(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
19 October 2006 (19.10.2006)

PCT

(10) International Publication Number
WO 2006/109106 A1

(51) International Patent Classification:
B60R 22/32 (2006.01)

(21) International Application Number:
PCT/IB2005/001037

(22) International Filing Date: 14 April 2005 (14.04.2005)

(25) Filing Language: Italian

(26) Publication Language: English

(71) Applicant and
(72) Inventor: **LA CORTE, Carlo** [IT/IT]; Strada Del Falconcello, 1, I-53041 Asciano (IT).

(74) Agents: **JORIO, Paolo** et al.; c/o Studio Torta S.r.l., Via Viotti, 9, I-10121 Torino (IT).

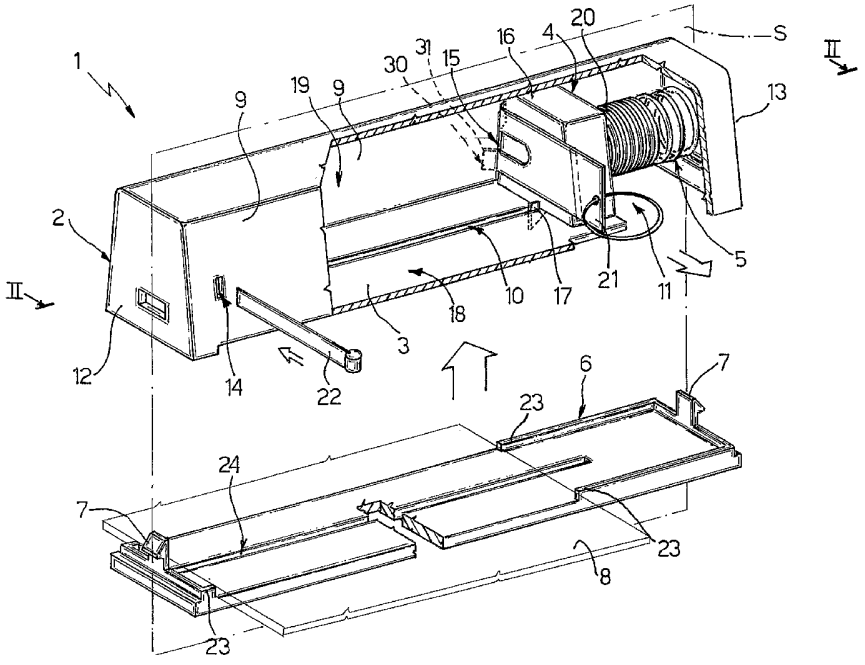
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, 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, SM, 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, IS, IT, LT, 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 "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** DEVICE FOR A QUICK RELEASE OF A SAFETY BELT



(57) **Abstract:** Device for releasing a safety belt (8) comprising a support(2); fixing means (6) of the support (2) to a planar section of the strap of the safety belt (8); moveable cutting means (4) carried by the support (2) and able to cooperate with the safety belt (8); and actuating means (5) for the cutting means(4).

WO 2006/109106 A1

DEVICE FOR A QUICK RELEASE OF A SAFETY BELT

TECHNICAL FIELD

The present invention concerns a quick-release device for safety belts.

BACKGROUND ART

Safety belts commonly used in motor vehicles generally include elements that support them to the vehicle's chassis, a retaining strap connected to the support, a locking buckle to allow a user (for example a driver or passenger) to put on the belt, and regulating devices to adapt the belt to the user's physiognomy. The belt has the form of a textile strap or, more generally, is made of a flexible, non-stretchable material.

During a sudden deceleration in the direction of the vehicle's speed, for example caused by an accident, safety belts keep the user against the seat, avoiding impact against the dashboard or windshield.

Nevertheless, after the accident, the agitated state of the user can make the opening of the buckle difficult, or the buckle also could be damaged by the impact or simply be in a non-accessible position, blocking the user in the seat and hampering emergency operations.

In particular, the user could find himself in extremely high-risk conditions in case of a fire on board or if the motor vehicle falls into a stretch of water.

At this point, there is a need for a quick-release device for the safety belts. Yet, the only known devices are used within the field of sports car racing, where the safety belts include various straps, each supplied with its own locking device to link to a central buckle in order to fasten the safety belts.

These known devices are held by a central buckle and include a single button in order to simultaneously unfasten all the fastening devices to the central buckle which, positioned at chest level, is easily accessible.

DISCLOSURE OF INVENTION

The purpose for the invention herewith is therefore to provide a quick-release device for safety belts adaptable to any type of safety belts: above all else, those commonly used in motor vehicles on public roads.

A further scope of the present invention is to provide a quick-release device for safety belts that allows the activation also in an automatic way.

Other scopes of the present invention are to provide a quick-release device that is easy to use, reliable, economical, and with little encumbrance of space.

Therefore, the present invention provides a rapid-release device for safety belts according to claim 1.

In particular, the device according to the invention herewith includes: a box shaped housing with a longitudinal opening; a movable device placed inside the box shaped housing and slidable along tracks carried by lateral walls of the box shaped housing; a blade movable inside of the opening and carried by the movable device; a fixing plate connected to the housing and adapted for holding the portion of the strap corresponding to the aperture.

Thus, the quick-release device can be adapted to any type of safety belt thanks to the use of the movable blade and to the presence of the fixing plate.

In fact, the blade is effective on any kind of belt and, by means of the fixing plate, it is possible to locate the device on any segment of the belt itself, e.g. on areas that are easily accessible in case of panic or disorientation after an accident.

Furthermore, the device has a simple structure, with low production costs, and can be actuated in an automatic way, as will be described better subsequently.

BRIEF DESCRIPTION OF THE DRAWINGS

Other scopes and advantages of this invention will be clarified by the description that follows containing some non-restrictive embodiments with reference to the enclosed figures where:

- Fig. 1 illustrates an assonometric view with parts that have been removed for sake of clarity of a first embodiment of the quick-release device for safety belts according to this invention;
- Fig. 2 illustrates a longitudinal section along line II-II of figure 1 of a modified embodiment of the present invention;
- Fig. 3 illustrates a transversal section of the quick-release device along to line III-III of figure 2;
- Fig. 4 illustrates a longitudinal section of a further embodiment of the present invention similar with that of figure 2;
- Fig. 5 illustrates the schematic assembly of the quick-release device of figure 1 assembled on a common safety belt.

BEST MODE FOR CARRYING OUT THE INVENTION

In Figure 1, is indicated with 1 as a whole, a quick-release device for safety belts of motor vehicles.

The quick-release device 1 comprises an elongated box shaped housing 2 having a lower base 3 and a longitudinal groove 10 carried on lower base 3, a cutting device 4 that slides longitudinally sliding along groove 10, and actuating means 5 for cutting device 4. To hold device 1 on the safety belt, device 1 comprises a fixing plate 6, connected to housing 2 by means of a snap fastening 7 and adapted for clamping a straight portion 8 of a belt 8a of the safety belt against lower base 3.

Housing 2 has, in this non-restrictive example, a prismatic shape having an isosceles trapezoidal transversal section (it could also have a tubular curvilinear form with curvilinear or semi-curvilinear section) and comprises a couple of longitudinal lateral walls 9, lower base 3 having groove 10 and an opening 11, a transversal first end wall 12 and a second end wall 13 opposite to first end wall.

In particular, opening 11 is arranged near end wall 13 and is designed to allow the insertion of cutting device 4 and actuating means 5 into housing 2, while groove 10, transversal compared to portion 8 of belt 8a, is arranged along a vertical plane of symmetry S of housing 2 and extends along the entire length of portion 8 of belt 8a from end wall 12 up to opening 11.

Furthermore, the lateral walls 9 have first slits 14 arranged vertically near end wall 12 and second slits 15 arranged vertically on the junction of groove 10 and opening 11.

Inside housing 2 (fig. 3), cutting device 4 comprises an inertial mass 16 of prismatic shape having a conjugated profile with that of housing 2, and a blade 17 rigidly connected to inertial mass 16 to allow its insertion into groove 10. Inertial mass 16 stands on an internal surface 18 of lower base 3 and is guided

laterally, when activated by actuating means 5, by second internal surfaces 19 of lateral walls 9.

Actuating means 5 are directly connected to inertial mass 16 and comprise a helical spring 20 placed between the inertial mass 16 itself and end wall 13 corresponding to opening 11.

Under the action of spring 20, inertial mass 16 slides inside of housing 2 between a first position defined by a removable abutment 21 inserted in slits 15 and held in position through known resilient means 30, and a second position defined by a stop 22 inserted slits 14.

Resilient means 30 comprises, according to a non-restrictive embodiment, elastic appendices 31 coming out of slits 15 and bent towards walls 9.

First position, represented in figure 1, corresponds to a configuration in which portion 8 of belt 8a is undamaged and inertial mass 16, pushed removable abutment 21 of spring 20 compressed against end wall 13, has blade 17 facing a lateral border of portion 8 belt 8a. On the contrary, second position corresponds to a configuration in which the inertial mass 16 is against stop 22, spring 20 is expanded and portion 8 of belt 8a has been cut – as will be subsequently better described.

Consequently, spring 20 is compressed for a period that may be quite long because it extends only to the moment when its action is needed, for example after an accident.

In order to have an actuating force capable of cutting portion 8 of belt 8a (even after a long period of time from the initial compression), spring 20 has a variable winding angle of its own spires so that, in the first position previously

defined, at least three spires are not packed, that is they are not in contact with one another as shown in figure 1.

To further facilitate the cutting operation, fixing plate 6 comprises vertical guiding protrusions 23 of portion 8 of belt 8a perpendicularly aligned to groove 10 in proximity to end wall 12 as well as in proximity of the point of conjunction of groove 10 with opening 11.

Fixing plate 6 also presents a security groove 29 aligned with the groove 10 and only partially engaging blade 17 to protect the user and, at the same time, to define a second guide for blade 17 itself together with the one defined by groove 10.

The functioning of quick-release device 1 is as follows:

In security conditions, cutting device 4 is in the initial position and housing 1 is held by means of fixing plate 6 on belt 8a of the safety belt (figure 5) in an easily accessible position, for example in correspondence with the user's shoulder or at the point of contact with the chassis.

In case of emergency, for example at the beginning of a fire after an accident, the user may easily access device 1 and pull removable abutment 21 against the action of resilient means 30.

In this way, spring 20 no longer has obstacles and pushes the inertial mass 16 as well as blade 17 towards the lateral edge of portion 8 of belt 8a provoking a cut and allowing the user to be freed from the safety belt.

Following are described some further examples of quick-release devices in which similar or equal details of those already described are indicated with the same numbers.

Figure 2 illustrates a longitudinal section of a quick-release device 50 in which actuating means 5 includes a pyrotechnic device 51 joined to second end wall 13 and connected to inertial mass 16. The first position is defined by removable abutment 21 which, once removed, lights a match (not illustrated) to activate pyrotechnic device 51, which furnishes the cutting device 4 with the necessary power to cut portion 8 of belt 8a.

Also, device 50 may comprise an inertial automatic command system 70, for example provided with accelerometer sensors to control pyrotechnic device 51. For example, the system can provide the delayed ignition of the pyrotechnic device 51 through a match whose duration is calculated to consent an adequate interval of time between the moment of the accident, during which the safety belt needs to retain the user, and the activation of the pyrotechnic device 51 itself.

Figure 4 illustrates a further embodiment in which actuating means 5 of a quick-release device 60 comprises a rod 61 and a holding ring 62. Rod 61, located parallel to groove 10, comprises a first end portion 63 connected the inertial mass 16 and a second end portion 64 coming out from first end wall 12 and connected to holding ring 62. According to this embodiment, removable abutment 21 is not provided for defining the first position. On the contrary, fixing plate 6 includes a stop insert 66 for blade 17, disposed transversally on the inside of security groove 29 in proximity of an end of the security groove 29 facing wall 13.

Stop insert 66 is integral with fixing plate 6 and, defining an abutment, prevents blade 17 to accidentally lacerate the lateral edge of portion 8 belt 8a.

In case of emergency, the user actuates blade 17 by means of holding ring 62 which, after having lacerated Stop insert 66, cuts portion 8 of belt 8a. Therefore, in this case, the power for cutting is supplied by the user that acts directly on rod 61 by means of ring 62.

According another embodiment, actuating means 5 of cutting device 4 can be actuated by means of compressed gas.

CLAIM

1. Quick-release device (1) for a safety belt includes a support (2) and fixing means (6) of said support (2) on a substantially straight portion (8) of a belt (8a) of said safety belt, characterized in that it includes a cutting means (4) carried by said support (2) and suitable for cooperating with said portion (8) of said belt (8a), and actuating means (5) of said cutting means (4).
2. Device according to claim 1, characterized in that said cutting means (4) comprises a mobile element (16) having a blade (17) positioned towards said portion (8) of said belt (8a).
3. Device according to claim 2, characterized in that said mobile element (16) is selectively mobile between a first position in which said portion (8) of said belt (8a) is intact and a second position in which said portion (8) of said belt (8a) has been cut by said blade (17).
4. Device according to claim 3, characterized in that said mobile element (16) includes an inertial mass.
5. Device according to claims 3 or 4, characterized in that it includes guide means (18, 19) for said mobile element (16) on said support (2).
6. Device according to any of the preceding claims, characterized in that it includes control devices (21; 61; 70) for said actuating means (5).
7. Device according to claim 6, characterized in that said control devices (21; 61) are manual.
8. Device according to claim 6, characterized in that said control devices (70) are automatic.

9. Device according claim 8, characterized in that said control devices (70) are inertial.

10. Device according to any one of claims 7 to 9, characterized in that said control devices (21) comprise removable stop means (21) of said mobile element (16) in said first position.

11. Device according to claim 10, characterized in that said actuating means (5) are elastic means (20), which pushes said mobile element (16) against said stop means (21) in said first position and brings said mobile element (16) in said second position when actuated.

12. Device according to any one of claims 7 to 9, characterized in that said actuating means (5) are pyrotechnic means (51).

13. Device according to claim 7, characterized in that said control devices (61) is a rod (61) connected to said mobile element (16).

14. Device according to any one of the preceding claims, characterized in that said fixing means (6) include locking elements (7) for keeping the said portion (8) of said belt (8a) pressed between respective walls (3, 6) of said housing (2) and of said fixing means (6).

15. Device according to claim 1, characterized in that it comprises:

- a box shaped housing (2) comprising lateral walls (9) and having a longitudinal opening (10),

- a mobile element (16) housed inside said housing (2) and sliding along guide surfaces (18, 19) defined by said lateral walls (9),

- a mobile blade (17) mobile inside said opening (10) and carried by said mobile element (16),

- a fixing plate (6) connected to said housing (2) and adapted for holding said portion (8) of said belt (8a) in correspondence of said opening (10).

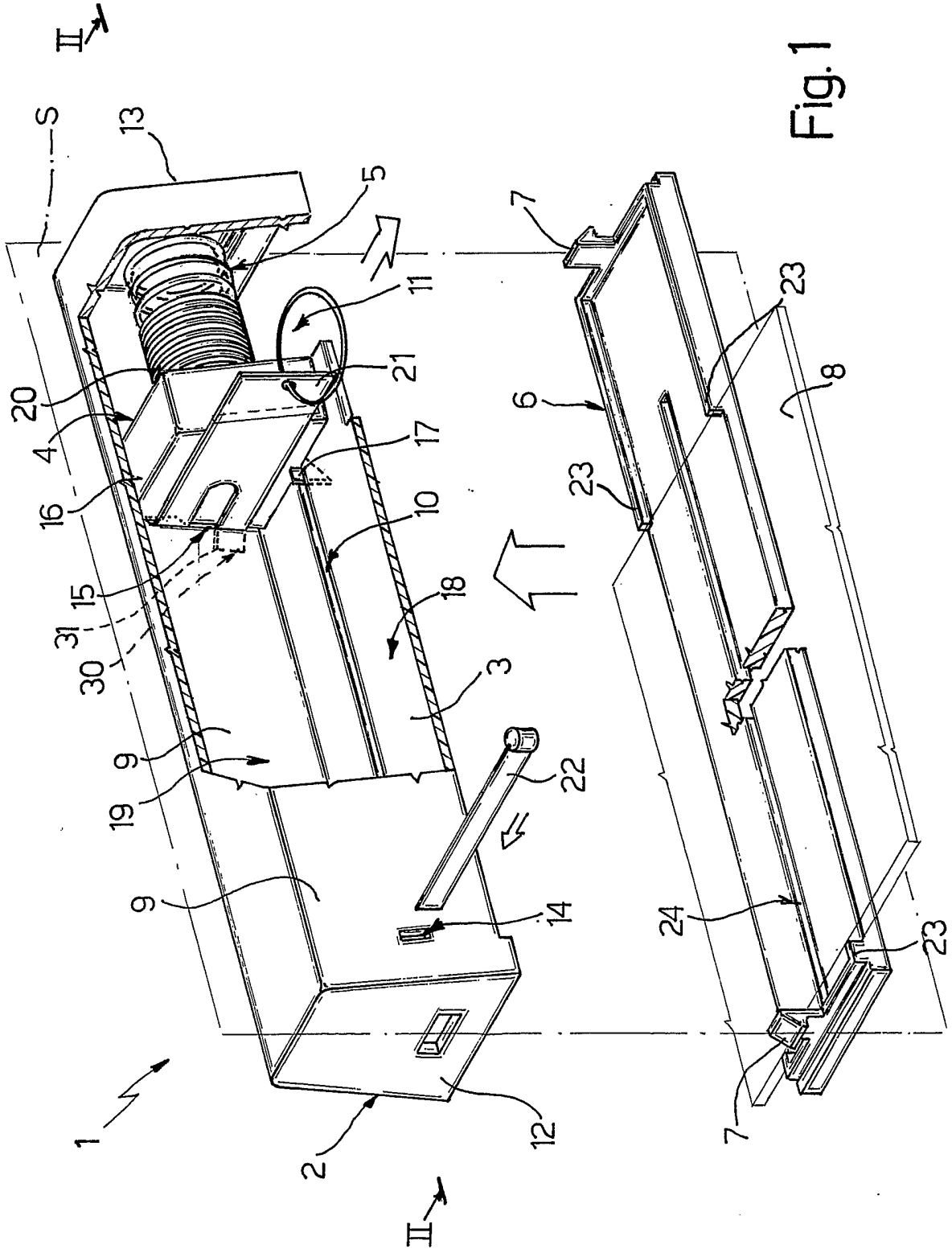

II
S
13
5
7
11
23
21
20
6
8
4
17
23
16
10
15
18
31
30
3
9
22
19
9
14
24
23
1
12
7
2
II

Fig. 1

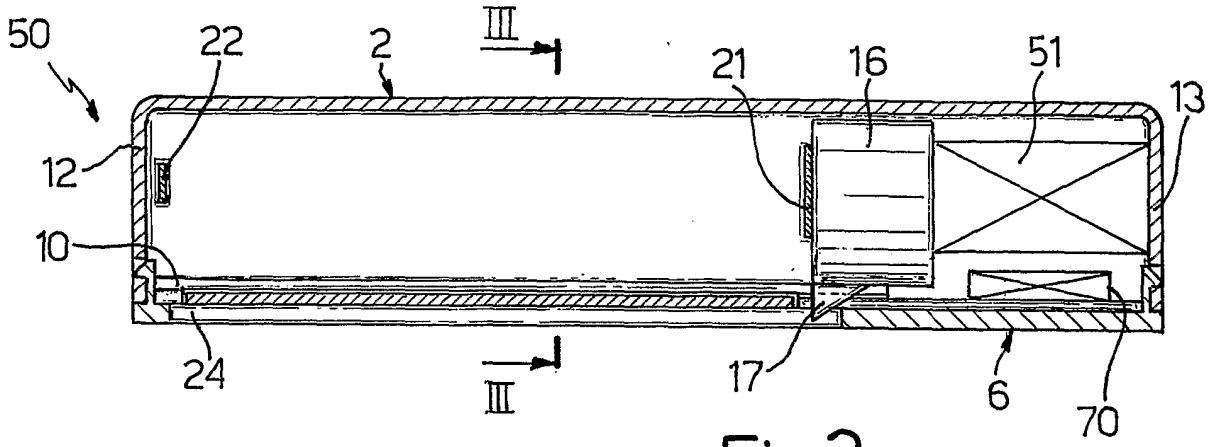


Fig.2

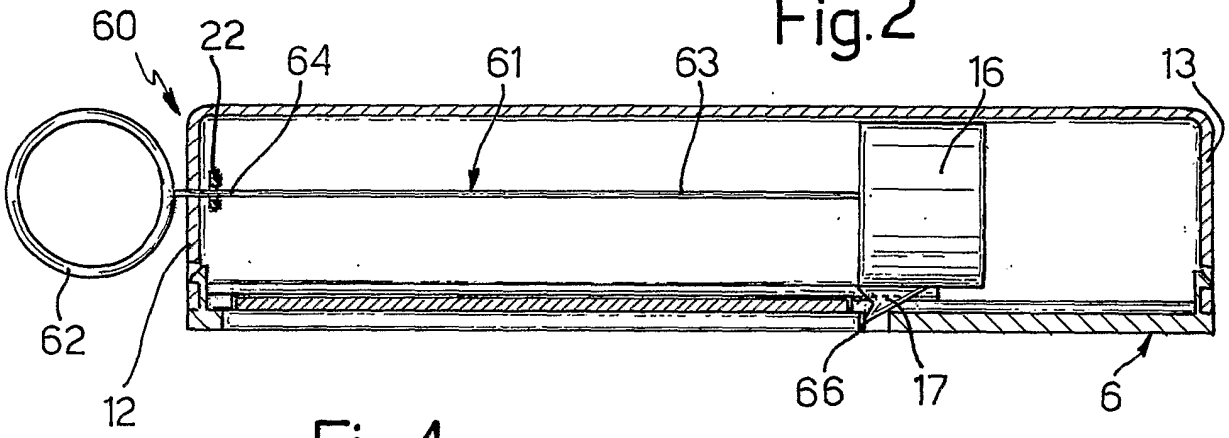


Fig.4

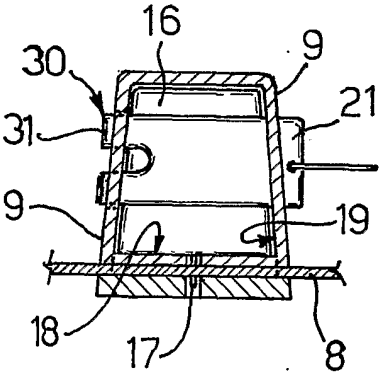


Fig.3

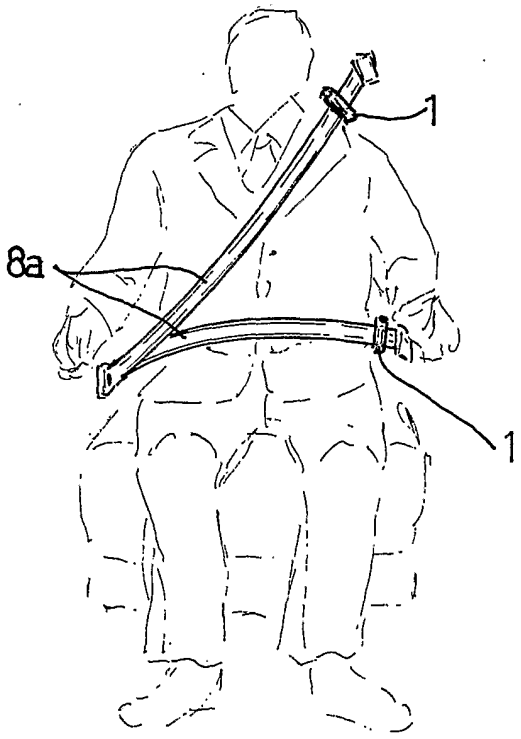


Fig.5

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB2005/001037

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B60R22/32

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)
IPC 7 B60R

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, PAJ, 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	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 02, 29 February 2000 (2000-02-29) -& JP 11 319131 A (HASHIMOTO TOMONAO), 24 November 1999 (1999-11-24)	1-3,5-7, 14,15
Y	abstract; figures 3,5	12
X	FR 2 391 739 A (NIEDERGANG THERESE) 22 December 1978 (1978-12-22) page 4, line 2 - page 5, line 14; figures 2,3	1,7,13
Y	BE 870 322 A1 (HUSSON ROGER) 2 January 1979 (1979-01-02) paragraph '0006!; figure 2	12

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in 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

"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

Date of the actual completion of the international search	Date of mailing of the international search report
7 September 2005	14/09/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Petersson, M

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB2005/001037

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 2005/037615 A (LUCIANI, MASSIMILIANO) 28 April 2005 (2005-04-28) page 6, line 6 - page 7, last paragraph page 8, last paragraph - page 12, line 12; figures 1-3,5,7 -----	1,4,8, 10,11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/IB2005/001037

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 11319131 A	24-11-1999	NONE	
FR 2391739 A	22-12-1978	FR 2391739 A1	22-12-1978
BE 870322 A1	02-01-1979	NONE	
WO 2005037615 A	28-04-2005	WO 2005037615 A1	28-04-2005