

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
3 March 2005 (03.03.2005)

PCT

(10) International Publication Number
WO 2005/018965 A1

(51) International Patent Classification⁷: **B60G 17/15**,
17/04, B60R 16/08, B60G 11/30, B60T 17/02

(21) International Application Number:
PCT/SE2004/001092

(22) International Filing Date: 5 July 2004 (05.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0302259-7 21 August 2003 (21.08.2003) SE

(71) Applicant (for all designated States except US): **SCANIA
CV AB (PUBL)** [SE/SE]; Fack, S-151 87 Södertälje (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **STAAF, Magnus**
[SE/SE]; Ängsvägen 4, S-155 34 Nykvarn (SE). **REIM-
DAL, Roine** [SE/SE]; Vassvägen 3, S-645 44 Strängnäs
(SE).

(74) Agent: **EGRELIUS, Fredrik**; SCANIA CV AB (publ),
Patents, S-151 87 Södertälje (SE).

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

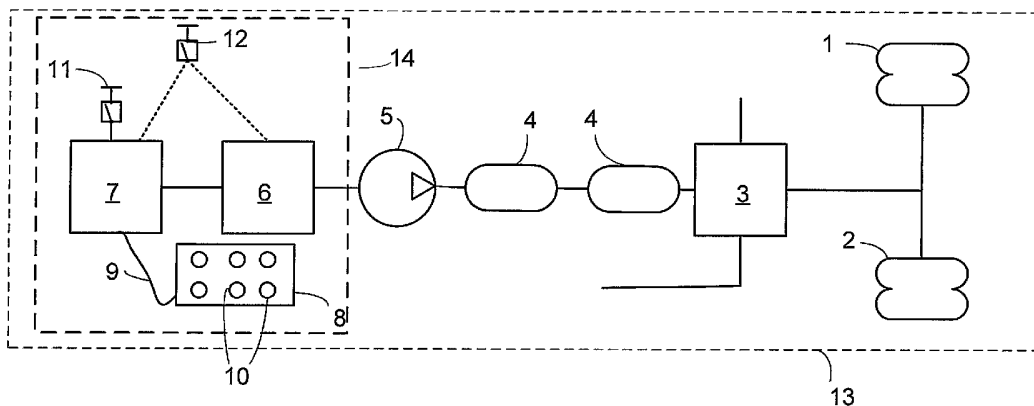
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: ARRANGEMENT IN A VEHICLE WITH AIR SUSPENSION



(57) Abstract: In a vehicle (13) with air suspension (1, 2) comprising an air supply system (4) with a compressor (5) that is adapted to automatically charge the air supply system both when the pressure therein reaches a predetermined minimum pressure and when an air-consuming activity is initiated by an operator of the vehicle, an operator-operated control switch (12) is provided to separately trigger the compressor (5) to charge the air supply system (4) up to a predetermined pressure.

ARRANGEMENT IN A VEHICLE WITH AIR SUSPENSION

TECHNICAL FIELD

The invention relates generally to vehicles with air suspension comprising a compressor
5 and more specifically to an arrangement for controlling the compressor of such vehicles.

BACKGROUND OF THE INVENTION

In vehicles, e.g. trucks, with air suspension, a compressor is provided to automatically
charge an air supply system, comprising air tanks and air bellows, both when the pressure
10 in the air supply system reaches a predetermined minimum pressure and when an air-
consuming activity, such as raising the vehicle or load transfer between tag axle and drive
axle of the vehicle, is requested by an operator, e.g. the driver, of the vehicle.

US-6171065-B1 discloses a vehicle with pneumatic springs that can be filled with
15 compressed air by a control unit operated compressor.

In today's vehicles, when an air-consuming activity, such as raising the vehicle, is
requested by the operator, e.g. by pressing a button on a control box, and the compressor
is automatically started, the pressure in the air supply system of the vehicle most often is
20 insufficient or not optimal i.a. due to the fact that air has already been consumed during
normal operation of the vehicle. This means that the activity requested by the operator
will be time-consuming and that the operator will have to wait an extended time for the
activity to finish, since it takes time for the compressor to build up the pressure where the
requested activity may be performed most effectively.

25 A way to solve this problem is to always automatically activate the compressor as soon as
the pressure in the compressed-air system is lower than a predetermined optimal pressure
level for an activity that requires the highest pressure level in order to be performed in an
effective way. This solution is however normally not used in vehicles today, since the
30 compressor, which normally directly or indirectly is driven by an internal combustion

engine, substantially increases the fuel consumption of the vehicle. A frequent use of the compressor naturally also decreases the service life of the compressor.

SUMMARY OF THE INVENTION

- 5 The object of the invention is to eliminate the above problem to save time for the operator without substantially increasing the fuel consumption of the vehicle.

This is attained by the arrangement according to the invention in that an operator-operated control switch is provided to separately trigger the compressor to charge the air supply system up to a predetermined pressure. The separate triggering of the compressor is to be understood as an activation of the compressor without activating any air-consuming activity.

10 Hereby, the operator can trigger the compressor in advance of an air-consuming activity, e.g. when the vehicle is close to a loading or unloading place. Then, when the operator requests the air-consuming activity, the air supply system will have the predetermined pressure from the beginning and the activity will be finished quicker.

15 In one embodiment of the invention the control switch is a separate switch in a cab of the vehicle. Hereby is achieved that the driver easily can activate the compressor at will.

In another embodiment the control switch is included in a control box in the vehicle. The control switch may then be adapted to be operated by a button on the control box.

20 According to one embodiment the predetermined pressure is a substantially optimal pressure for the air consuming activity. Hereby is achieved that the air-consuming activity may be utilised most effectively directly from the start of the air-consuming activity.

25 The invention also relates to a vehicle, which comprises air suspension and the arrangement.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be described more in detail below with reference to the appended drawing on which Fig. 1 is a schematic illustration of an air supply system of a vehicle
5 with air suspension.

DESCRIPTION OF THE INVENTION

In Fig. 1, air bellows 1, 2 represent the air suspension of the drive axle (not shown) of a vehicle 13, e.g. a truck. For vehicles with full air suspension, the front axle of the truck
10 will have its own air bellows (not shown). Also, if the truck has a tag axle (not shown) separate air bellows (not shown) would provide air suspension for the tag axle.

In a manner known per se, the air bellows 1, 2 are connected via a solenoid valve block 3 to air tanks 4 of the truck. If the truck has a tag axle, its air bellows would also be
15 connected to the valve block 3. The same is true for the air bellows, if any, for the front axle. Even if only two air tanks 4 are shown in Fig. 1, it is to be understood that the number of air tanks can vary dependent on the actual type of truck.

The air tanks 4 are connected to a compressor 5 for charging the air tanks with
20 compressed air. The air tanks 4 and the compressor 5 constitute the air supply system of the truck.

Also in a manner known per se, the compressor 5 is controlled by an air processing control unit 6 that in its turn receives electrical control signals from a control unit 7 for
25 automatically adjusting chassis height both when the truck is driven and when it is stationary. To trigger control signals from the control unit 7 to the air processing control unit 6, an operator-operated, portable control box 8 is provided in a cab 14 of the truck.

In Fig. 1, the control box 8 is shown connected to the control unit 7 by a wire 9.

However, it is to be understood that the connection between the control box 8 and the
30 control unit 7 equally well can be wireless. It shall also be understood that the wire 9 may have such a length that the control box 8 may be moved and operated outside the vehicle.

In a manner known per se, the control box 8 is provided with a number of buttons 10 for operating switches (not shown) for initiating different air-consuming activities such as raising rear or front of the vehicle.

5

An air-consuming activity such as load transfer from tag axle to drive axle can also be initiated by operating a separate switch 11 in a cab 14 of the truck 13.

When an air-consuming activity is initiated by an operator via the control box 9 or the switch 11, the control unit 7 sends a corresponding electrical control signal to the air processing control unit 6 to start the compressor 5 in order to charge the air tanks 4.

During normal operation of the vehicle, air is consumed in the air tanks 4. The air processing control unit 6 is provided with pressure sensors (not shown) to sense the pressure in the air tanks 4 and trigger the air processing control unit 6 to start the compressor 5 when the pressure in the air tanks 4 reaches a pre-set predetermined minimum value.

As mentioned above, when an air-consuming activity, such as raising, is initiated by the operator by pressing a corresponding button 10 on the control box 8 or closing the switch 11, and the compressor 5 is automatically started, most often, the pressure in the air tanks 4 is insufficient or not optimal from the beginning of the operation due to the fact that air in the air tanks 4 has already been consumed during normal operation of the vehicle and/or by an earlier air-consuming activity.

25

In accordance with the invention, an operator-operated control switch 12 is provided to separately trigger the compressor 5 via the air processing control unit 6 to start to charge the air tanks 4 up to a predetermined "sufficient" or "optimal" pressure, which is higher than the predetermined minimum-value, in advance of any known air-consuming activity.

If the vehicle enables several air-consuming activities, the predetermined pressure may be set to a pressure that is considered "sufficient" for all the air-consuming activities, that

is optimal for an air-consuming activity that requires the highest pressure or that is optimal for an air-consuming activity that is the most frequently used of all the air-consuming activities.

- 5 As indicated by broken lines in Fig. 1, the control switch 12 can be connected to trigger the compressor 5 either directly via the air processing control unit 6 or indirectly via the control unit 7 and the air processing control unit 6.

- 10 In Fig. 1, the control switch 12 is shown as a separate switch in the cab 14, but outside the control box 8. It is however to be understood that the control switch 12 can be included within the control box 8 to be operated by one of the buttons 10 on the control box 8.

- 15 By closing the control switch 12 to trigger the compressor 5 in advance of an expected air-consuming activity, the air tanks 4 will be pressurized to a sufficient pressure at the time the operator initiates the air-consuming activity by pressing a corresponding button 10 on the control box 8.

CLAIMS

1. An arrangement in a vehicle with air suspension (1, 2) comprising an air supply system (4) with a compressor (5) that is adapted to automatically charge the air supply system (4)
5 both when the pressure therein reaches a predetermined minimum pressure and when an air-consuming activity is initiated by an operator of the vehicle, **characterized in** that an operator-operated control switch (12) is provided to separately trigger the compressor (5) to charge the air supply system (4) up to a predetermined pressure.
- 10 2. The arrangement according to claim 1, **characterized in** that the control switch (12) is a separate switch in a cab (14) of the vehicle (13).
3. The arrangement according to claim 1, **characterized in** that the control switch (12) is included in a control box (8) in the vehicle (13).
15
4. The arrangement according to claim 3, **characterized in** that the control switch (12) is adapted to be operated by a button (10) on the control box (8).
5. The arrangement according to any one of the preceding claims, **characterised in** that
20 the predetermined pressure is a substantially optimal pressure for the air consuming activity.
6. A vehicle (13) comprising air suspension (1, 2) and an arrangement according to claim 1.

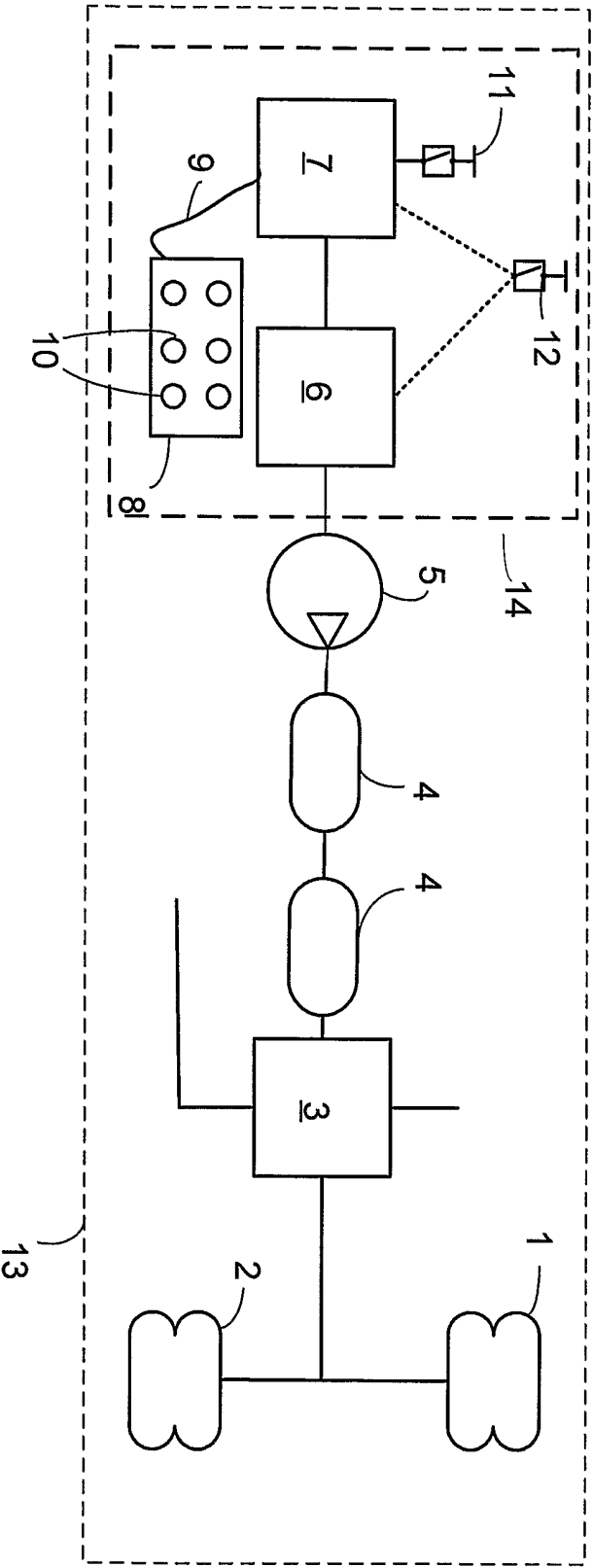


Fig. 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2004/001092

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60G 17/15, B60G 17/04, B60R 16/08 // B60G 11/30, B60T 17/02
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)

IPC7: B60G, B60R, B60T

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0557547 A1 (TSENG, CHEI-SU), 1 Sept 1993 (01.09.1993), column 1, line 12 - line 55; column 4, line 2 - line 51, figure 1, detail 97 --	1-6
A	US 6036449 A (NISHAR ET AL), 14 March 2000 (14.03.2000) --	1-6
A	SE 507378 C3 (VOLVO LASTVAGNAR AB), 18 May 1998 (18.05.1998) -- -----	1-6

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search
12 October 2004

Date of mailing of the international search report

14 -10- 2004

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Mariana Eddin/EK
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2004/001092

EP	0557547	A1	01/09/1993	SE	0557547 T3	
				AT	122979 T	15/06/1995
				DE	69202695 D,T	19/10/1995
US	6036449	A	14/03/2000	DE	19913248 A	07/10/1999
				GB	2335760 A,B	29/09/1999
				GB	9906703 D	00/00/0000
SE	507378	C3	18/05/1998	BR	9711659 A	24/08/1999
				DE	69712209 D,T	28/11/2002
				EP	0923478 A,B	23/06/1999
				JP	2000517266 T	26/12/2000
				SE	9603173 A	03/03/1998
				US	6149246 A	21/11/2000
				WO	9809859 A	12/03/1998