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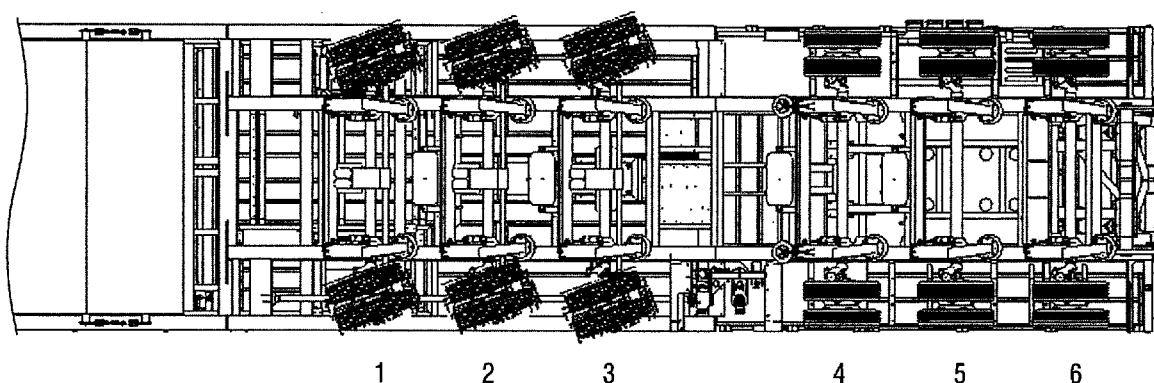


FIG. 4

(57) Abstract: A multi-axle transport trailer having a plurality of axles includes a suspension comprising air bags associated with each axle, the air bags in communication with an air source, wherein air bags associated with different axles are capable of having different air pressures therein. The trailer further optionally includes a steering system associated with at least one axle, the axle including a tie rod connected between wheels on both ends of the axle, the steering system comprising cylinders configured to articulate the wheels, and a sensing device configured to monitor movement of the tie rod and facilitate actuating the cylinders to turn the wheels.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/15998

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B60G 17/00, B60G 17/02, B62D 13/04, B62D 61/00, B62D 61/10, B62D 63/00 (2017.01)
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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)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- A	US 4,494,766 A (McHugh et al.) 22 January 1985 (22.01.1985) entire document, especially Title, Abstract, figs. 1-17, col 8, ln 7-68, col 9, ln 1-21, col 10, ln 1-30, col 11, ln 13-22.	1, 4-5, 8-9 ----- 2-3, 10
A	US 5,479,999 A (Proia) 2 January 1996 (02.01.1996) entire document, especially Title, Abstract, figs. 1-4, col 4, ln 51-67, col 7, ln 43-67.	2-3, 10
A	US 2005/0121878 A1 (Muldoon) 9 June 2005 (09.06.2005) entire document, especially Title, Abstract, figs. 1-7, para[0026].	2-3, 10

☐ 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

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"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

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 17/15998

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-5, 8-10, drawn to a multi axle transport trailer.

Group II: Claims 6-7, drawn to a method of operating a multi-axle transport trailer in reverse.

Group III: Claims 11-12, drawn to a steering system including a sensing cylinder coupled to a tie rod connected between trailer wheels.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

--See Extra Sheet--

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-5, 8-10

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

•-Box III ? Observations where unity of invention is lacking-•-

SPECIAL TECHNICAL FEATURES

Group I has the special technical features of a plurality of axles having a suspension comprising air bags associated with each axle, the air bags in communication with an air source, wherein air bags associated with different axles are capable of having different air pressures therein not required by Group II or III.

Group II has the special technical features of a method of operating a trailer in reverse comprising the steps of using a control valve configured to operate cylinders to articulate the wheels, the method comprising:
transmitting a signal to the control valve when the trailer is moved in reverse;
reducing air pressure within air bags associated with axles having wheels to be articulated not required by Group I or III.

Group III has the special technical features of a sensing cylinder, a first accumulator in fluid communication with a first end of the sensing cylinder, and a second accumulator in fluid communication with a second end of the sensing cylinder and a switch configured to monitor pressure within the first and second accumulators, wherein increased pressure within either the first or second accumulator causes the switch to send a signal to actuate the steering cylinders in an appropriate direction to articulate the wheels, not required by Groups I-II.

SHARED TECHNICAL FEATURES

The only technical features shared between Groups I-III is a multi-axle transport trailer having a steering system associated with at least one axle, the axle including a tie rod connected between wheels on both ends of the axle and steering cylinders configured to articulate the wheels, which does not provide any contribution over the prior art as it is anticipated by US 4,949,766 A to McHugh et al. (hereinafter "McHugh").

McHugh teaches a multi-axle transport trailer (Title; Abstract; fig.1) comprising:
a plurality of axles (62; fig. 6, 8-9), and a suspension comprising air bags (102; figs. 6, 8-9) associated with each axle (62; fig.6, 8-9; col 8, ln 7-21) the air bags in communication with an air source (124; fig.9; col9, ln 9-12), wherein air bags (102) associated with different axles are capable of having different air pressures therein (col 8, ln 63-68, col 9, ln 1-21); and
a steering system associated with at least one axle (see col 10, ln 3-9), the axle including a tie rod (150; fig.15) connected between wheels (60) on both ends of the axle (62), the steering system comprising cylinders (steering cylinders 142) configured to articulate the wheels (col 10, ln 23-40; figs. 13-15), and a sensing device (140) configured to monitor movement of the tie rod (150) and facilitate actuating the cylinders to turn the wheels (col 10, ln 23-40).

As the common features were known in the art at the time of the invention, they cannot be considered special technical features that would otherwise unify the groups.

Therefore, Groups I-III lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.