



- (51) International Patent Classification:
B60R 21/207 (2006.01) *B60N 2/427* (2006.01)
B60R 21/231 (2011.01) *B60N 2/52* (2006.01)
- (21) International Application Number:
PCT/IB2017/051095
- (22) International Filing Date:
24 February 2017 (24.02.2017)
- (25) Filing Language: Italian
- (26) Publication Language: English
- (30) Priority Data:
102016000019698
25 February 2016 (25.02.2016) IT
- (71) Applicant: IVECO S.P.A. [IT/IT]; Via Puglia, 35, 10156 Torino (IT).
- (72) Inventors: GALLARDO, Giovanni; Via Delle Scuole, 17, 10020 Brusasco (IT). CERETTO CASTIGLIANO, Enrico; Via Montello, 30, 10078 Venaria Reale (IT). FINOTTELLO, Roberto; Via Volpiano, 4/4, 10040 Lombardore (IT).

- (74) Agents: FIUME, Orazio et al.; c/o Studio Torta S.p.A., Via Viotti, 9, 10121 Torino (IT).
- (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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SEAT OF A COMMERCIAL OR INDUSTRIAL VEHICLE

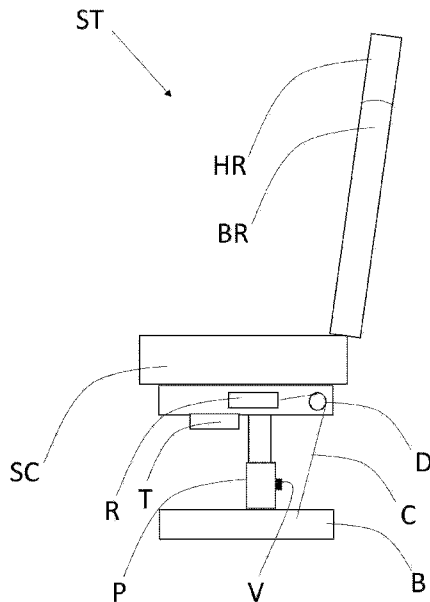


FIG. 1

(57) Abstract: Seat (ST) of a commercial or industrial vehicle comprising a seat cushion (SC) and a backrest (BR) connected to the seat cushion, as well as a pneumatic support system comprising at least one piston (P), wherein the seat comprises a collapsing system of the seat in response to an activation signal of a vehicle airbag, wherein said collapsing system comprises retraction means (R, D, C) configured to force said seat cushion (SC) to move towards said base (B) in response to said activation signal.

WO 2017/145116 A1

Published:

— with international search report (Art. 21(3))

— 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))

"SEAT OF A COMMERCIAL OR INDUSTRIAL VEHICLE"

Technical field of the invention

The invention relates to the field of the seats of commercial or industrial vehicles.

State of the art

There is a very large use of airbags in the field of terrestrial vehicles.

They are available in different types and sizes. A seat of an occupant is known, whether it is the driver's seat or the seat of any other passenger, that has an airbag built-in in a side of the backrest.

Generally speaking, side airbags are designed so as to soften side impacts between vehicles. In order to protect the head of an occupant, the so-called curtain airbags are known, which are usually inserted in a fixed part of the vehicle surrounding the window.

By so doing, in case of a side crash, the curtain airbag protects the upper part of the torso of the occupant, namely humerus, neck and head, whereas the airbag built-in in the backrest protects the lower part of the torso, up to the pelvis.

Airbag activation times are very quick, as well as their deflation times after the activation. Generally speaking, airbags remain inflated for a few dozens of seconds, up to a minute, since, in case of side impact between vehicles, the occupants of the vehicle need to be able to easily free themselves.

In case of commercial and industrial vehicles, the situation is very different. As a matter of fact, in a commercial or industrial vehicle, the seats are located at a much greater height from the ground compared to the one of cars; therefore, an impact between a heavy vehicle and car usually does not cause damages to the occupants of the industrial vehicle.

From a statistical point of view, the most serious damages to the occupants of a commercial or industrial vehicle are not caused by crash impacts with other vehicles, but by the rollover of the vehicle itself.

Side airbags are known, which are inflated in response to a signal detecting a condition preceding the rollover of the vehicle. These airbags are aimed at protecting the side of

the occupant when the side of the vehicle hits the ground. Airbags built-in in the side of the seat have a much slower dynamic compared to those used in cars, as rollover times are significantly longer. Hence, the time during which they remain inflated is longer as well, since it can exceed one minute.

Known solutions are not sufficient to preserve an occupant of a commercial or industrial vehicle.

Summary of the invention

Therefore, the object of the invention is to provide a seat that is specifically designed for an occupant of a commercial or industrial vehicle.

In particular, a main object of the invention is to reduce the chance that a passenger might actually hit surrounding portions of the vehicle cab.

The idea on which the invention is based is that of carrying out a forced retraction of the driver's seat, so as to move the passenger towards the floor of the vehicle.

According to a preferred variant of the invention, an inflatable protection is provided, which surrounds the three free sides of the backrest up to the seat cushion, so that this protection extends forwards, completely surrounding the sides and the head of the passenger in a continuous manner.

According to this variant of the invention, this is a seat

in which the backrest and the headrest are in one piece and, therefore, the airbag - at least in an active condition - continuously surrounds both the the two opposite sides of the occupant and the head, projecting from the sides of the backrest and of the relative head rest.

Advantageously, the occupant is protected on all sides.

According to a first variant of the invention, this inflatable protection is obtained by means of a single airbag, whereas, according to a second variant of the invention, it is obtained by means of two or more inflatable modules, which, at least in an active - i.e. inflated - condition of the protection, are contiguous to one another long the perimeter of the backrest and of the headrest.

Advantageously, when one single airbag is implemented, it is capable not only of protecting the occupant, but also of better holding him/her.

According to a preferred embodiment of the invention, the inflation of the airbag is obtained by means of a pressurized cold gas cylinder, instead of by means of an explosive charge. More preferably, a second pressurized cylinder is suited to inject a polyurethane foam into the protection that was previously at least partially inflated. The seat comprises, furthermore, a pneumatic suspension

system. Preferably, when the airbag is activated, the pneumatic suspension is simultaneously deflated and retraction means cause the seat to move to a position close to the floor of the cab.

According to a preferred variant of the invention, these retraction means comprise a fluid piston operated by the same gas/fluid used for inflating the airbag.

Advantageously, one single operation allows users to simultaneously inflate the airbag of the seat and move the seat to a less risky position for its occupant.

The subject-matter of the invention comprises a seat of a commercial or industrial vehicle.

The subject-matter of the invention also comprises a commercial or industrial vehicle comprising the aforesaid seat.

The claims describe preferred embodiments of the invention, thus forming an integral part of the description.

Brief description of the figures

Further objects and advantages of the invention will be best understood upon perusal of the following detailed description of an embodiment thereof (and of relative variants) with reference to the accompanying drawings merely showing non-limiting examples, wherein:

figure 1 shows a schematic side view of the seat of an

example of a seat according to the invention;

figure 2 shows a perspective view of a preferred variant of the seat of a figure 1 with a built-in airbag;

figure 3 shows a commercial or industrial vehicle implementing the seat according to figures 1 and/or 2.

In the figures, the same numbers and the same reference letters indicate the same elements or components.

For the purposes of the invention, the term "second" component does not imply the presence of a "first" component. As a matter of fact, these terms are only used for greater clarity and should not be interpreted in a limiting manner.

Detailed description of embodiments

According to the invention, shown with reference to figures 1 and 2, a seat ST of a commercial or industrial vehicle comprises a seat cushion SC and a backrest BR connected to the seat cushion and a headrest HR fixed to the upper end of the backrest, and the backrest comprises an airbag BG which, at least in active inflated condition, uninterruptedly surrounds both sides of an occupant passing over the head of the occupant.

Preferably, the airbag is formed by a single inflatable chamber.

Advantageously, said airbag, when its made of a single inflatable chamber, can be fixed to the backrest not only

to protect the occupant from possible objects hitting him/her, but also to hold the torso of the occupant.

As a matter of fact, the airbag is preferably designed so as to be deflated only after different minutes since its activation, namely at least 3 - 4 minutes.

As you will read more in detail below, a preferred variant of the airbag does not become deflated at all after its activation.

This ensures an efficient protection of the occupant, taking into account the fact the dynamic of heavy vehicle rollover is very slow and can last different seconds.

The seat comprises inflation means T of the airbag in response to an activation signal, which is usually generated by a sensor G on board the vehicle. Said inflation means are fixed to the seat and comprise a supply of pressurized cold gas, arranged to be injected into the airbag BG.

Preferably, said supply is fixed to a lower part of the seat cushion or at the base of the seat, so that, during possible movements of the seat carried out to adjust the latter relative to the pedals of the vehicle, everything moves with the seat, thus limiting as much as possible electric, pneumatic and mechanical connections between the floor of the vehicle and the seat ST.

According to a preferred variant of the invention, the

inflation means T comprise, in addition to a supply of pressurized cold gas, a supply of high density foam, for example polyurethane foam, arranged to be injected into said airbag, when it is already at least partly inflated by said cold gas.

By so doing, the cold gas releases the airbag from the backrest of the seat, causes the airbag to reach a completely extended condition and, during this last step or following it, high density foam is injected into the airbag.

The seat, like the majority of seats for industrial or commercial vehicles, comprises a pneumatic support system, as it is particularly comfortable.

Said system usually comprises at least one piston P, interposed between a base B of the seat intended to be fixed, usually in a sliding manner, to a floor of a vehicle cab, and a lower part of the seat cushion SC.

According to the invention, the seat comprises a collapsing system of the seat, which, in response to an activation signal, preferably the same one that activates a vehicle airbag, preferably the airbag BG, causes the seat cushion of the seat to move towards the relative base.

The collapsing system according to the invention comprises - optionally a valve V associated with said piston and configured to vent said piston P in response to said

activation signal,

- retraction means R, D, C configured to move the seat cushion (SC) towards the relative base B, always in response to the aforesaid activation signal.

The vent valve V is not essential with the collapsing system, as the suspension could also be created with a torsional spring, rather than with a pneumatic piston. Anyway, the retraction means can be sized so as to be capable of operating the collapsing also countering the stretching force of the suspension of the seat.

According to a preferred variant of the invention, the retraction means comprise an actuator T and a cable C. The actuator is fixed to the seat cushion SC or to the backrest BR and said cable has a first end connected to the base B of the seat and a second end connected to the actuator T, so that a retraction of the cable by the actuator causes a movement of the seat cushion SC towards the base B.

Evidently, the actuator can be fixed to the base B of the seat and the opposite end of the cable can be fixed to the seat cushion of the seat.

According to a preferred variant of the invention, which can be combined with the previous ones, the actuator consists of a fluid dynamic actuator operatively connected with the supply of pressurized cold gas T, so that, when the supply T releases the gas to inflate the airbag BG, it

activates, at the same time, the actuator, which retracts the cable, thus determining the collapsing of the seat ST. The sensor G, which is schematically shown associated with the vehicle V of figure 3, can be a gyroscope or an inclinometer or it can coincide with the vehicle control unit (VCU), which implements ECS functions (electronic stability control) and/or ERM functions (electronic rollover mitigation). In any case, these are known device. These devices are capable of estimating a "non-return" condition, namely a condition in which an impending rollover is recognized, or they are capable of preventing said non-return condition from occurring.

Therefore, they are capable of generating an electric signal, which, for the purposes of the invention, is functional to the activation of the airbag BG of the seat ST and/or of the collapsing system of the seat.

The non-limiting example described above can be subjected to variations, without for this reason going beyond the scope of protection of the invention set forth in the claims.

When reading the description above, a skilled person can carry out the subject-matter of the invention without introducing further manufacturing details. The information contained in the part concerning the state of art only serves the purpose of better understanding the invention

and does not represent a declaration of existence of the items described.

CLAIMS

1. Seat (ST) of a commercial or industrial vehicle comprising a seat cushion (SC) and a backrest (BR) connected to the seat cushion, as well as a pneumatic support system comprising at least one piston (P), interposed between a base (B) of the seat intended to be fixed to a floor of a vehicle cab, and a lower part of the seat cushion (SC), wherein the seat comprises a collapsing system of the seat in response to an activation signal of a vehicle airbag, wherein said collapsing system comprises retraction means (R, D, C) configured to force said seat cushion (SC) to move towards said base (B) in response to said activation signal.

2. Seat according to claim 1, wherein said retraction means comprise an actuator (R) and a cable (C), wherein said actuator is fixed to the seat cushion (SC) or to the backrest (BR) and said cable has a first end connected to said base (B) of the seat and a second end connected to said actuator, so that a retraction of the cable by the actuator causes a forced movement of said seat cushion (SC) towards the base (B).

3. Seat according to claim 1 or 2, further comprising a valve (V) associated with said piston and configured to vent said piston (P) in response to said airbag activation signal.

4. Seat according to any of the claims 1 - 3, comprising at least one inflatable airbag associated with said backrest.
5. Seat according to any one of the claims 1 - 3, further comprising a headrest (HR) in one piece with an upper end of the backrest, wherein said backrest comprises an airbag (BG) which, at least in active inflated condition, uninterruptedly surrounds both sides of an occupant passing over the head of the occupant.
6. Seat according to claim 5, wherein said airbag is formed by a single inflatable chamber.
7. Seat according to any one of the claims 4 - 6, wherein said actuator (R) consists of a fluid dynamic actuator operatively connected with said supply of pressurized cold gas, so that, when said pressurized gas is released, inflation of said airbag (BG) and collapsing of the seat (ST) take place simultaneously.
8. Seat according to any one of the claims 4 - 7, wherein said airbag is configured so that, once activated, it remains inflated for at least 3 - 4 minutes.
9. Seat according to claim 7, wherein said inflation means (T) comprise, in addition to a supply of pressurized cold gas, a supply of high density foam, arranged to be injected into said airbag, when it is already at least partly inflated by said cold gas.
10. Industrial or commercial vehicle comprising a seat (ST)

according to any one of the preceding claims.

11. Vehicle according to claim 9, further comprising means (G) for detecting a future overturning of the vehicle, configured to generate an activation signal to activate said airbag (BG) according to any one of claims 1 - 5 and/or to activate collapsing of said seat according to any one of claims 6 - 9.

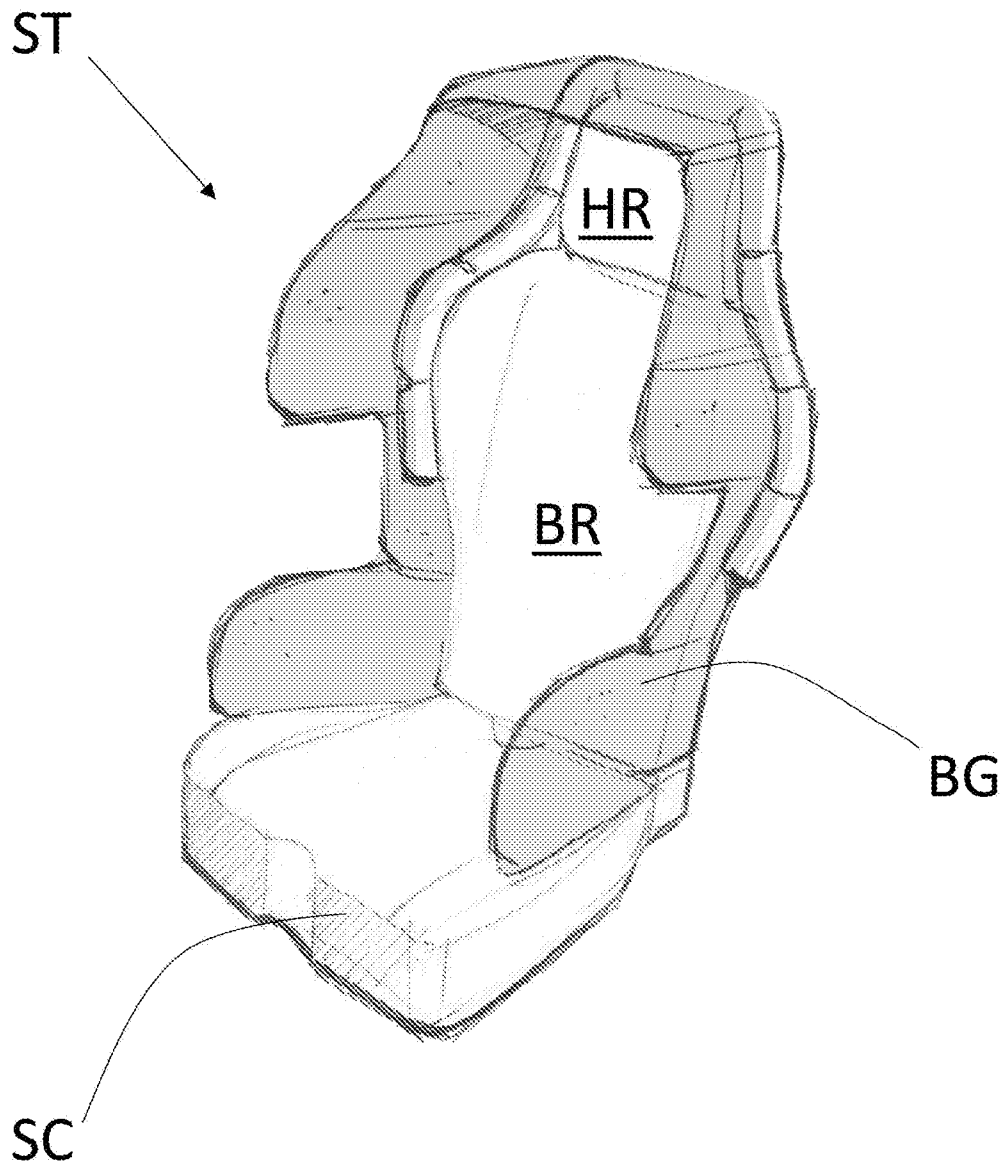


FIG. 2

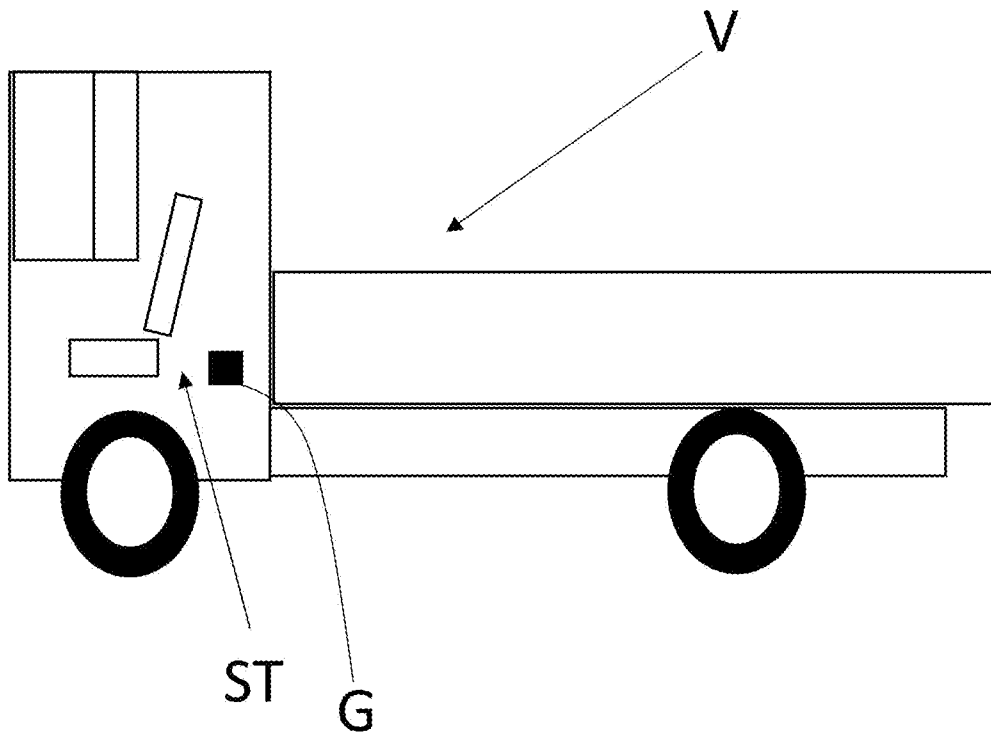


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/051095

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B60R21/207 B60R21/231 B60N2/427 B60N2/52
 ADD.
 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)
 B60R B60N

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 practicable, search terms used)
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 2002/021041 A1 (JESSUP CHRIS P [US] ET AL) 21 February 2002 (2002-02-21) paragraphs [0034], [0036], [0037], [0040], [0041], [0071] figures	1-3,8, 10,11 3-6,9 7
Y	US 5 590 736 A (MORRIS JOHN M [US] ET AL) 7 January 1997 (1997-01-07) column 3, lines 9-36 figure 1	3
Y	DE 10 2014 006922 A1 (DAIMLER AG [DE]) 4 December 2014 (2014-12-04) paragraphs [0017], [0021] - [0023] figures 1,2	4-6
	----- -/--	

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>
---	---

Date of the actual completion of the international search 14 June 2017	Date of mailing of the international search report 21/06/2017
---	--

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Wisnicki, Michal
--	--

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/051095

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 206 412 B1 (SWANN TIMOTHY A [US] ET AL) 27 March 2001 (2001-03-27) column 2, lines 30-37, 52-65 column 3, line 40 - column 4, line 45 figure 3	9
A	----- WO 2015/145285 A1 (P GEVS SRL [IT]; GUERRIERI PIETRO) 1 October 2015 (2015-10-01) page 8, lines 14-23 figure 5	1-11
A	----- DE 198 59 988 A1 (DELPHI AUTOMOTIVE SYSTEMS GMBH [DE]) 29 June 2000 (2000-06-29) figures 1-3 -----	1-11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IB2017/051095

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002021041	A1	21-02-2002	NONE
US 5590736	A	07-01-1997	US 5590736 A WO 9709204 A1
DE 102014006922	A1	04-12-2014	NONE
US 6206412	B1	27-03-2001	NONE
WO 2015145285	A1	01-10-2015	CN 106255624 A EP 3122600 A1 US 2017144622 A1 WO 2015145285 A1
DE 19859988	A1	29-06-2000	NONE