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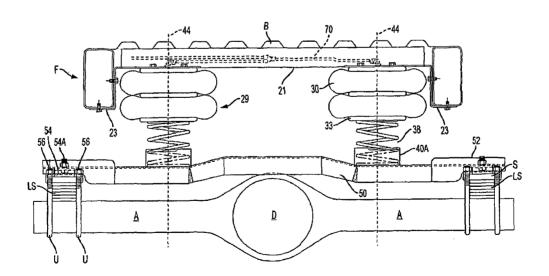
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(54) Title: IMPROVED AIR SPRING/COIL SPRING COMBINATION SUSPENSION SYSTEM



(57) Abstract: A supplemental suspension system for a vehicle having a rear axle and a leaf spring suspension system including a pair of leaf springs mounted over respective ends of the rear axle, the supplemental suspension system including a lower support member which is positioned above the rear axle, which extends between respective leaf springs of the pair of leaf springs, and which is fixedly mounted to respective leaf springs of the pair of leaf springs; and a plurality of spring assemblies which are mounted above the rear axle, each spring assembly of the plurality of spring assemblies being composed of, in combination, a coil spring and an air spring arranged around a common central axis and attached by a retainer, wherein the plurality of spring assemblies are supported by the lower support member.



### INTERNATIONAL SEARCH REPORT

International application No.

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| B. FIELDS SEARCHED   |   |  |                                       |
| Minimum documentation searched (classification system followed by classification symbols) U.S.: 280/124.109,124.157,124.162,124.163,124.164,124.165,124.175,124.179;267/34         |   |  |                                       |
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| C. DOC   | UMENTS CONSIDERED TO BE RELEVANT  |  | · · · · · · · · · · · · · · · · · · · |
| Category *   | Citation of document, with indication, where ap   | ppropriate, of the relevant passages   | Relevant to claim No.                 |
| A  | US 2006/0103102 (Mullican) 18 May 2006 (18.05.2)  | 006), Figure 1.  | 1-20                                  |
| Α  | US 3,966,223 (Carr) 29 June 1976 (29.06.1976), Figure 1.  |  | 1-20                                  |
| A  | US 2989301 (Johannsen) 20 June 1961 (20.06.1961), Figure 1.   |  | 1-20                                  |
| Α  | US 2711315 (Mosebach) 21 June 1955 (21.06.1955), Figure 1.  |  | 1-20                                  |
| Α  | US 4687224 (Selzer) 18 August 1987 (18.08.1987), Figure 1.  |  | 7                                     |
| Α  | US 5346246 (Lander) 13 September 1994 (13.09.1994), Figure 1.   |  | 1-20                                  |
| · A  | US 3727899 (Pemberton) 17 April 1973 (17.04.1973), Figure 1.  |  | 1-20                                  |
|  |   |  |                                       |
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