Trailed vehicles of various forms are commonly used in many different applications and for many different purposes. Caravans or trailer camper vans are a popular means for providing transportable accommodation for persons who wish for example to travel to many different geographical locations including locations where accommodation is not available. In many situations persons who are using a caravan or trailer camper van travel to locations where a towing vehicle has limited traction due to the nature of the ground conditions. The load that the towed vehicle places on a towing vehicle in these situations is high making it difficult for the towing vehicle to obtain sufficient traction to move the towed vehicle. Typical locations in which this can occur include sandy locations at a beach or the like. A user of vehicle of the above type therefore is limited in the locations in which he or she can drive even if the towing vehicle is a four-wheel drive vehicle.

In addition to the above disadvantages, towing of a trailed vehicle can place a considerable load on the towing vehicle in normal driving situations thus substantially increasing fuel consumption of the towing vehicle and therefore costs to the user.

Motorised trailers are known in connection with large road transport vehicles however usually these are driven directly or indirectly by the engine of the towing vehicle and therefore are affected by the varying RPM of the engine of the towing vehicle.

### Summary of the Invention

The present invention aims to overcome or alleviate one or more of the above disadvantages or at least provide an alternative to the know arrangements by providing a motorised trailer for use with a towing vehicle and which when used with a towing vehicle is capable in assisting in the motion of the towing vehicle. The present invention in a particular aspect aims to provide a motorised trailer which can reduce load on the towing vehicle to therefore enable the towing vehicle to obtain traction in a range of environments. The present invention in another aspect aims to provide a motorised trailer which is capable of reducing the fuel consumption of a towing vehicle. Other

objects and advantages of the invention will become apparent from the following description.

The present invention thus provides in one aspect although not necessarily the broadest aspect, a motorised trailer comprising a chassis, said chassis being supported by  
5 at least one pair of drivable wheels, at least one hydraulic drive motor coupled to said drivable wheels, an hydraulic pump for supplying hydraulic fluid to said hydraulic drive motor/s and a drive engine for driving said hydraulic pump and wherein fluid is supplied from said pump to said hydraulic motor/s in use to drive said drivable wheels at a road speeds corresponding to the road speeds of a towing vehicle. Thus the driving of the  
10 trailer at substantially the same road speed as the towing vehicle will provide assistance to the motion of the towing vehicle.

The drive engine suitably comprises an internal combustion engine. The drive engine is suitably operated to provide a substantially constant output or RPM to drive the hydraulic pump at a substantially constant rate and the supply of fluid from the pump to  
15 the hydraulic motor/s is varied to vary the rotational speed of the drivable wheels to maintain the trailer operating at substantially the same road speed as the towing vehicle. Preferably the pump is connected to a hydraulic reservoir and means are provided to bypass hydraulic fluid back to the reservoir in accordance with the fluid demands of the hydraulic motor/s. Thus at higher speeds, the hydraulic demands of the hydraulic motor/s  
20 will be higher and less fluid will be bypassed back to the reservoir. Similarly more fluid will be bypassed to the reservoir at lower speeds. The bypass means suitably comprises a pressure sensing valve. Typically the pump comprises a load-sensing pump or is in a load-sensing circuit such that flow to the hydraulic motor/s from the pump is varied in accordance with the flow and pressure demands of the hydraulic motor/s.

25 Preferably the drivable wheels may be selectively connected to or disconnected from the hydraulic drive motor/s. Preferably the drivable wheels include free wheeling hubs provided with actuating means such as solenoid actuators which enables the wheel to be selectively connected to or disconnected from the hydraulic drive motor.

30 Preferably the hydraulic drive motor comprises a single hydraulic drive motor connected to the drivable wheels through a differential. Preferably the differential is a limited slip differential. Preferably the free wheeling hubs of the drivable wheels are mounted on shafts which are connected to the differential. Preferably the shafts are connected to the differential through universal joints. Preferably the shafts comprise stub shafts and half-shafts are provided between each stub shaft and the differential.

Respective universal joints may be provided at opposite ends of half-shafts to connect the half-shafts to the differential and stub shafts respectively.

The hydraulic pump and drive engine may be mounted on the chassis of the trailer or may be mounted on a towing vehicle with respective hydraulic lines interconnecting the hydraulic motor and pump. The hydraulic fluid reservoir may be mounted on the trailer or on the towing vehicle.

In another aspect, the present invention provides a drive system for a trailer having a pair of drivable wheels, said drive system including an hydraulic drive motor adapted to be coupled to said drivable wheels, an hydraulic pump for supplying hydraulic fluid to said hydraulic drive motor and a drive engine for driving said hydraulic pump and wherein fluid is supplied from said pump to said hydraulic motor in use to maintain said trailer operating at different road speeds substantially the same as the different road speeds respectively of a towing vehicle.

Suitably the drivable wheels include free wheeling hubs and means are provided to selectively engage or disengage the hubs.

Preferably control means are provided to enable the range of road speeds at which fluid is supplied to the hydraulic motor from the pump to be selectively varied. The control means may also selectively control the operation of the drive engine including the starting thereof. Preferably the control means are adapted to control the free wheeling hubs. Preferably the control means are operable to disengage the hubs when the road speed exceeds a predetermined speed. Preferably the control means is operable to engage the hubs upon starting of the drive engine.

The control means may comprise programmable control means or other computer operated or associated control means.

In yet another aspect, the present invention provides in combination, a towing vehicle and a trailer coupled to said towing vehicle, said trailer having at least one pair of drivable wheels, an hydraulic drive motor coupled to said drivable wheels, an hydraulic pump for supplying hydraulic fluid to said hydraulic drive motor and a drive engine for driving said hydraulic pump and wherein fluid is supplied from said pump to said hydraulic motor in use to drive said drivable wheels to maintain said trailer operating at road speeds substantially the same as the respective road speeds of the towing vehicle.

In yet a further aspect, the present invention provides a method of operating a motorized trailer coupled to a towing vehicle, said trailer having at least one pair of drivable wheels, said method including the step of driving said drivable wheels to

maintain said trailer operating at road speeds substantially the same as the road speeds of the towing vehicle.

Preferably the drivable wheels are adapted to be driven by a hydraulic motor and fluid is supplied in use to the hydraulic motor to vary the drive applied to the drivable wheels by the hydraulic motor.

Preferably the hydraulic motor is supplied with fluid from a load sensing hydraulic pump driven by an engine and wherein the method includes the step of operating the engine at a substantially constant rate or RPM.

### **Brief Description of the Drawings**

In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the invention and wherein :-

Fig. 1 illustrates in partly cutaway view the chassis of a motorised trailer according to an embodiment of the present invention;

Fig. 2 is a schematic diagram of the control system for the motorised trailer; and

Fig. 3 illustrates schematically mobile accommodation unit incorporation the trailer of Fig. 1 and coupled to a towing vehicle.

### **Detailed Description of the Preferred Embodiment**

Referring to the drawings and firstly to Fig. 1, there is illustrated the chassis 10 of a motorised trailer according to the present invention. The chassis 10 may comprise for example the chassis of a caravan or camper trailer, a boat trailer, a water tank trailer, a box like trailer or any other trailed vehicle for use in domestic, commercial or military applications. The chassis 10 is provided with a towing coupling 11 at its leading end to enable it to be coupled to a towing vehicle in a conventional manner. The chassis 10 is formed as is conventional of steel RHS frame members including opposite elongated side frame members 12 and cross frame members 13 extending between the side frame members 12 typically being connected thereto by welding. The chassis 10 however may be in any configuration other than in the configuration illustrated in Fig. 1.

Supporting the chassis 10 for movement over a ground surface are a pair of drivable tyred wheels 14 arranged at opposite sides of the chassis 10 and which in the embodiment illustrated provide the sole rolling support to the chassis 10. The wheels 14 include free wheeling hubs 15 mounted to respective stub shafts 16. Each stub shaft 16 is supported rotatably in bearings in a bearing housing 17, each being mounted or secured to respective torsions arms 18 provided at opposite ends of, and fixed to, a torsion bar 19

located in and extending longitudinally of an elongated hollow housing 20. The housing 20 is mounted fixedly to the chassis 10 and extends transversely thereof substantially parallel to the chassis members 13.

5 The free wheeling hubs 15 may be engaged or disengaged with their associated stub shafts 16 for rotation therewith and for this purpose, each hub 15 is an electrically actuated hub 15 of a known type for example an electrically actuated hub which enables a hub 15 to be selectively engaged with, or disengaged from its associated stub shaft 16 by an electrical actuator such as a solenoid actuator and from a location remote from the hub 15 by applying a suitably voltage or control signal to the actuator.

10 Mounted centrally to one of the cross arms 13 of the chassis 10 and in substantial transverse alignment with the wheels 14 is a differential gearbox unit 21 which in this embodiment is a limited slip differential unit and respective half shafts 22 connect the opposite output shafts 23 of the differential unit 21 to the respective stub shafts 16 via inner and outer universal joints 24 and 25 between the shafts 23 of the differential unit 21  
15 and stub shafts 16 respectively.

Drive is capable of being transmitted to the drivable wheels 14 from an hydraulic drive motor 26 connected or coupled to the input shaft 27 of the differential unit 21. Hydraulic fluid is supplied to the drive motor 26 from an hydraulic pump 28 connected to an hydraulic fluid reservoir or tank 29 supported on the chassis 10, the pump 28 being  
20 coupled to an internal combustion engine 30. The engine 30 and associated hydraulic pump 28 are mounted on the chassis 10 on a transverse support frame member 31 of the chassis 10 which is located below the upper surface of the chassis 10 so that the engine 30 and associated pump 28 are in effect recessed into the chassis 10 do not interfere to a significant extent with any accommodation or cartage unit mounted on or constructed  
25 with the chassis 10. The engine 30 however may project to some extent above the upper level of the chassis 10. The engine 30, pump 28 and reservoir 29 alternatively may be mounted on a towing vehicle to which the chassis 10 is to be coupled.

Flexible hydraulic hoses indicated generally at 32 interconnect the pump 28, motor 26 and reservoir 29 such that hydraulic oil can be supplied from the pump 28 to the  
30 motor 26 via the fluid line 33 and be re-circulated from the motor 26 back to the reservoir 29 via the fluid line 34. Fluid supply from the reservoir 29 to the pump 28 is provided through fluid line 35. A further fluid return line 36 is connected between the pump 28 and reservoir 29,

The pump 28 comprises a load-sensing pump or is in load-sensing hydraulic circuit including a pressure sensing valve 37 to supply fluid to the motor 26 in accordance with the flow and pressure requirements of the motor 26. The pump 28 will only supply fluid to the hydraulic motor 26 when the wheels 14 are rotating. Thus with  
5 the wheels 14 rotating with the hubs 15 engaged, the motor 26 will be driven back through the differential 21 resulting in a pressure change in the fluid supply line 33 from the pump 28 to the motor 26. This pressure change will be sensed by the valve 37 which causes increased fluid to be supplied to the motor 26 to drive the wheels 14.

The internal combustion engine 30 which drives the pump 28 is controlled or set  
10 by adjustment of its throttle to operate at a substantially constant rate or RPM at its output shaft typically 2000 RPM to 3000RPM to handle the hydraulic demand of the hydraulic motor 26 for the range of speeds at which assistance is required to be provided by the trailer to the towing vehicle. Additionally the engine 30 is an electric start engine so that it can be started and operated remotely.

The operation of the motorised trailer as described above is controlled by a  
15 controller 38 (see Fig. 2) which is normally positioned within a towing vehicle. The controller 38 is connected to the engine 30 for starting of the engine and controlling the speed thereof. The controller 38 is further connected to the electrically actuated hubs 15 to control the engagement and disengagement of the hubs 17 with the stub axles 16. The  
20 controller 38 is further connected to the pump 28 to monitor the operation of the pump 28 and set parameters for the supply of fluid from the pump 28 to the motor 26. The controller 33 further includes a start switch 39 for starting the engine 30 and an adjustable control knob 40 which enables the operator to determine the range of road speed of the towing and towed vehicle at which the drive is transmitted to the wheels 14 to provide  
25 assistance to the towing vehicle. For this purpose, the controller 38 is also connected to the towing vehicle speedometer to enable the speed of operation of the towing vehicle to be sensed.

In use, an accommodation trailer 41 such as a caravan type trailer incorporating a  
30 motorised trailer chassis 10 as described above is coupled via towing coupling 11 to a towing hitch 42 on a towing vehicle 43. The controller 38 is located in the cab of the vehicle 43 and the operator or driver of the towing vehicle by depression or actuation of the start switch 39 starts the engine 30 so as to drive the pump 28. At the same time, depression or actuation of the start switch 39 will also activate the electrically actuated hubs 15 such that they become connected positively to the stub shafts 16 to enable the

wheels 14 to be driven. Before the towing vehicle commences movement, fluid pumped by the pump 28 from the reservoir 29 is directed back to the reservoir 29 through the line 36 under the control of the pressure sensitive valve 37.

When the towing vehicle 43 commences its forward movement, the wheels 14 will commence rotation and this movement will be sensed by the change in pressure in the hydraulic supply line 33 from the pump 28 to the motor 26 as sensed by the pressure sensing valve 37. This will cause hydraulic fluid to be supplied from the pump 28 to the motor 26 and therefore drive to be transmitted from the motor 26 through the differential unit 21 via the half shafts 22, stub shafts 16 and hubs 15 to the wheels 14. As the wheels 14 are now driven, the towing vehicle 43 will be assisted in its forward movement.

Any change of speed in the towing vehicle 43 and thus the trailer 41 will be sensed by a change in pressure in the hydraulic system by the valve 37 and will result in the pump 28 either supplying more or less hydraulic fluid to the hydraulic motor 26. Thus if the speed of the towing vehicle 43 increases, the pump 28 will automatically compensate to supply further fluid to the motor 26 to maintain the wheels 14 rotating at a rotational speed to drive the trailer 41 at the same road speed as the towing vehicle 43. Similarly if the road speed of the towing vehicle 43 reduces, fluid from the pump 28 is bypassed to the reservoir 29 so that less fluid is supplied to the motor 26 and the rotational speed of the wheels 14 is reduced.

The controller 38 can be set so that fluid is continued to be supplied from the pump 28 to the motor 26 until the towing vehicle 43 reaches a predetermined speed such as 80Km/hr. When the towing vehicle 43 exceeds that speed as sensed by the controller 38, the controller 38 will deactivate the hub actuators so that the hubs 15 are decoupled from their stub shafts 16. The hubs 15 and associated wheels 14 can then freewheel so as not to impede the towing vehicle 43 at higher speeds. The operator however through the adjustable control knob 40 of the controller 38 can determine the range of road speeds through which drive is transmitted to the wheels 14 of the towed vehicle 41 to provide assistance to the towing vehicle 43.

The controller 38 will also sense when the pump 28 ceases supplying fluid to the motor 26 if the internal combustion engine 30 stops operating due for example to a lack of fuel. The controller 38 in this situation will deactivate the actuators of the free wheeling hubs 15 to disconnect the freewheeling hubs 15 from the shafts 16 so that the motor 26 is not driven by the wheels 14 which may cause damage to the pump 28 and/or hydraulic components.

The controller 38 suitably comprises a programmable computer type controller however it will be appreciated that various different control arrangements may be provided for controlling the drive of the wheels 14 of the trailer 41. Further whilst the chassis 10 has been described as being supported by a pair of wheels 14, it may include tandem wheels or any other wheel configuration. The trailer 41 also may comprise any form of trailed vehicle as referred to above.

As referred to above and as shown in Fig. 3, the engine 30 and associated pump 28 may be recessed into the chassis 10 for example by being supported on the lower support frame member 31 so as not to project significantly into the accommodation area of the trailer 41. Alternatively, the engine 30 and pump 28 may be located elsewhere on the chassis 10 of the trailer 41. The engine 30 and pump 28 may also be carried in the towing vehicle 43 (as shown in dotted outline) with the hydraulic lines 32 (also shown in dotted outline) extending from the pump 28 into the trailer 41 for connection to the hydraulic drive motor 26.

The pump 28 may be controlled by any known load sensing hydraulic circuit to provide variable output to the hydraulic motor 26 and for this purpose, the pump 28 may comprise a variable displacement pump, variable volume pump or any other form of pump.

The terms “comprising” or “comprises” as used throughout the specification and claims are taken to specify the presence of the stated features, integers and components referred to but not preclude the presence or addition of one or more other feature/s, integer/s, component/s or group thereof.

Whilst the above has been given by way of illustrative embodiment of the invention, all such variations and modifications thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of the invention as defined in the appended claims.

**CLAIMS**

1. A motorised trailer comprising a chassis, said chassis being supported by at least one pair of drivable wheels, at least one hydraulic drive motor coupled to said drivable  
5 wheels, an hydraulic pump for supplying hydraulic fluid to said hydraulic drive motor/s and a drive engine for driving said hydraulic pump and wherein fluid is supplied from said pump to said hydraulic motor/s in use to drive said drivable wheels at a road speeds corresponding to the road speeds of a towing vehicle.
- 10 2. A trailer as claimed in claim 1 wherein said drive engine comprises an internal combustion engine and wherein in use, said engine is operated to provide a substantially constant output to drive the hydraulic pump at a substantially constant rate and wherein the supply of fluid from the pump to the hydraulic motor is varied to drive the drivable  
15 wheels at a rotational speed to maintain the trailer operating at substantially the same road speed as the towing vehicle.
3. A trailer as claimed in claim 2 wherein said pump is connected to a hydraulic reservoir and wherein means are provided to bypass hydraulic fluid back to the reservoir in accordance with the fluid demands of the hydraulic motor.  
20
4. A trailer as claimed in claim 3 wherein said bypass means comprises a pressure sensing valve.
5. A trailer as claimed in any one of claims 1 to 4 wherein said drivable wheels are  
25 adapted to be selectively connected to or disconnected from the hydraulic drive motor/s.
6. A trailer as claimed in claim 5 wherein said drivable wheels include freewheeling hubs provided with actuating means which enables the wheel to be selectively connected to or disconnected from the hydraulic drive motor/s.
- 30 7. A trailer as claimed in claim 5 or claim 6 wherein said hydraulic motor comprises an hydraulic motor connected to the drivable wheels through a differential.
8. A trailer as claimed in claim 7 wherein said freewheeling hubs of the drivable wheels are mounted on shafts which are connected to the differential through universal

joints.

9. A trailer as claimed in claim 8 wherein said shafts comprise stub shafts and half-shafts are provided between each stub shaft and the differential.

5

10. A trailer as claimed in claim 9 wherein respective said universal joints are provided at opposite ends of said half-shafts to connect the half-shafts to the differential and stub shafts respectively.

10 11. A trailer as claimed in any one of claims 1 to 10 wherein said hydraulic pump and drive engine are mounted on said chassis of the trailer or said towing vehicle with respective hydraulic lines interconnecting the hydraulic motor/s and pump.

15 12. A drive system for a trailer having a pair of drivable wheels, said drive system including an hydraulic drive motor adapted to be coupled to said drivable wheels, an hydraulic pump for supplying hydraulic fluid to said hydraulic drive motor and a drive engine for driving said hydraulic pump and wherein fluid is supplied from said pump to said hydraulic motor in use to maintain said trailer operating at different road speeds substantially the same as the different road speeds respectively of a towing vehicle.

20

13. A drive system as claimed in claim 12 wherein said drivable wheels include freewheeling hubs and means are provided to selectively engage or disengage the hubs.

25 14. A drive system as claimed in claim 12 or claim 13 and including control means to enable the range of road speeds at which fluid is supplied to the hydraulic motor from the pump to be selectively varied.

30 15. A drive system as claimed in claim 14 wherein said control means is adapted to control the operation of the drive engine including the starting thereof.

30

16. A drive system as claimed in claim 15 wherein said the control means are operable to disengage the hubs when the road speed exceeds a predetermined speed and engage the hubs upon starting of the drive engine.

17. A towing vehicle and a trailer coupled to said towing vehicle, said trailer having at least one pair of drivable wheels, an hydraulic drive motor coupled to said drivable wheels, an hydraulic pump for supplying hydraulic fluid to said hydraulic drive motor and a drive engine for driving said hydraulic pump and wherein fluid is supplied from  
5 said pump to said hydraulic motor in use to drive said drivable wheels to maintain said trailer operating at road speeds substantially the same as the respective road speeds of the towing vehicle.

18. A method of operating a motorized trailer coupled to a towing vehicle, said trailer  
10 having at least one pair of drivable wheels, said method including the step of driving said drivable wheels to maintain said trailer operating at road speeds substantially the same as the road speeds of the towing vehicle.

19. A method as claimed in claim 18 wherein said drivable wheels are adapted to be  
15 driven by a hydraulic motor and wherein fluid is supplied in use to said hydraulic motor to vary the drive applied to the drivable wheels by said hydraulic motor.

20. A method as claimed in claim 21 wherein said hydraulic motor is supplied with  
20 fluid from an hydraulic pump driven by an engine and wherein said method includes the step of operating said engine at a substantially constant rate or RPM.

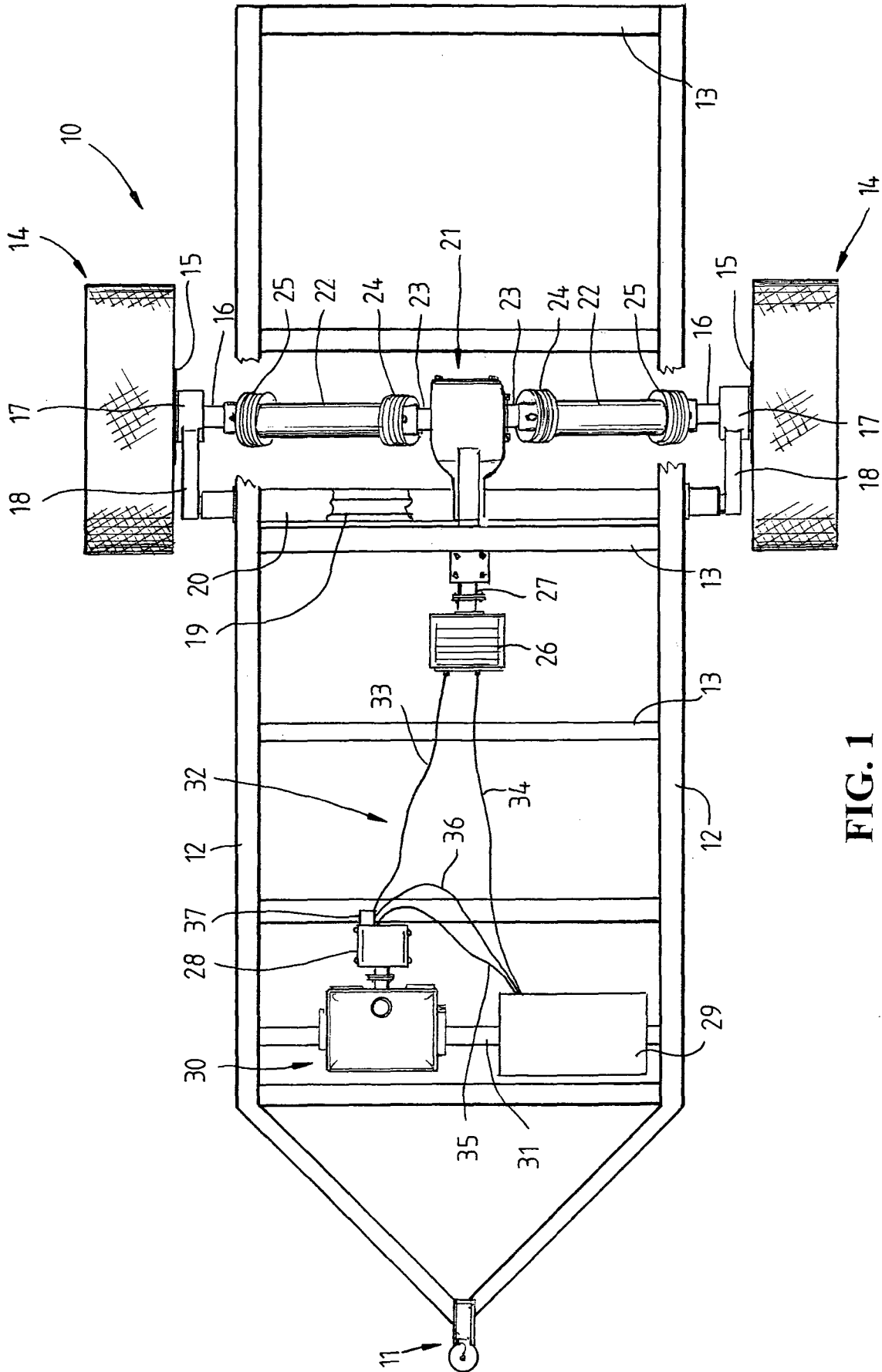


FIG. 1

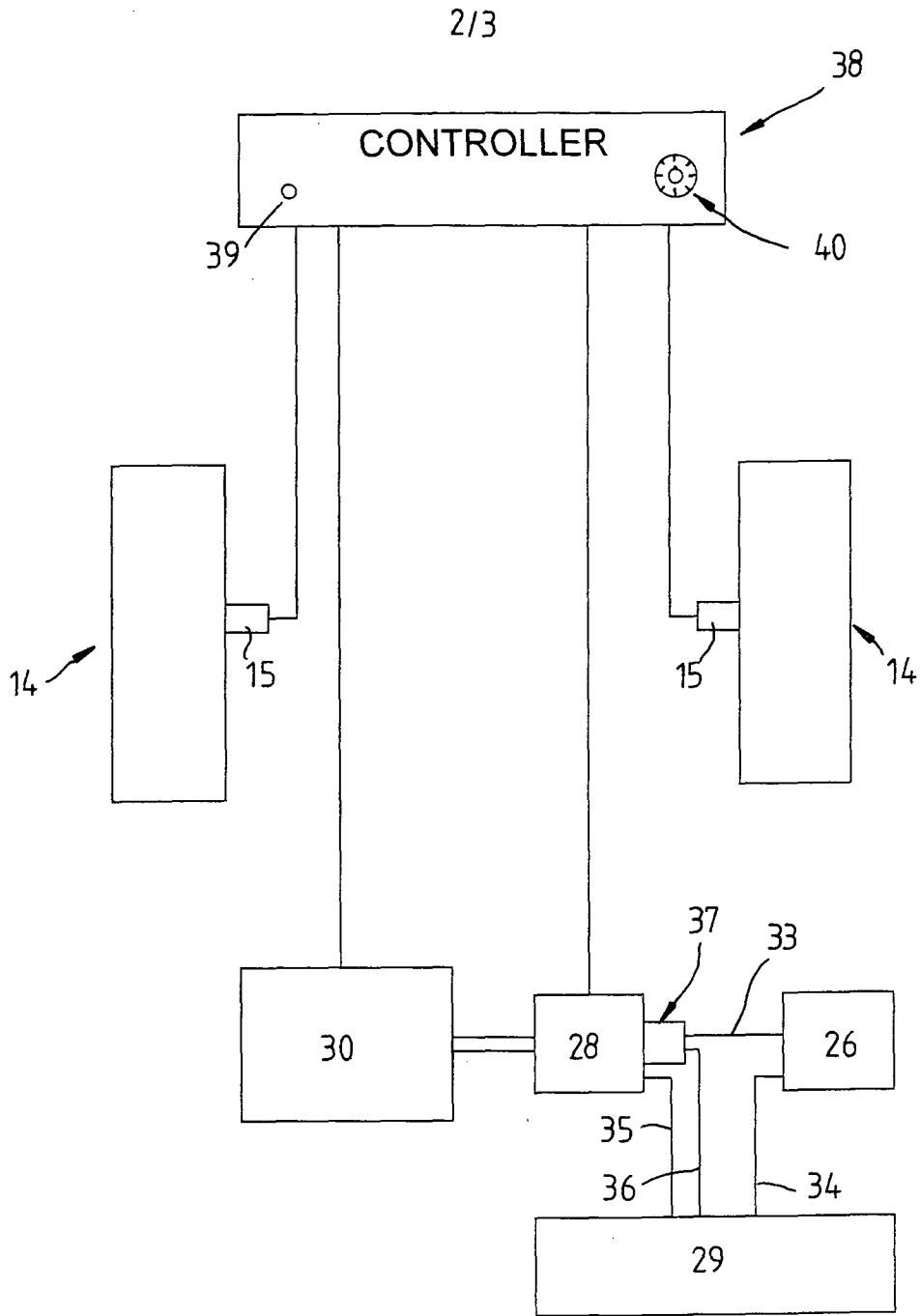


FIG. 2

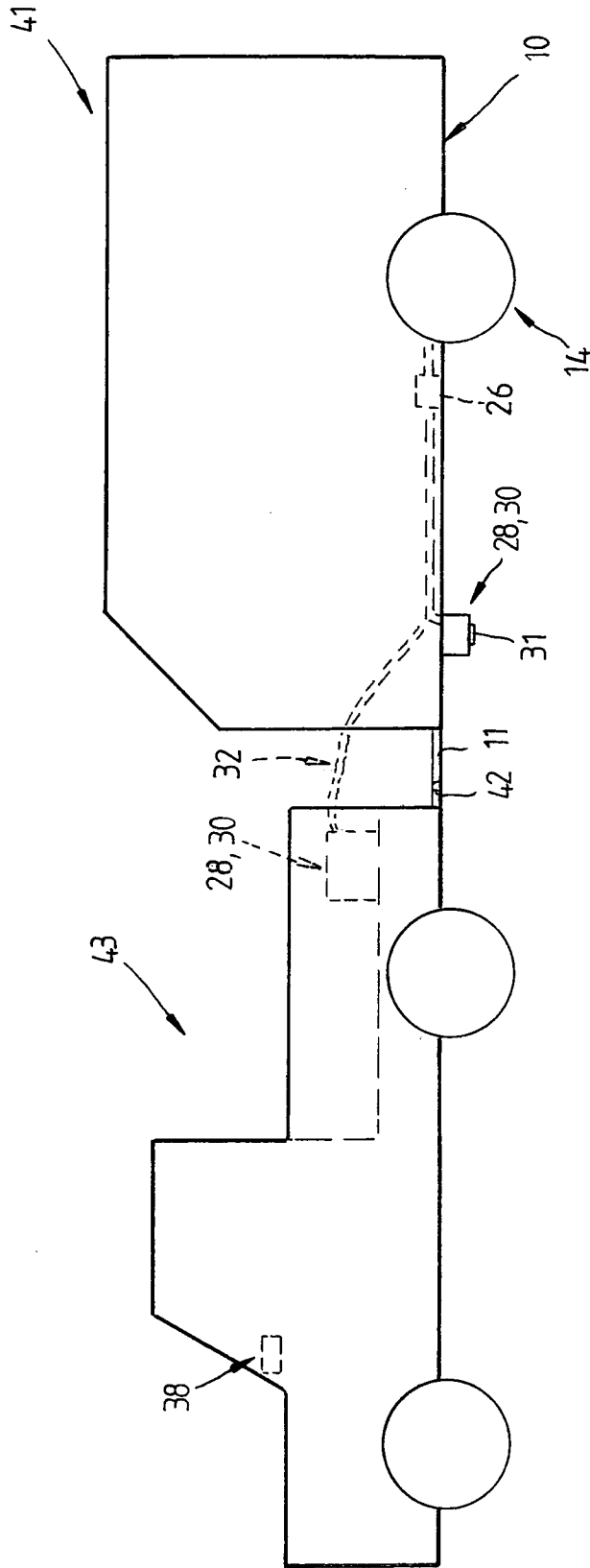


FIG. 3

# INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/AU2008/001230**

**A. CLASSIFICATION OF SUBJECT MATTER**

Int. Cl.

**B62D 59/04** (2006.01)      **B60K 8/00** (2006.01)      **B62D 63/00** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

**AU:PAIS IPC B62D 59/04**

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

1. EPODOC, WPI: IPC B62D, B60K and Keywords (motorise, self-driven, trailer, hydraulic, synchronise, speed) and like terms
2. USPTO & ESP@CE: Keywords (motorise, powered, hydraulic, trailer, caravan) and like terms.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4027738 A (LUNDIN) 7 June 1977 Figures 1, 7, 8; Column 1 line 65 – Column 2 line 2; Column 1 lines 16-19; lines 28-64;	1, 3-8 11, 12, 13, 15, 17, 18, 19
X	US 4505347 A (PRECHTEL) 19 March 1985 Figures 1-3, column 3 lines 64-66, Column 1 lines 44-54, Column 2 lines 41-46, Column 4, lines 36-44, Column 1 line 51-Column 4 line 2	1, 3-5, 7, 8, 11, 12, 15, 17, 18, 19
X	US 4762192 A (MAXWELL) 9 August 1988 Figures 1, 3, 7, 8;	1, 3, 4, 7, 8, 11, 12, 15, 17, 18, 19
X	US 4625821 A (AUMONT et al.) 2 December 1986 Figures 1-3, Column 1 lines 48-64; column 6 lines 36-47	1, 3, 4, 7, 8, 11, 12, 14, 15, 17, 18, 19

Further documents are listed in the continuation of Box C

See patent family annex

* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search  
**25 November 2008**

Date of mailing of the international search report  
**09 DEC 2008**

Name and mailing address of the ISA/AU  
**AUSTRALIAN PATENT OFFICE**  
 PO BOX 200, WODEN ACT 2606, AUSTRALIA  
 E-mail address: [pct@ipaaustralia.gov.au](mailto:pct@ipaaustralia.gov.au)  
 Facsimile No. +61 2 6283 7999

Authorized officer  
**Dr ARUN SHARMA**  
 AUSTRALIAN PATENT OFFICE  
 (ISO 9001 Quality Certified Service)  
 Telephone No : +61 2 6222 3642

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2008/001230

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4771838 A (KETCHAM) 20 September 1988 Figures 5-8, column 9 lines 21-33, column 11 lines 3-24, column 10 line 24 – column 11 line 24	1-4, 7, 8, 12, 15, 17, 18, 19, 20
A	US 4518053 A (QUEVEAU) 21 May 1985 Whole document	
A	US 5332052 A (CARNEVALE) 26 July 1994 Whole document	
A	WO 1986/002048 A1 (ANDERSON) 10 April 1986 Whole document	

Information on patent family members

International application No.

PCT/AU2008/001230

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	4027738	CH	613413	DE	2557150	FR	2295314
		GB	1532790	SE	7415880		
US	4505347	DE	3143723				
US	4762192	NONE					
US	4625821	CA	1224159	EP	0096621	FR	2527525
US	4771838	NONE					
US	4518053	NONE					
US	5332052	NONE					
WO	1986/002048	EP	0197030				

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX