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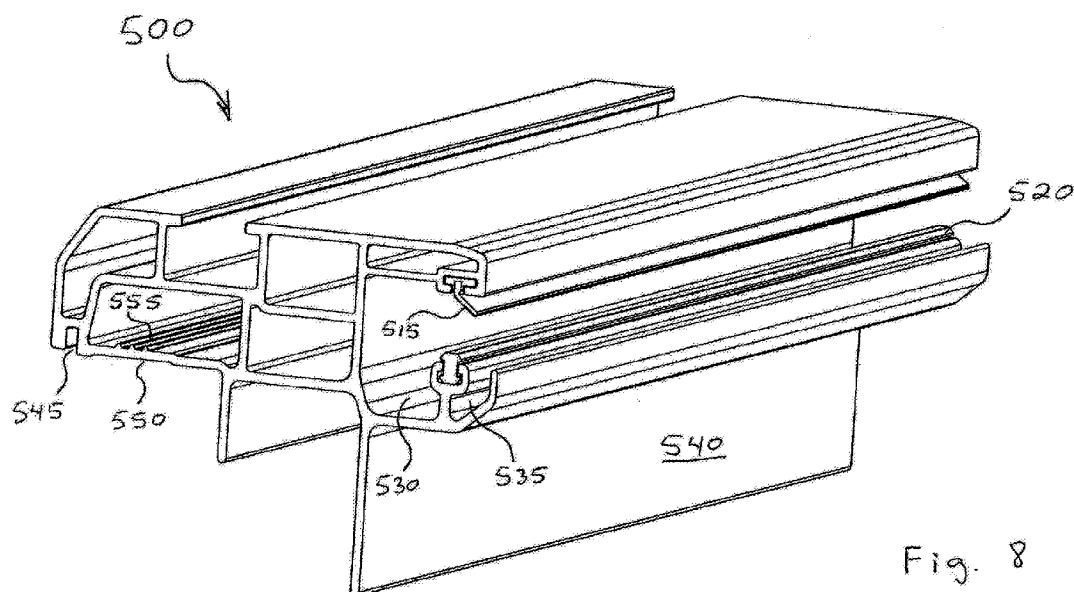


Fig. 8

(57) Abstract: A side rail for a cargo bed of a vehicle enables improved and smoother control and operation of an associated drive chain and slat assembly. The side rail comprises: an elongate body that defines a longitudinal axis; an axially extending drive channel disposed at a medial side of the body and defining an opening therein for receiving a drive chain, the drive channel having a recessed inner portion and a stepped outer portion adjacent the opening; a first receiving channel disposed within an upper wall of the outer portion of the drive channel and extending axially therealong; a first sealing member disposed within the first receiving channel; a second receiving channel disposed opposite the first receiving channel within a lower wall of the outer portion of the drive channel and extending axially therealong; and a guide element disposed within the second receiving channel and projecting upwardly therefrom, the guide element having an upper contact surface for slidably contacting a surface of the drive chain.

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).

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TITLE
A SIDE RAIL

FIELD OF THE INVENTION

[001] The present invention relates to a side rail. In particular, although not exclusively, the invention relates to a side rail for inclusion with a roll top cover for operably covering and securing the cargo beds or trays of utility vehicles or pickup trucks.

BACKGROUND TO THE INVENTION

[002] Numerous types of truck bed covers can be arranged over the utility or cargo bed portion of a ute or pickup truck to secure and protect the bed including cargo items disposed therein. In particular, roll top covers generally include a motorized or mechanical drive system for operably covering and uncovering the top of an open cargo bed, truck box or the like by way of an extendable and retractable slat assembly.

[003] Prior art roll top covers can suffer from a number of drawbacks. By way of example, such roll top covers may not be fully weather resistant and/or impervious to moisture and dust. Additionally, the frictional forces that are produced between the drive chain and the associated drive chain track or rail during operation (i.e., opening and/or closing) of the roll top cover can be significant so as to make closing and/or opening difficult for a user. Further to this, movement or vibration of the slats of the roll top cover can result in the production of undesirable noise during operation of the associated vehicle.

[004] Accordingly, an improved roll top cover that overcomes one or more of the above disadvantages is required.

OBJECT OF THE INVENTION

[005] It is an object of the present invention to overcome and/or alleviate one or more of the disadvantages of the prior art or provide the consumer with a useful or commercial choice.

SUMMARY OF THE INVENTION

[006] In one aspect, although not necessarily the only aspect or the broadest aspect, the invention resides in a side rail for a cargo bed of a vehicle comprising:

an elongate body that defines a longitudinal axis;

an axially extending drive channel disposed at a medial side of the body and defining an opening therein for receiving a drive chain, the drive channel having a recessed inner portion and a stepped outer portion adjacent the opening;

a first receiving channel disposed within an upper wall of the outer portion of the drive channel and extending axially therealong;

a first sealing member disposed within the first receiving channel;

a second receiving channel disposed opposite the first receiving channel within a lower wall of the outer portion of the drive channel and extending axially therealong; and

a guide element disposed within the second receiving channel and projecting upwardly therefrom, the guide element having an upper contact surface for slidably contacting a surface of the drive chain.

[007] Suitably, the side rail of the present aspect is for operation of a roll top cover and/or a tonneau cover.

[008] In one embodiment, the side rail further comprises:

a third receiving channel positioned between and adjacent the second receiving channel and the opening; and

a second sealing member disposed within the third receiving channel.

[009] In one embodiment, the first sealing member comprises a base positioned within the first receiving channel and a pair of curved projections extending therefrom into the drive channel for contacting an upper surface of the drive chain and/or a slat of the roll top cover.

[0010] In particular embodiments, the second sealing member curves upwardly and medially into the drive channel.

[0011] In some embodiments, front and/or rear end portions of the body include a respective end cap engaged thereto.

[0012] Suitably, the recessed inner portion defines a gutter.

[0013] In certain embodiments, the side rail of the present aspect further comprises an axially extending support channel recessed in an upper side of the body and opening upwardly therefrom. With respect to such embodiments, the support channel is suitably a U-shaped channel having opposed lip portions extending toward one another. Preferably, the side rail further comprises a cover element engaged within the support channel.

[0014] Suitably, the support channel is configured for receiving at least partly therein one or more automotive accessories. Preferably, the one or more automotive accessories are selected from the group consisting of a railing system, a trim element, a sail plane element, a sports bar element, a canopy, a cabin guard, a storage rack and any combination thereof.

[0015] In one embodiment, the side rail further comprises:

a fourth receiving channel recessed in a lower side of the body and extending axially therealong, the fourth receiving channel adjacent a lateral edge portion of the lower side; and

a third sealing member disposed within the fourth receiving channel and extending laterally therefrom so as to overlie the lateral edge portion.

[0016] In another aspect, the invention provides a roll top cover assembly for operably covering a cargo bed of a vehicle, comprising the side rail of the aforementioned aspect.

[0017] In a further aspect, the invention provides a tonneau cover assembly for operably covering a cargo bed of a vehicle, comprising the side rail of any one of Claims 1 to 13.

[0018] Further features of the invention will become apparent from the detailed description below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] To assist in understanding the invention and to enable a person skilled in the art to put the invention into practical effect, preferred

embodiments of the invention will be described by way of example only with reference to the accompanying drawings, in which:

FIG. 1 is a top-down perspective view of an embodiment of a roll top cover suitably installed on a vehicle;

FIG. 2 illustrates a perspective view of an embodiment of a side rail for operation of the roll top cover of Figure 1 prior to installation on a vehicle;

FIG. 3 is a cross-sectional view of the side rail of Figure 2;

FIG. 4 illustrates an end-on perspective view of the side rail of Figure 2;

FIG. 5 illustrates a top down perspective view of the side rail of Figure 2;

FIG. 6 is a cross-sectional view of the side rail of Figure 2 having a removable cover strip attached thereto;

FIG. 7 is a cross-sectional view of a side rail according to an alternative embodiment of the present invention; and

FIG. 8 is a perspective view of the side rail of FIG. 7.

DETAILED DESCRIPTION OF THE INVENTION

[0020] The present invention relates to a side rail for inclusion in a roll top cover that is operable between an extended or closed position and a retracted or open position when installed on a cargo bed of a vehicle, such as pickup trucks and utility vehicles. Elements of the invention are illustrated in concise outline form in the drawings, showing only those specific details that are necessary to understand the embodiments of the present invention, but so as not to provide excessive detail that will be obvious to those of ordinary skill in the art in light of the present description.

[0021] In this specification, adjectives such as first and second, top and bottom, upwards and downwards, and the like may be used solely to distinguish one element or action from another element or action without necessarily requiring or implying any actual such relationship or order. Words such as “comprises” or “includes” are intended to define a non-exclusive inclusion, such that a method or apparatus that comprises a list of elements does not include only those elements but may include other elements not

expressly listed, including elements that are inherent to such a method or system.

[0022] According to a first aspect, the present invention is defined as side rail for operation of a roll top cover for covering a cargo bed of a vehicle comprising:

an elongate body that defines a longitudinal axis;

an axially extending drive channel disposed at a medial side of the body and defining an opening therein for receiving a drive chain, the drive channel having a recessed inner portion and a stepped outer portion adjacent the opening;

a first receiving channel disposed within an upper wall of the outer portion of the drive channel and extending axially therealong;

a first sealing member disposed within the first receiving channel;

second and third receiving channels disposed opposite the first receiving channel within a lower wall of the outer portion of the drive channel and extending axially therealong, the third receiving channel positioned between and adjacent the second receiving channel and the opening;

a guide element disposed within the second receiving channel and projecting upwardly therefrom, the guide element having an upper contact surface for slidably contacting a surface of the drive chain; and

a second sealing member disposed within the third receiving channel.

[0023] Particular advantages of some embodiments of the side rail of the present invention include providing improved and smoother control and operation of an associated drive chain and slat assembly that significantly reduces any movement, in particular twisting and/or side to side movement, therebetween. A further advantage resides in the provision of a side rail that contributes to the drainage of any debris, fluids, dust and the like away from the roll top cover as well as prevents or minimises such debris, fluids, dust and the like from entering the cargo bed of the vehicle.

[0024] Figures 1 to 5 provide a preferred embodiment of a side rail 400 of the invention. As illustrated in Figure 1, the side rail 400 is configured for being part of a roll top cover 1 for covering a cargo bed 110 of a vehicle 100.

In the embodiment provided, the side rail 400 is configured to be operably coupled to a drive chain 300 and an associated slat assembly 10 so as to allow for slidable movement of the roll top cover 1 between an open or retracted position and a closed or extended position, as illustrated by Figure 1. The slat assembly 10 is constructed of a plurality of successive and pivotably interconnected slats 11. Similarly, the drive chain 300 comprises a plurality of successive and pivotably interconnected drive chain elements 301, with each drive chain element 301 engaged to opposed side portions or end walls of a single slat 11.

[0025] As shown in Figures 2 to 4, each drive chain element 301 is configured for operably connecting its respective slat 11 to the side rail 400. From Figure 2, it can be observed that the roll top cover 1 is operable by way of a drive system 500 to move between the extended position, in which the slats 11 of the slat assembly 10 are arranged and extend between opposed side rails 400 so as to have the respective upper surfaces thereof substantially flush theretogether and thereby define a substantially flattened or planar arrangement of the slat assembly 10 (i.e., to restrict access to the underlying cargo bed 110, see Figure 1), and the retracted position, in which the slat assembly 10 attains a substantially curved or spiral arrangement so as to enable a user access to the cargo bed 110 thereunder.

[0026] Referring to Figures 3 to 5, the side rail 400 includes an elongate body 405 having a length and first and second ends and further being defined by opposed lateral and medial sides 401,402 as well as opposed upper and lower sides 403,404. It will be appreciated that the sides 401-404 define a relatively low profile of the side 400 when in cross-section. Opening outwardly or laterally from the medial side 402 of the body 405 is a T-shaped drive channel 410. In this manner, the drive channel 410 defines an opening 411 that extends along the length of the body 405. As shown in Figure 2, the opening 411 is configured to receive therein or therethrough a portion of the drive chain 300 and/or the associated slat assembly 10 so as to allow for slidable movement thereof within the drive channel 410 in first and second directions (i.e., forward and rearward directions relative to the cargo bed 110 of the vehicle 100).

[0027] The drive channel 410 includes a stepped or narrowed lateral or outer portion 412 that defines the opening 411 and a recessed medial or inner portion 413. A lower portion of the recessed inner portion 413 defines a gutter 420 for receiving and draining any debris, dust, fluids and the like that have migrated from the drive chain 300 and/or slat assembly 10 through the outer portion 412 of the drive channel 410.

[0028] Disposed in an upper wall or portion of the outer portion 412 and adjacent the opening 411 of the drive channel 410 and extending therealong is a first receiving slot or channel 414. In this manner, the first receiving channel 414 defines a T-shaped space or slot that opens downwardly into the outer portion 412 of the drive channel 410. The outer portion 412 further includes second and third receiving channels 415, 416 that are each disposed opposite the first receiving channel 414 in a lower portion of the outer portion 412 of the drive channel 410. Similar to the first receiving channel 414, the second receiving channel 415 defines a T-shaped space or slot that opens upwardly into the drive channel 410. The third receiving channel 416 is positioned adjacent and spaced laterally from the second receiving channel 415 and adjacent the opening 411 medially, which defines a J-shaped space or slot that opens upwardly into the drive channel 410.

[0029] As can be observed from Figures 3 to 5, a first sealing member 440 is disposed within the first receiving channel 414. The first sealing member 440 comprises a base 441 that is rectangular in cross-section and of suitable dimensions for being securely and frictionally received within the first receiving channel 414. Extending downwardly from the base 441 are first and second curved projections 442, 443 that are angularly disposed with respect to each other, such that each curved projection 442, 443 is configured to contact an upper surface of the drive chain 300 and/or the slat assembly 10. In this regard, the first curved projection 442 extends or is angled laterally or outwardly towards the opening 411 defined by the drive channel 410, whilst the second curved projection 443 extends or is angled medially or inwardly towards the recessed inner portion 413. As a result of this arrangement, the first sealing member 440 helps to not only prevent or minimise debris, dust, fluids and the like from entering the drive channel 410 and ultimately the gutter 420, but also acts to reduce the movement or splashing of such debris,

dust, fluids and the like out of the gutter 420 once drained or collected therein. As such, this arrangement advantageously acts to keep the cargo bed 110 dry.

[0030] Further to the above and disposed within the third receiving channel 416 is an elongate second sealing member 445 that projects upwardly therefrom and extends longitudinally at least partly the length of the body 405. To this end, a first end 445a of the second sealing member 445 curves upwardly and inwardly into the drive channel 410 so as to be configured to slidingly abut or contact a lower or bottom surface of each of the overlying drive chain elements 301 and/or the slats 11 as they move thereover in the first or second direction within the drive channel 410. A second end 445b of the second sealing member 445 is of suitable dimensions for being securely received within the third receiving channel 416. The first end 445a of the second sealing member 445 is preferably made of a resiliently deformable material that allows for the first end 445a to elastically deform to accommodate a range of different profiles of the bottom surface of the drive chain elements 301 sliding thereover. As can be observed in Figure 2, the bottom surface of the drive chain elements 301 includes spaced apart first and second arcuate projections 371,372 that are separated by a substantially flattened portion 373. As such, the second sealing member 445 acts to minimise the likelihood of debris, fluids, dust or the like that has collected in, for example, the gutter 420 migrating between the lower surface of the drive chain 300 and the drive channel 410 of the side rail 400 and into the cargo bed 110 of the vehicle 100.

[0031] It will be appreciated that the first and second sealing members 440,445 may comprise any suitable material known in the art, including rubber materials of a suitable grade and shore hardness. Preferably, the material to be used for the sealing members 440,445 demonstrates adequate levels of fluid and/or chemical resistance as well as frost and heat resistance. Additionally, the material to be used for the sealing members 440,445 suitably demonstrates a requisite level of flammability and UV resistance as typically required for automotive applications.

[0032] As shown in Figures 3 to 5, the side rail 400 further includes an I-shaped guide or contact element 425 disposed within the second receiving

channel 415. The contact element 425 defines an upper contact surface 426 that is adapted to slidably receive, at least partly, thereon the bottom surface of the drive chain elements 301. Accordingly, the contact element 425 is preferably of a material that minimises the frictional forces between the drive chain element 301 and the underlying contact surface 426.

[0033] In cross-section, it can be observed that the body 405 of the side rail 400 includes first, second, third and fourth hollow portions 451-454. The hollow portions 451-454 are configured to reduce the effective weight of the side rail 400, whilst also maintaining a requisite strength for the structural integrity of the side rail 400. Additionally, first and second ends of the body 405 are both open ended to define a space therebetween.

[0034] The front and rear ends of the side rail 400, that is those ends adjacent the cab and tailgate of the vehicle 100 respectively, terminate in a respective end piece or cap 480a,b, shown in Figure 1. The caps 480a,b are configured to matingly and frictionally snap or slide in place around the cross-sectional shape or configuration of the side rail 400. In addition to this, the caps 480a,b can be secured to their respective ends of the side rail 400 by means of one or more fasteners, as are known in the art. Alternatively, the caps 480a,b can be configured so as to have engagement portions (not shown) that are matingly and securely received within one or more of the hollow portions 451-454 of the body 405.

[0035] The above described relationship between the side rail 400, the drive chain 300 and the first and second sealing members 440,445 promotes any water which may enter the drive channel 410 moving into the gutter 420 and subsequently draining into a housing 510 of the drive system 500. A draining outlet (not shown) may then be made from a bottom portion of the housing 510 through the cargo bed 110 of the vehicle 100 to permit the release of debris, liquid, and the like therefrom and thereby maintaining the cargo bed 110 itself dry.

[0036] Recessed in the upper side 403 and opening upwardly therefrom is a U-shaped support track or channel 430. As can be observed from Figures 3 to 5, the support channel 430 has a pair of opposed lip portions 431,432 that are parallel or flush with the upper side 403. The support channel 430, and in particular the opposed lip portions 431,432 are designed to receive and

secure a range of automotive accessories to the side rail 400. By way of example, and as shown in Figure 6, the opposed lip portions 431,432 have matingly received a removeable cover strip 435 thereover. In this manner, the cover strip 435 may be used to cover the support channel 430 when not in use by another automotive accessory. Additional automotive accessories that may be received and engaged by the support channel 430 include, but are not limited to, a railing system, a trim element, a sail plane element, a sports bar element, a canopy, a cabin guard and a storage rack.

[0037] The lower side 404 of the body 405 further comprises an outwardly or downwardly opening fourth receiving channel 450 recessed therein and disposed adjacent a lateral edge portion 401a with the lateral side 401. Disposed within the fourth receiving channel 450 is a third sealing member 460 that extends outwardly therefrom and in a right-angled fashion over the lateral edge portion 401a to overlie a lower portion of the lateral wall 401. In this way, the third sealing member 460 is configured for abutting and sealingly contacting an upper surface of a side wall 111 of the cargo bed 110 when appropriately installed on the vehicle 100.

[0038] As can be observed in Figures 3 to 5, the lower side 404 of the body 405 also includes a pair of spaced apart and downward or outward extending perpendicular projections 470a,b. The first projection 470a has two functions, firstly to act as an end stop for one or more clamping members (not shown) which clamp the side rail 400 to the cargo bed 100. Secondly, the first projection 470a also has a paired of threaded apertures (not shown) positioned at opposing ends that function to hold a grub screw or the like therein. These grub screws (not shown) can be used to adjust the roll top cover 1 as a whole in such way that it will preferably be appropriately mounted concentric to the cargo bed 110.

[0039] Conversely, the second projection 470b can facilitate the mounting of one or more accessory rails or supports (not shown) if required. These accessory rails (not shown) can then be used to mount or engage other accessories, such as LED lights and a cargo manager (also called inner tub cargo divider).

[0040] Figure 7 is a cross-sectional view of a side rail 500 according to an alternative embodiment of the present invention. The side rail 500 includes a

first channel 505 disposed above a main drive channel 510. A first sealing member 515 is positioned in the first channel 505. A guide member 520 is positioned in a second channel 525. A water gutter 530 and a water overflow channel 535 are positioned on either side of the second channel 525.

[0041] A mounting rib 540 provides a location for rigid attachment of accessories such as an LED light. Also, a loom/harness channel 542 enables effective concealment of electrical wiring and cables.

[0042] An outboard side of the side rail 500 includes a side rail tab seal channel 545. Also, a recess 550 provides a location for a foam seal. Further, ribs 555 assist in the effective clamping of the side rail 500 to a vehicle.

[0043] Figure 8 is a perspective view of the side rail 500, which illustrates in particular the angled profile of the first sealing member 515.

[0044] The side rails 400, 500 may be made or constructed from any suitable material known in the art, including, but not limited to, metals such as aluminium (e.g., marine grade aluminium) and steel, and polymeric materials, such as plastics (e.g., reinforced plastics). In one preferred embodiment, the side rail 400, 500 is made or constructed of material/s other than aluminium so as to reduce friction between it and the drive chain 300.

[0045] The above description of various embodiments of the present invention is provided for purposes of description to one of ordinary skill in the related art. It is not intended to be exhaustive or to limit the invention to a single disclosed embodiment. As mentioned above, numerous alternatives and variations to the present invention will be apparent to those skilled in the art of the above teaching. Accordingly, while some alternative embodiments have been discussed specifically, other embodiments will be apparent or relatively easily developed by those of ordinary skill in the art. The invention is intended to embrace all alternatives, modifications, and variations of the present invention that have been discussed herein, and other embodiments that fall within the spirit and scope of the above described invention.

CLAIMS

1. A side rail for a cargo bed of a vehicle comprising:
 - an elongate body that defines a longitudinal axis;
 - an axially extending drive channel disposed at a medial side of the body and defining an opening therein for receiving a drive chain, the drive channel having a recessed inner portion and a stepped outer portion adjacent the opening;
 - a first receiving channel disposed within an upper wall of the outer portion of the drive channel and extending axially therealong;
 - a first sealing member disposed within the first receiving channel;
 - a second receiving channel disposed opposite the first receiving channel within a lower wall of the outer portion of the drive channel and extending axially therealong; and
 - a guide element disposed within the second receiving channel and projecting upwardly therefrom, the guide element having an upper contact surface for slidably contacting a surface of the drive chain.

2. The side rail of Claim 1, wherein the side rail is for operation of a roll top cover and/or a tonneau cover.

3. The side rail of Claim 1 or Claim 2, further comprising:
 - a third receiving channel positioned between and adjacent the second receiving channel and the opening; and
 - a second sealing member disposed within the third receiving channel.

4. The side rail of Claim 3, wherein the second sealing member curves upwardly and medially into the drive channel.

5. The side rail of any one of the preceding claims, wherein the first sealing member comprises a base positioned within the first receiving channel and a pair of curved projections extending therefrom into the drive channel for contacting an upper surface of the drive chain and/or a slat of the roll top cover.

6. The side rail of any one of the preceding claims, wherein front and/or rear end portions of the body include a respective end cap engaged thereto.

7. The side rail of any one of the preceding claims, wherein the recessed inner portion defines a gutter.

8. The side rail of any one of the preceding claims, further comprising an axially extending support channel recessed in an upper side of the body and opening upwardly therefrom.

9. The side rail of Claim 8, wherein the support channel is a U-shaped channel having opposed lip portions extending toward one another.

10. The side rail of Claim 8 or Claim 9, further comprising a cover element engaged within the support channel.

11. The side rail of any one of Claims 8 to 10, wherein the support channel is configured for receiving at least partly therein one or more automotive accessories.

12. The side rail of Claim 11, wherein the one or more automotive accessories are selected from the group consisting of a railing system, a trim

element, a sail plane element, a sports bar element, a canopy, a cabin guard, a storage rack and any combination thereof.

13. The side rail of any one of the preceding claims, further comprising:

a fourth receiving channel recessed in a lower side of the body and extending axially therealong, the fourth receiving channel adjacent a lateral edge portion of the lower side; and

a third sealing member disposed within the fourth receiving channel and extending laterally therefrom so as to overlie the lateral edge portion.

14. A roll top cover assembly for operably covering a cargo bed of a vehicle, comprising the side rail of any one of the preceding claims.

15. A tonneau cover assembly for operably covering a cargo bed of a vehicle, comprising the side rail of any one of Claims 1 to 13.

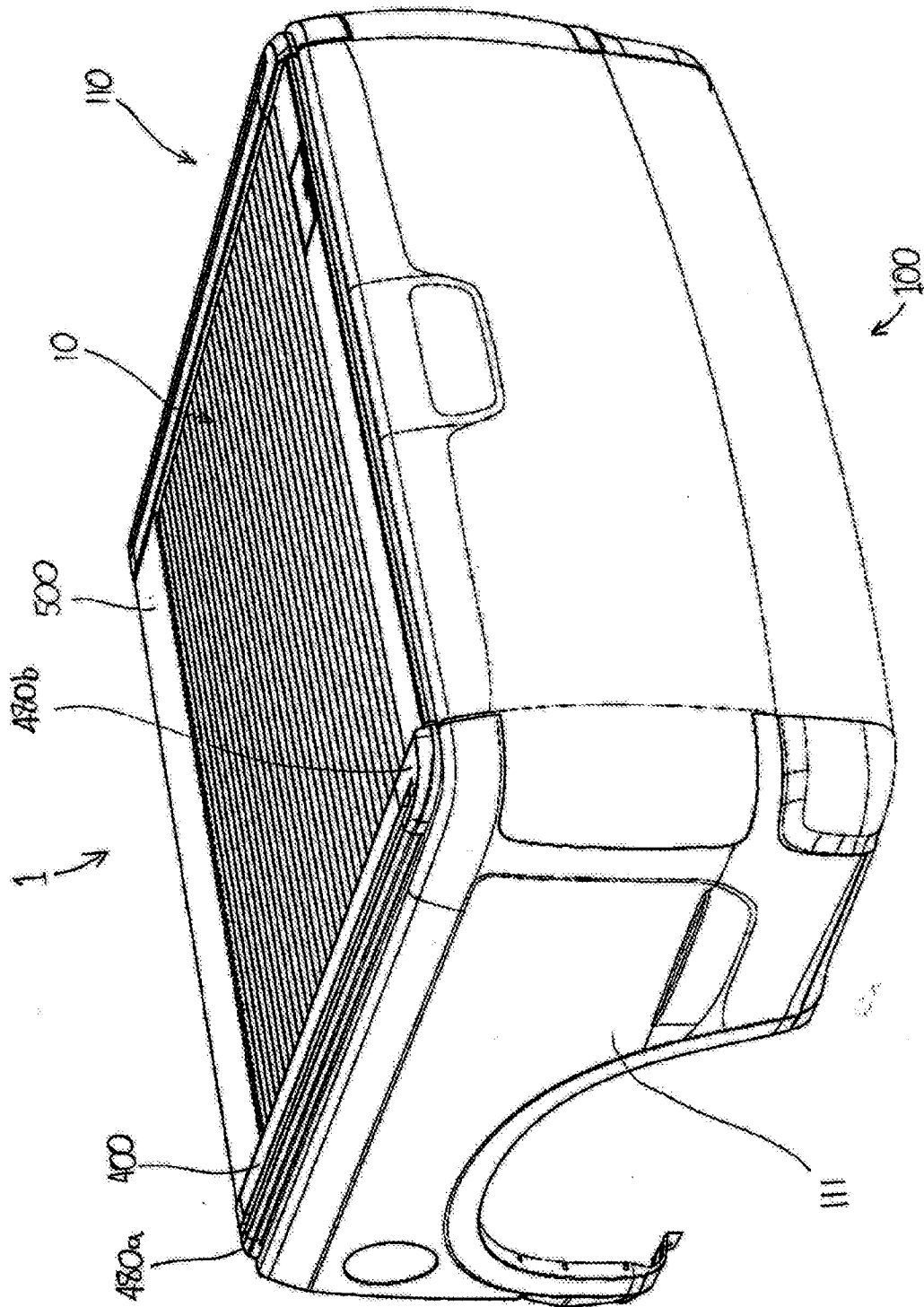


FIG. 1

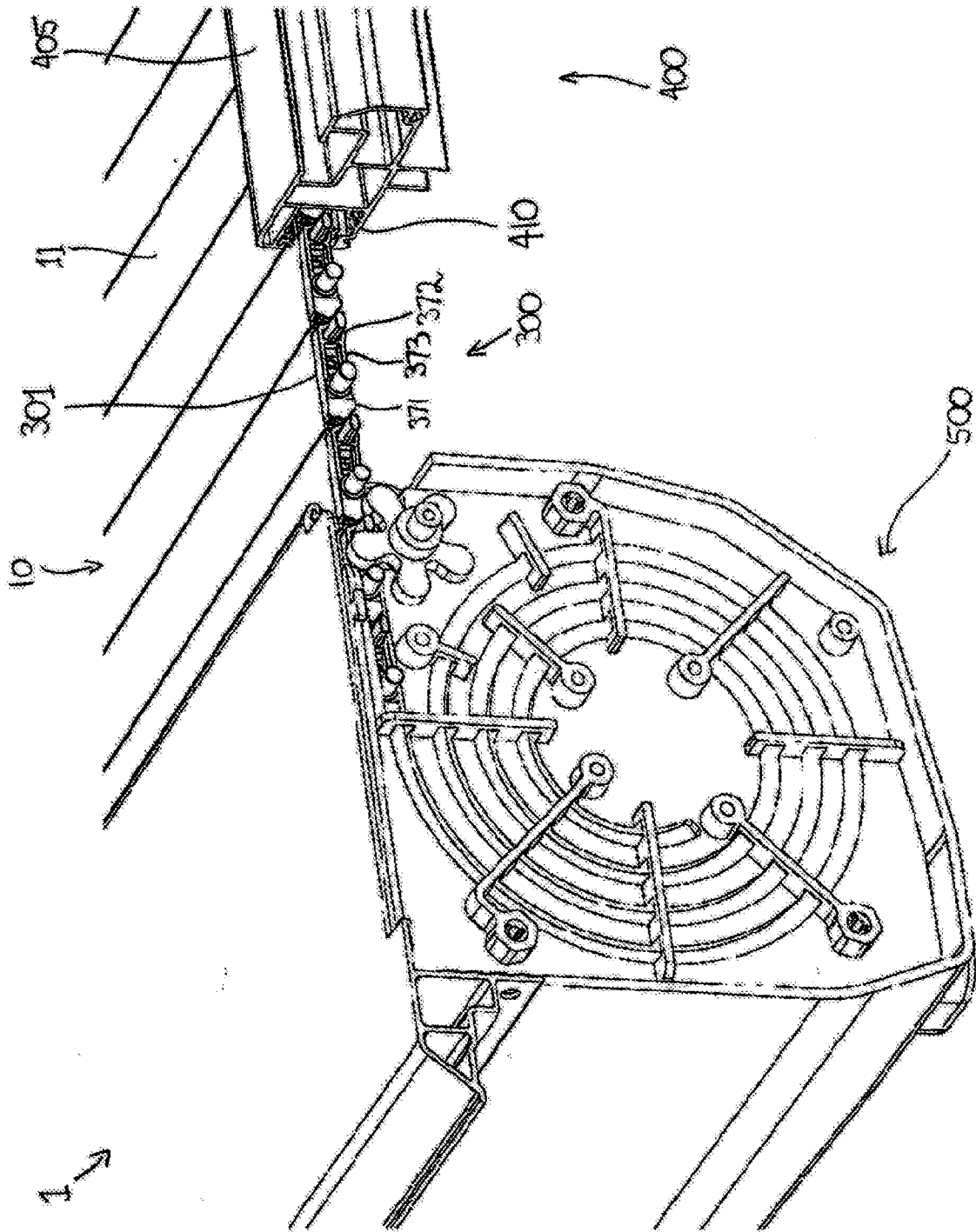


FIG. 2

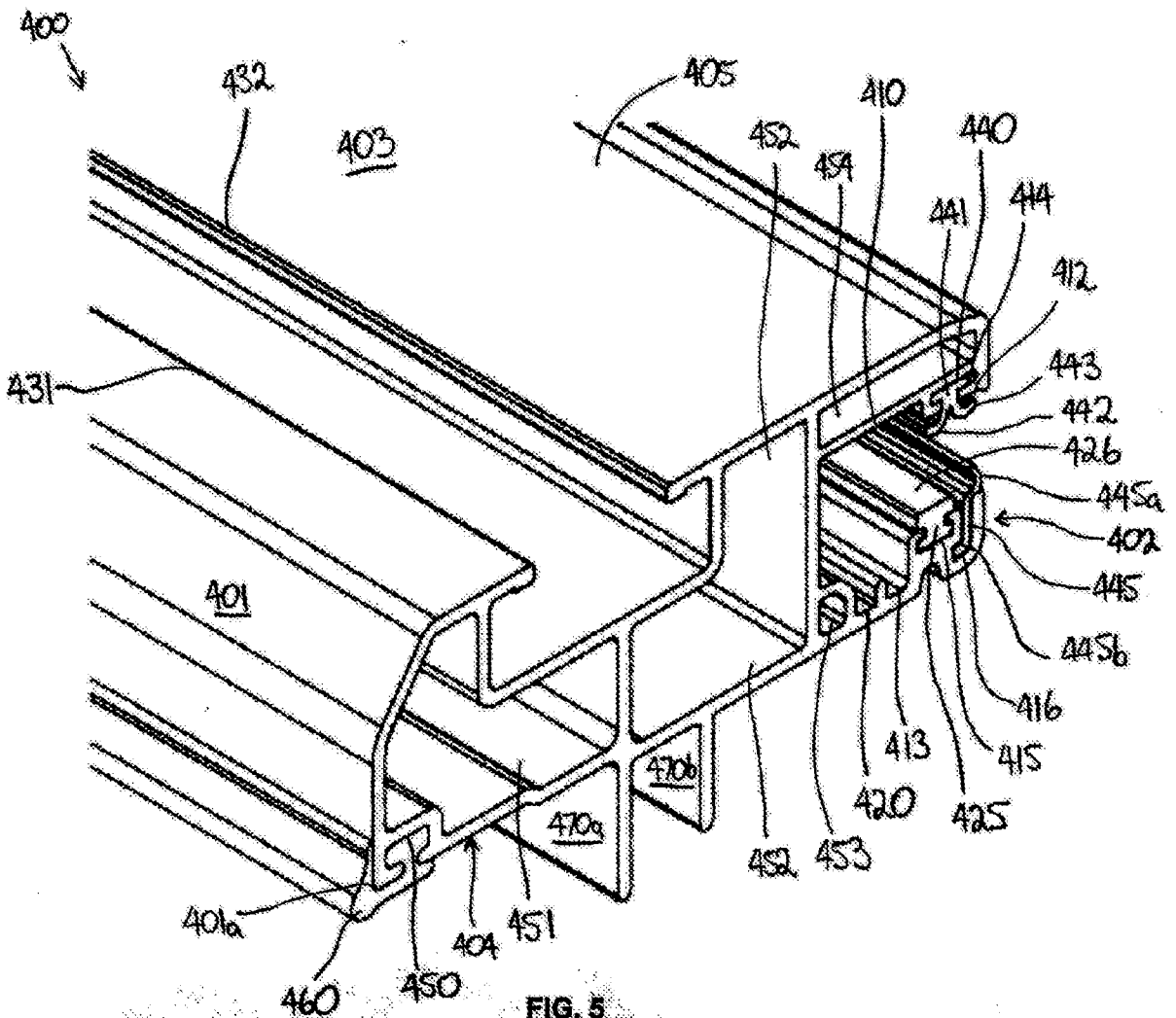


FIG. 5

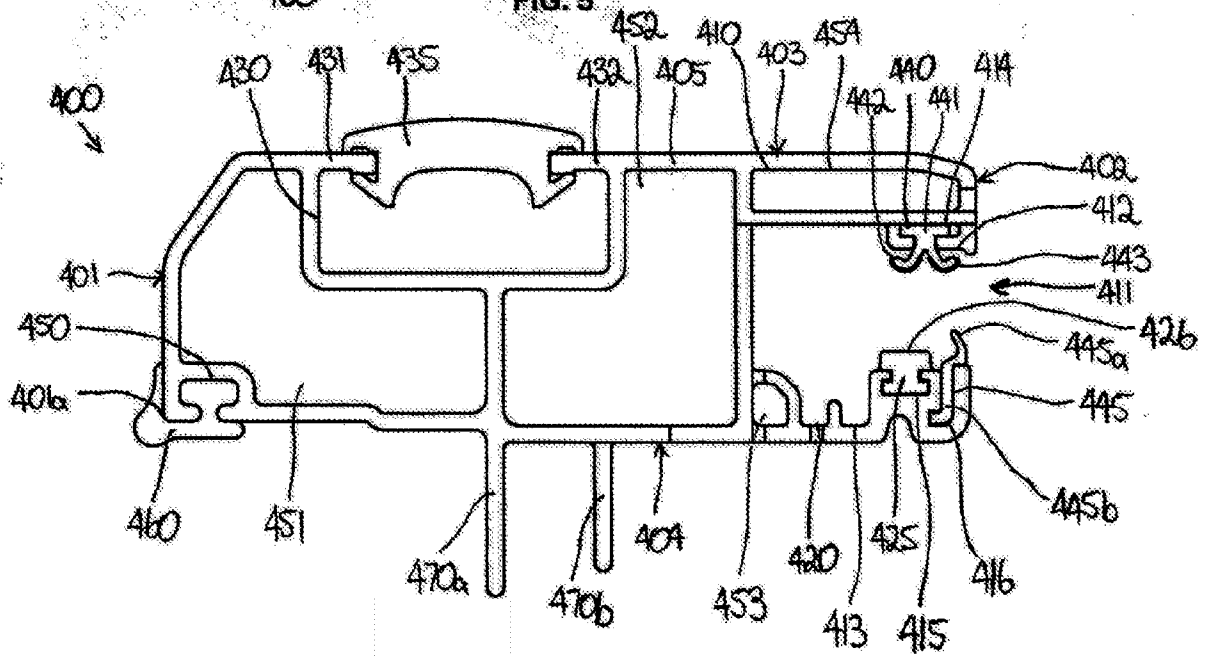


FIG. 6

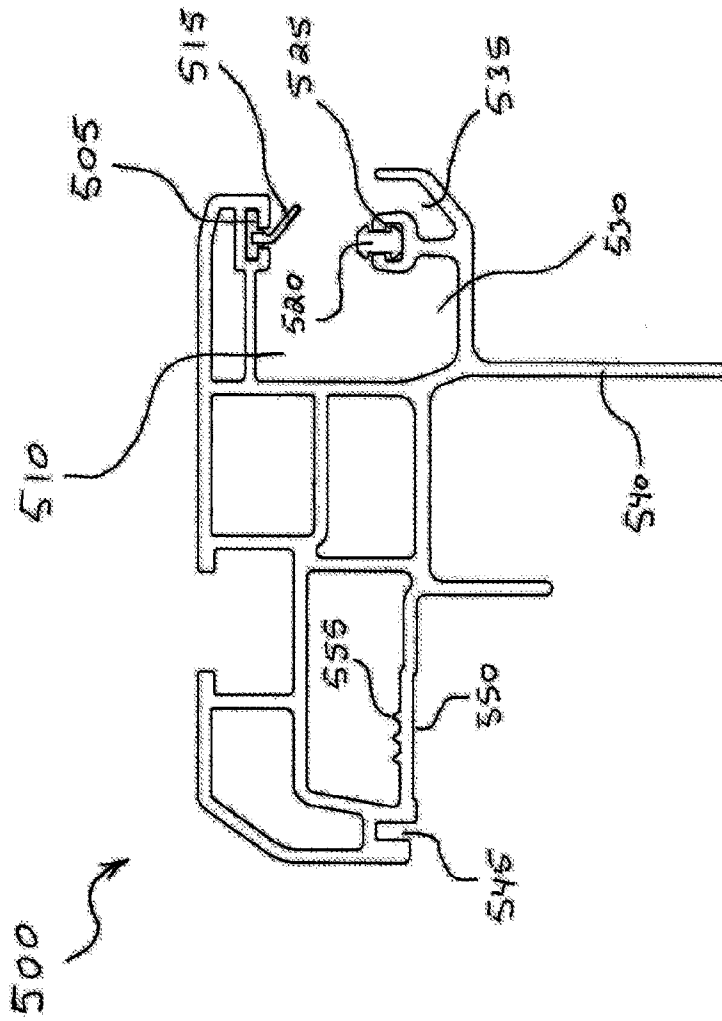


Fig 7

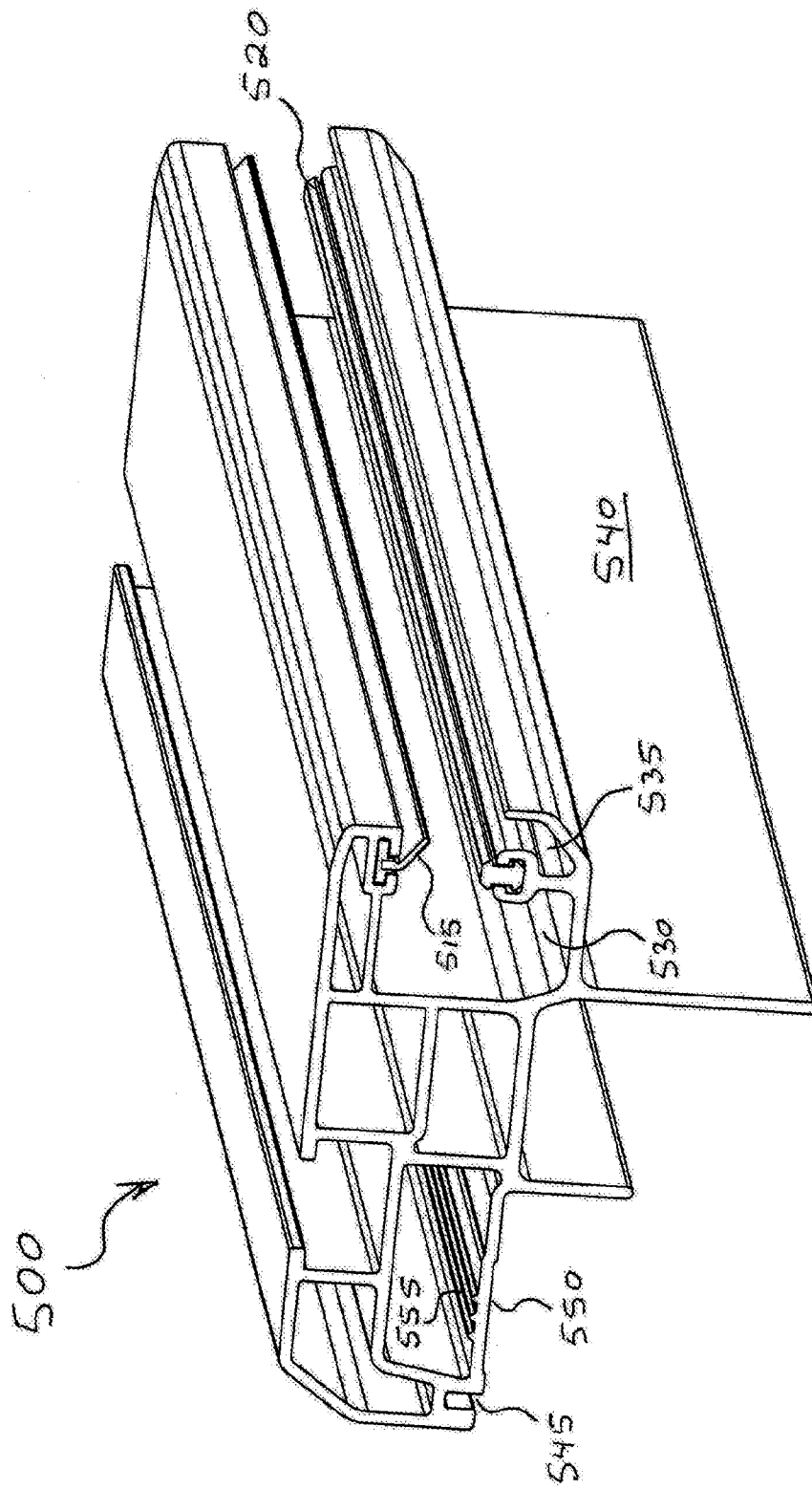


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2019/050542

A. CLASSIFICATION OF SUBJECT MATTER

B60J 5/14 (2006.01) B60J 7/04 (2006.01) E06B 9/15 (2006.01) E06B 9/58 (2006.01)

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)

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)

EPODOC, WPIAP, English Full Text, PATENW: B60J5/06/LOW, B60J5/12/LOW, B60J7/02/LOW, B60J10/27/LOW, B60J10/80/LOW, E06B9/15/LOW, E06B9/58/LOW (IPC); E06B2009/1577/LOW, E06B2009/588/LOW (CPC); vehicle, cargo, pick up, platform, tonneau, shutter, slat, roller, seal, waterproof, drive, channel, groove, side rail, track, extrusion, and similar terms (KEYWORDS).

Espacenet: (B60J5/12/low or B60J7/02/low) and (E06B2009/588 or E06B2009/1577/low) as the CPC; (B60J5/12/low or B60J7/02/low) and (E06B9/58 or E06B9/15/low) as the IPC; (side? and seal* and guid*) in the title or abstract AND (B60J5/14/low or B60J7/04/low) as the IPC.

Google Patents: side rail, roll top, tonneau, cover, cargo bed, utility vehicle, drain, gutter, channel, seal, rubber, guide, support, accessories, attachment, and similar terms. Espacenet, AusPat, IP Australia internal databases: applicant and inventor name search.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

 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	"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
"D" document cited by the applicant in the international application	"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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"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
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INTERNATIONAL SEARCH REPORT

International application No.

C (Continuation).

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X	WO 1998/032943 A1 (QUIG) 30 July 1998 Figures 1 to 5, Page 7 Line 6 to Page 14 Line 31	1-15
X	US 5330246 A (BERNARDO) 19 July 1994 Figures 1 to 6, Column 4 Line 54 to Column 6 Line 40	1-15
X	US 5040843 A (RUSSELL et al.) 20 August 1991 Figures 1 to 11, Column 2 Line 45 to Column 6 Line 62	1-15
A	US 5228736 A (DUTTON) 20 July 1993 Figures 1 to 14, Column 2 Line 37 to Column 6 Line 17	1-15
A	US 5584521 A (HATHAWAY et al.) 17 December 1996 Figures 1 to 34, Column 4 Line 62 to Column 10 Line 45	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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End of Annex