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[Continued on next page]

(54) Title: MODULAR SUSPENSION SYSTEM AND COMPONENTS THEREOF

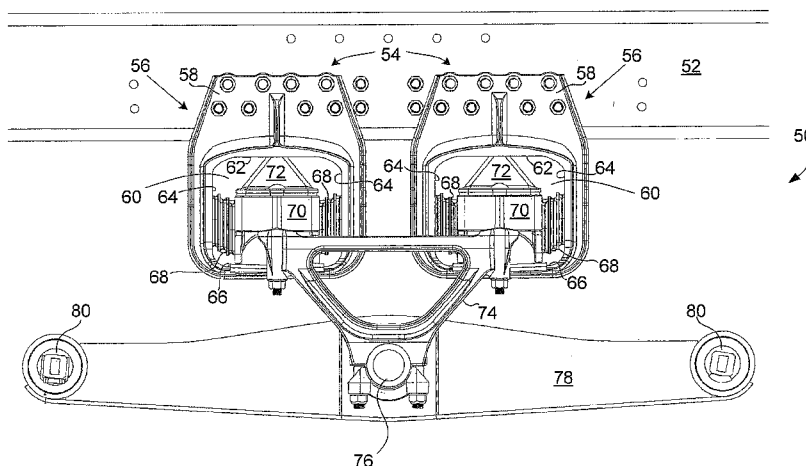


FIG. 1

(57) Abstract: An elastomeric spring suspension is described for supporting a longitudinally extending vehicle frame rail above first and second axles forming a tandem axle configuration. The suspension includes a frame hanger assembly mounted to the vehicle frame rail. The frame hanger assembly has two full spring modules, each of which includes two shear springs, a progressive spring rate load cushion having a pyramidal shape with a flattened top surface and a spring mount for mounting the springs. A saddle assembly is connected to the spring mount, and an equalizing beam is connected to the saddle assembly and further connected to the axles. The spring rate for the suspension increases almost linearly as a function of sprung load, resembling a pneumatic suspension. Accordingly, the suspension exhibits excellent ride quality, without sacrificing roll stability.



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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

INV. B60G5/02 B60G11/24 F16F1/40 F16F1/50 B60G11/22

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)

F16F B60G

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 539 170 A (HAMEL DENIS MARCEL) 10 November 1970 (1970-11-10) column 1, line 1 - column 3, line 14; figures 1-6	1,6-9,11
X	GB 2 128 942 A (ERF LIMITED) 10 May 1984 (1984-05-10) page 1, line 40 - page 2, line 65; figure 3	1,6,7,9, 18
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A		1,6,7
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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 document 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
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- "&" document member of the same patent family

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	GB 2 252 276 A (GKN TADCHURCH LIMITED [GB]) 5 August 1992 (1992-08-05) page 2, paragraph 1 - page 4, paragraph 3; figure 1	1,6 3,17,21
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X A	US 3 817 551 A (MOORE R) 18 June 1974 (1974-06-18) column 2, line 34 - column 4, line 63; figures 1-5	1,2 18,21
X A	US 6 585 286 B2 (ADEMA DANIEL R [CA] ET AL) 1 July 2003 (2003-07-01) cited in the application column 4, line 63 - column 7, line 5; figures 3-11	1,4 6-9,21
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X A	US 3 618 971 A (WRAGG RONALD) 9 November 1971 (1971-11-09) column 2, line 4 - column 2, line 41; figures 1,2	1 21
X	US 4 995 636 A (HALL RON E [US] ET AL) 26 February 1991 (1991-02-26) column 2, line 9 - column 4, line 4; figures 1-5	1
X	DE 973 418 C (GOETZEWERKE) 11 February 1960 (1960-02-11) page 3, line 11 - line 23; figures 3-5	1,6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/036662

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:

see additional 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 an 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.:

1-21

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-21

A suspension assembly comprising a spring housing having interior walls and first and second shear springs held in compression between a spring mount and respective interior walls and a modular suspension assembly comprising first and second such suspension assemblies

2. claims: 22-37

a load cushion comprising a cushion portion with tapering edges and a base plate.

3. claims: 38-44

A modular suspension system comprising first and second suspension assemblies each assembly comprising a spring housing having interior walls and first and second shear springs held in compression between a spring mount and respective interior walls.

4. claims: 45-54

A suspension for supporting a longitudinally extending vehicle frame rail above first and second axles forming a tandem axle configuration, comprising: a frame hanger assembly including at least one spring module having an elastomeric shear spring retained in compression therein and an elastomeric progressive spring rate load cushion and a saddle assembly connected to a spring mount, an equalising beam connected to the saddle assembly and further connected to the first and second axles.

5. claims: 55-65

A suspension for supporting a longitudinally extending vehicle frame rail above an axle, comprising: a frame hanger assembly including at least one spring module having an elastomeric shear spring retained in compression therein and an elastomeric progressive spring rate load cushion and a saddle assembly connected to a spring mount, the saddle assembly being operatively connected to the axle.

6. claims: 66-83

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

A frame hanger spring module for use in a vehicle suspension, comprising: a frame hanger bracket having a frame attachment portion and an opening defined by a top wall, a bottom wall, and first and second side walls of the spring module; an elastomeric shear spring included within the opening; and a spring mount included within the opening; wherein the elastomeric shear spring is retained in compression between one of the first and second side walls and the spring mount.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/036662

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