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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 April 2012 (05.04.2012)

PCT

(10) International Publication Number
WO 2012/041378 A1

(51) International Patent Classification:
B60S 1/38 (2006.01) *B60S 1/40* (2006.01)

(21) International Application Number:
PCT/EP2010/064561

(22) International Filing Date:
30 September 2010 (30.09.2010)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **FEDERAL-MOGUL S.A.** [BE/BE]; Avenue Champion, B-6790 Aubange (BE).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **BOLAND, Xavier** [BE/BE]; 304, Route de Luxembourg, B-6700 Arlon (BE).

(74) Agent: **HOOIVELD, Arjen Jan Winfried**; Sweelinckplein 1, NL-2517 GK Den Haag (NL).

(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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, 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, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

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

(54) Title: WINDSCREEN WIPER DEVICE

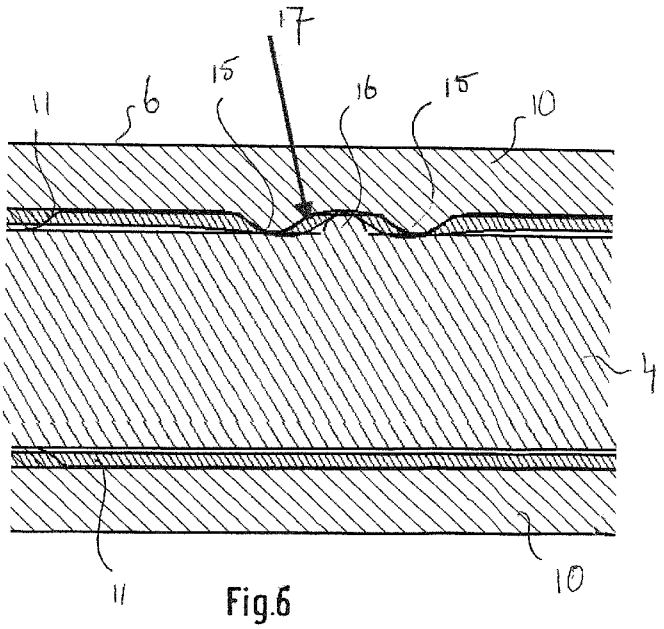

Fig.6

(57) Abstract: A windscreen wiper device (1) comprising an elastic, elongated carrier element, as well as an elongated wiper blade (2) of a flexible material, which includes at least one longitudinal groove (3), in which groove (3) at least one longitudinal strip (4) of the carrier element is disposed, which windscreen wiper device comprises a connecting device (6) for an oscillating arm (7), said wiper blade (2) and said longitudinal strip (4) are mutually fixated by mutually cooperating protrusion/recess means of said longitudinal strip (4) and said connecting device (6) at the location of the interconnection of said connecting device (6) and said wiper blade (2), and wherein said wiper blade (2) is allowed to move in longitudinal direction relative to said longitudinal strip (4) outside the location of the interconnection of said connecting device (6) and said wiper blade (2).

WO 2012/041378 A1

WINDSCREEN WIPER DEVICE

The present invention relates to a windscreen wiper device comprising an elastic, elongated carrier element, as well as an elongated wiper blade of a flexible material, which can be placed in abutment with a windscreen to be wiped, which wiper blade includes at least one longitudinal groove, in which groove at least one longitudinal strip of the carrier element is disposed, which windscreen wiper device comprises a connecting device for an oscillating arm, wherein said oscillating arm is pivotally connected to said connecting device about a pivot axis near one end thereof, with the interposition of a joint part, wherein said wiper blade comprises a spoiler at a side thereof facing away from the windscreen to be wiped.

Such a windscreen wiper device is generally known. This prior art windscreen wiper device is designed as a so-called "flat blade" or "yokeless blade", wherein no use is made of several yokes pivotally connected to each other, but wherein the wiper blade is biassed by the carrier element, as a result of which it exhibits a specific curvature. The spoiler is also called an "air deflector".

The object of the invention is to provide an improved windscreen wiper device.

In order to accomplish that objective, a windscreen wiper device of the type referred to in the introduction is characterized according to the invention in that said wiper blade and said longitudinal strip are mutually fixated by

mutually cooperating protrusion/recess means of said longitudinal strip and said connecting device at the location of the interconnection of said connecting device and said wiper blade, and wherein said wiper blade is allowed to move in longitudinal direction relative to said longitudinal strip outside the location of the interconnection of said connecting device and said wiper blade. In other words, said protrusion/recess means ensure that the wiper blade and the longitudinal strip are not allowed to mutually move under the connecting device, but in all other areas along the wiper blade a slight movement thereof is made possible in order to allow said wiper blade to follow any curvature of the windscreen to be wiped. It is this interaction between the protrusion/recess means that elastomeric material (i.e. usually rubber) of said wiper blade and material of the longitudinal strip (i.e. usually steel) are forced to engage with each other in a locking manner when the connecting device is mounted onto the wiper blade, all at the location under the connecting device. Preferably, said connecting device has a substantially U-shaped cross-section, wherein legs of said U-shaped cross-section are connected to the elastomeric material of said wiper blade on opposite sides thereof, either through a clamping operation or through a crimping operation, and wherein said protrusion/recess means are provided on an inner wall of said legs, as well as on an exterior edge of said longitudinal strip.

It is noted that the present invention is not restricted to the use of only one longitudinal strip forming the elastic carrier element that is particularly located in a central longitudinal groove of the wiper blade. Instead, said carrier element may also comprise two longitudinal strips,

wherein said strips are disposed in opposite longitudinal grooves of the wiper blade.Said groove(s) may be closed at one outer end.

In a preferred embodiment of a windscreen wiper device in accordance with the invention said connecting device is slightly deforming said wiper blade at the location of the interconnection of said connecting device and said wiper blade. Said deformation is realized at the time of mounting the connecting device onto the wiper blade during assembly of all relevant parts of the wiper blade, wherein said deformation is particularly effected in a side region of the wiper blade, without having any influence on a bottom region thereof (i.e. containing a wiping lip of the wiper blade). Consequently, wiping properties of said wiper blade are not adversely affected. Said deformation is preferably such that it is meandrous in shape in order to achieve a tight fixation of the longitudinal strip and the wiper blade under the connecting device.

In another preferred embodiment of a windscreen wiper device according to the invention said longitudinal strip is provided along an exterior edge thereof with at least one recess cooperating with a corresponding, sidewardly and inwardly extending protrusion on the connecting device, wherein said protrusion is not entering into said recess. Preferably, said protrusion is slightly deforming said wiper blade in the form of a C at the location of the recess.

In another preferred embodiment of a windscreen wiper device in accordance with the invention said longitudinal strip is provided along an exterior edge thereof with at least one sidewardly and outwardly extending protrusion cooperating

with a corresponding recess on the connecting device. More in particular, said recess on the connecting device is formed between two sidewardly and inwardly extending protrusions on the connecting device.

In another preferred embodiment of a windscreen wiper device according to the invention said protrusions are slightly deforming said wiper blade in the form of a S at the location of the recess.

In another preferred embodiment of a windscreen wiper device in accordance with the invention said joint part is detachably connected to said connecting device by engaging protrusions of said connecting device, at the location of said pivot axis, in recesses provided in said joint part. This is preferably realized through a snapping or clipping operation.

In another preferred embodiment of a windscreen wiper device according to the invention said joint part has an at least substantially U-shaped cross-section at the location of its connection to said connecting device, and wherein said joint part is provided with a recess provided coaxially with said pivot axis. In particular, the protrusions extend outwards on either side of said connecting device and are preferably cylindrical in shape. In the alternative, said protrusions are spherical or frusto-conical in shape. Said protrusions that function as bearing surfaces are thus paced far apart, so that forces exerted thereon will be relatively low. In yet another preferred variant said joint part is provided with co-axial through holes in legs of said U-shaped cross-section thereof, wherein a pivot pin is inserted in said through holes.

In another preferred embodiment of a windscreen wiper device in accordance with the invention said protrusions are provided with co-axial through holes. Accordingly, the wiper blade may then be connected to the oscillating arm on the basis of a so-called "sidelock system". The oscillating arm is provided with a joint pin or a pivot pin to be inserted in said co-axial through holes. Said pivot pin protrudes in a direction towards the wiper blade and has a pivot axis extending in a direction of the oscillating movement of the oscillating arm.

In another preferred embodiment of a windscreen wiper device according to the invention said joint part comprises at least one resilient tongue engaging in a correspondingly shaped hole provided in a base of a U-shaped cross-section of said oscillating arm, and wherein said resilient tongue is rotatable along a hinge axis between an outward position retaining said wiper blade onto said oscillating arm and an inward position releasing said wiper blade from said oscillating arm. Accordingly, the wiper blade may then be connected to the oscillating arm on the basis of a so-called "toplock system" on the basis of a bayonet connection. In order to connect the wiper blade onto the oscillating arm, the resilient tongue is initially pushed in against a spring force - as if it were a push button - and then allowed to spring back into the hole provided in the oscillating arm, thus snapping, that is clipping the resilient tongue into the hole. By subsequently pushing in again the resilient tongue against the spring force, the wiper blade may be released from the oscillating arm.

The present invention also refers to a wiper blade as defined above, as such.

The invention will now be explained more in detail with reference to figures illustrated in a drawing, wherein

- figure 1 is a perspective, schematic view of a preferred embodiment of a windscreen wiper device according to the invention, with (a part of) an oscillating arm;
- figure 2 is a cross-sectional view of the windscreen wiper device of figure 1 along the line A-A in figure 1;
- figure 3 shows in detail a perspective view of a longitudinal strip according to a first preferred embodiment, as used in a windscreen wiper device of figure 1;
- figure 4 shows the working principle of the mutual fixation of the wiper blade and the longitudinal strip at the location of the connecting device (in a top view in cross-section) according to the first preferred embodiment;
- figure 5 corresponds to figure 3, but now relating to a longitudinal strip according to a second preferred embodiment;
- figure 6 corresponds to figure 4, but now relating to the second preferred embodiment.

Figures 1 and 2 show a preferred variant of a windscreen wiper device 1 according to the invention. Said windscreen wiper device is built up of an elastomeric wiper blade 2 comprising a central longitudinal groove 3, wherein a longitudinal strip 4 made of spring band steel is fitted in

said longitudinal groove 3 (see figures 5, 6 and 7). Said strip 4 forms a flexible carrier element for the rubber wiper blade 2, as it were, which is thus biassed in a curved position (the curvature in operative position being that of a windscreen to be wiped). An end of said strip 4 and/or an end of said wiper blade 2 is connected on either side of the windscreen wiper device 1 to respective connecting pieces or "end caps" 5. In this embodiment, the connecting pieces 5 are separate constructional elements, which may be form-locked as well as force-locked to both ends of said strip 4 and/or ends of said wiper blade 2. In another preferred variant, said connecting pieces 5 are in one piece with the strip 4 made of spring band steel. The windscreen wiper device 1 is furthermore built up of a connecting device 6 of metal for connecting an oscillating wiper arm 7 thereto, with the interposition of a joint part 8. The oscillating wiper arm 7 is pivotally connected to the connecting device 6 about a pivot axis near one end. The preferred embodiment of figure 1 according to the invention comprises a spoiler or "air deflector" 9 which is made in one piece with the rubber wiper blade 2 and which extends along the entire length thereof.

Although not shown in figure 1, but fully understood by a skilled person, said oscillating arm 7 is connected to a mounting head fixed for rotation to a shaft driven by a small motor. In use, the shaft rotates alternately in a clockwise and in a counter-clockwise sense carrying the mounting head into rotation also, which in turn draws said oscillating arm 7 into rotation and by means of said connecting device 6 moves said wiper blade 2.

Figures 3 and 4 show in perspective and in a top view (in cross-section) the working principle of the mutual fixation of the wiper blade 2 and the longitudinal strip 4 at the location of the connecting device 6 according to the first preferred embodiment. As mentioned earlier, this connecting device 6 has a U-shaped cross-section with legs 10 and a base 11. At least one of said legs 10, as shown in figure 4, is provided with a sidewardly and inwardly extending protrusion 12. Said longitudinal strip 4, as shown in figure 3, is provided along an exterior edge 13 thereof with a recess 14 cooperating with said corresponding protrusion 12 on the connecting device 6. Consequently, when said connecting device 6 is mounted onto said wiper blade 2, that is when said legs 10 are clamped around rubber of said wiper blade 2, the rubber of said wiper blade 2 is slightly deformed in the shape of a C at the location where the legs 10 engage the rubber. In said mounted position said wiper blade 2 and said longitudinal strip 4 are mutually fixated by said legs 10 at the location of the interconnection of said connecting device 6 and said wiper blade 2, whereas in said mounted position said wiper blade 2 is allowed to move in longitudinal direction relative to said longitudinal strip 4 outside the location of the interconnection of said connecting device 6 and said wiper blade 2. The protrusion 12 does not enter the correspondingly shaped recess 14, but locally force the rubber inside said recess 14, thereby forming said C-shape. The retention of the wiper blade 2 additionally may also be the result of friction between legs 10 or the connecting device 6 and the rubber of the wiper blade 2.

Figures 5 and 6 correspond to figures 3 and 4, respectively, wherein corresponding parts have been designated with the

same reference numerals. More in particular, said figures 5 and 6 show in perspective and in a top view (in cross-section) the working principle of the mutual fixation of the wiper blade 2 and the longitudinal strip 4 at the location of the connecting device 6 according to the second preferred embodiment. Like the connecting device 6 of the first embodiment, also this connecting device 6 has a U-shaped cross-section with legs 10 and a base 11. At least one of said legs 10 comprises two sidewardly and inwardly extending protrusions 15, while said longitudinal strip 4 is provided along an exterior edge 13 thereof with at least one sidewardly and outwardly extending protrusion 16 cooperating with a corresponding recess 17, as formed between said protrusions 15 on the connecting device 6. In other words, said recess 17 formed by between said protrusions 15 on one of said legs 10 of the connecting device 6 accommodates said protrusion 16 on the longitudinal strip 4. As can be seen from figure 5, said protrusion 16 on the longitudinal strip 4 is particularly plateau-like in the sense that it is made through a stamping operation in order to accurately control the shape of said protrusion 16. As depicted in figure 6, said protrusion 15,16 are slightly deforming said wiper blade (2) in the form of a S at the location of the recess 17. Consequently, said leg 10 having the protrusions 15 is slightly deforming the rubber of said wiper blade 2 at the location where the leg 10 engages the rubber. In the mounted position of the connecting device 6, said wiper blade 2 and said longitudinal strip 4 are mutually fixated by said legs 19 at the location of the interconnection of said connecting device 6 and said wiper blade 2, whereas in said mounted position said wiper blade 2 is allowed to move in longitudinal direction relative to said longitudinal strip 4 outside the location of the interconnection of said

connecting device 6 and said wiper blade 2. Again, the retention of the wiper blade 2 additionally may also be the result of friction between legs 10 or the connecting device 6 and the rubber of the wiper blade 2.

As can be seen in figure 1 and 2, the joint part 8 comprises a resilient tongue 18 extending outwardly, while the oscillating arm 7 has an U-shaped cross-section at the location of its connection to said joint part 8, so that the tongue 18 engages in an identically shaped hole 19 provided in a base of said U-shaped cross-section. The connecting device 6 with the wiper blade 2 is mounted onto the oscillating arm 7 as follows. The joint part 8 being already clipped onto the connecting device 6 is pivoted relative to the connecting device 6, so that said joint part 8 can be easily slided on a free end of the oscillating arm 7. During this sliding movement the resilient tongue 18 is initially pushed in against a spring force and then allowed to spring back into said hole 19, thus snapping, that is clipping the resilient tongue 18 into the hole 19. This is a so-called bayonet-connection. The oscillating arm 7 together with the joint part 8 may then be pivoted back in a position parallel to the wiper blade 2 in order to be ready for use. By subsequently pushing in again said resilient tongue 18 against the spring force (as if it were a push button), the connecting device 6 and the joint part 8 together with the wiper blade 2 may be released from the oscillating arm 7. Dismounting the connecting device 6 with the wiper blade 2 from the oscillating arm 7 is thus realized by sliding the connecting device 6 and the joint part 8 together with the wiper blade 2 in a direction away from the oscillating arm 7.

The invention is not restricted to the variants shown in the drawing, but it also extends to other preferred embodiments that fall within the scope of the appended claims. For example, a skilled person will understand, without any inventive labor, that both opposite exterior edges 13 of the longitudinal strip 4 could each comprise a recess 14, so that both legs 10 of the connecting device 6 each could be equipped with corresponding protrusions 12 extending sidewardly and inwardly (first preferred embodiment). Likewise, both opposite exterior edges 13 of the longitudinal strip 4 could each comprise a sidewardly and outwardly extending protrusion 16, so that both legs 10 of the connecting device 6 each could be equipped with corresponding protrusions 15 forming recesses 17 extending sidewardly and inwardly (second preferred embodiment).

CLAIMS

1. A windscreen wiper device (1) comprising an elastic, elongated carrier element, as well as an elongated wiper blade (2) of a flexible material, which can be placed in abutment with a windscreen to be wiped, which wiper blade (2) includes at least one longitudinal groove (3), in which groove (3) at least one longitudinal strip (4) of the carrier element is disposed, which windscreen wiper device (1) comprises a connecting device (6) for an oscillating arm (7), wherein said oscillating arm (7) is pivotally connected to said connecting device (6) about a pivot axis near one end thereof, with the interposition of a joint part (8), wherein said wiper blade (2) comprises a spoiler (9) at a side thereof facing away from the windscreen to be wiped, **characterized in that** said wiper blade (2) and said longitudinal strip (4) are mutually fixated by mutually cooperating protrusion/recess means of said longitudinal strip (4) and said connecting device (6) at the location of the interconnection of said connecting device (6) and said wiper blade (2), and wherein said wiper blade (2) is allowed to move in longitudinal direction relative to said longitudinal strip (4) outside the location of the interconnection of said connecting device (6) and said wiper blade (2).

2. A windscreen wiper device (1) according to claim 1, wherein said connecting device (6) is slightly deforming said wiper blade (2) at the location of the interconnection of said connecting device (6) and said wiper blade (2).

3. A windscreen wiper device (1) according to claim 1 or 2, wherein said longitudinal strip (4) is provided along an exterior edge (13) thereof with at least one recess (14) cooperating with a corresponding, sidewardly and inwardly extending protrusion (12) on the connecting device (6), and wherein said protrusion (12) is not entering into said recess (14).

4. A windscreen wiper device (1) according to claim 3, wherein said protrusion (12) is slightly deforming said wiper blade (2) in the form of a C at the location of the recess (14).

5. A windscreen wiper device (1) according to claim 1 or 2, wherein said longitudinal strip (4) is provided along an exterior edge (13) thereof with at least one sidewardly and outwardly extending protrusion (16) cooperating with a corresponding recess (17) on the connecting device (6).

6. A windscreen wiper device (1) according to claim 5, wherein said recess (17) on the connecting device (6) is formed between two sidewardly and inwardly extending protrusions (15) on the connecting device (6).

7. A windscreen wiper device (1) according claim 5 or 6, wherein said protrusions (15,16) are slightly deforming said wiper blade (2) in the form of a S at the location of the recess (17).

8. A windscreen wiper device (1) according to any of the preceding claims 1 through 7, wherein said joint part (8) is detachably connected to said connecting device

(6) by engaging protrusions of said connecting device (6), at the location of said pivot axis, in recesses provided in said joint part (8).

9. A windscreen wiper device (1) according to claim 8, wherein said joint part (8) has an at least substantially U-shaped cross-section at the location of its connection to said connecting device (6), and wherein said joint part (8) is provided with a recess provided coaxially with said pivot axis.

10. A windscreen wiper device (1) according to claim 8 or 9, wherein the protrusions extend outwards on either side of said connecting device (6).

11. A windscreen wiper device (1) according to 8, 9 or 10, wherein said protrusions are provided with co-axial through holes.

12. A windscreen wiper device (1) according to 8, 9 or 10,wherein said joint part (8) comprises at least one resilient tongue (18) engaging in a correspondingly shaped hole (19) provided in a base of a U-shaped cross-sectionof said oscillating arm (7), and wherein said resilient tongue (18) is rotatable along a hinge axis between an outward position retaining said wiper blade (2) onto said oscillating arm (7) and an inward position releasing said wiper blade (2) from said oscillating arm (7).

13. An elongated wiper blade (2) of a flexible material, which can be placed in abutment with a windscreen to be wiped, which wiper blade (2) includes at least one

longitudinal groove (3), in which groove (3) at least one longitudinal strip (4) of a carrier element is disposed, which wiper blade (2) comprises a connecting device (6) for pivotally connecting an oscillating arm (7) to said connecting device (6) about a pivot axis near one end thereof, with the interposition of a joint part (8), wherein said wiper blade (2) comprises a spoiler (9) at a side thereof facing away from the windscreen to be wiped, **characterized in that** said wiper blade (2) and said longitudinal strip (4) are mutually fixated by mutually cooperating protrusion/recess means of said longitudinal strip (4) and said connecting device (6)at the location of the interconnection of said connecting device (6) and said wiper blade (2), and wherein said wiper blade (2) is allowed to move in longitudinal direction relative to said longitudinal strip (4) outside the location of the interconnection of said connecting device (6) and said wiper blade (2).

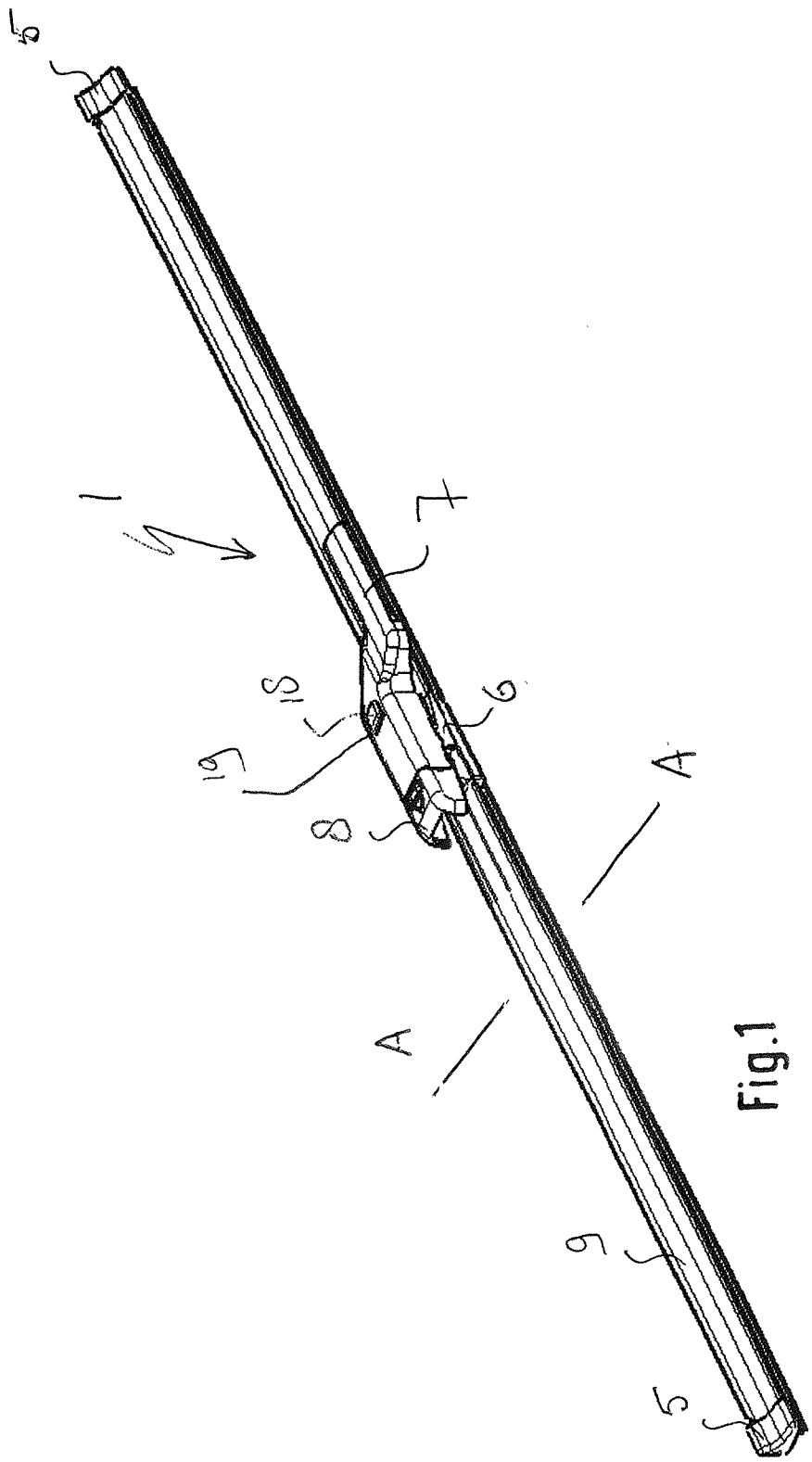

Fig.1

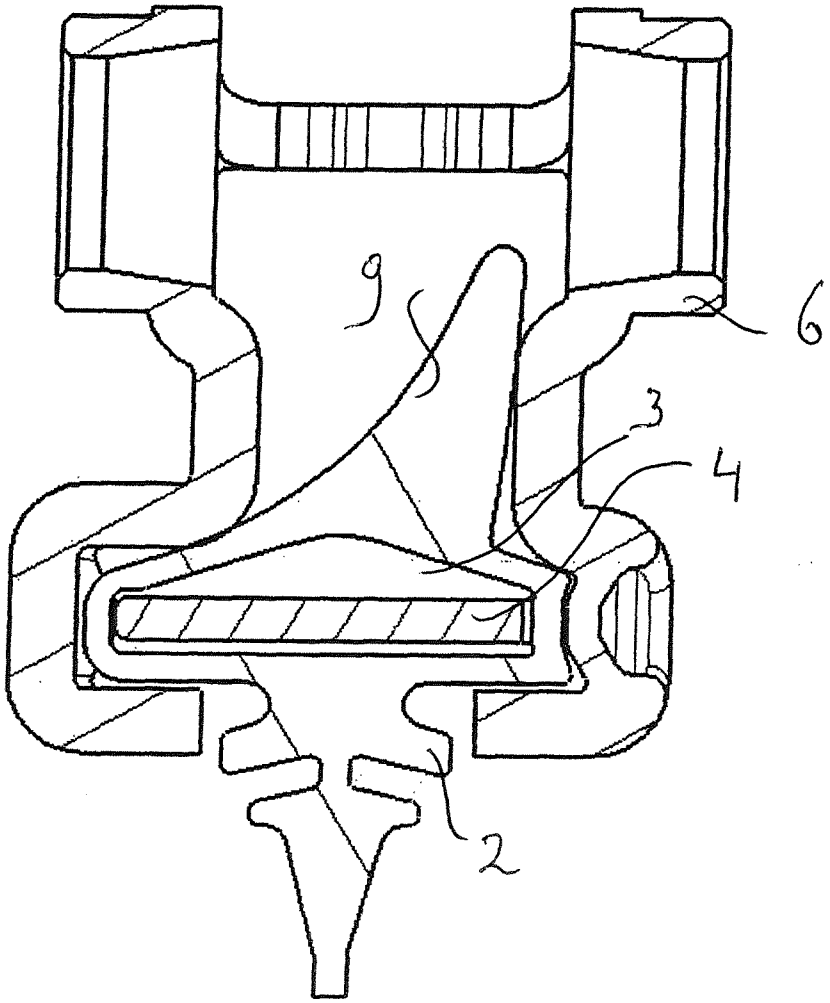

Fig.2

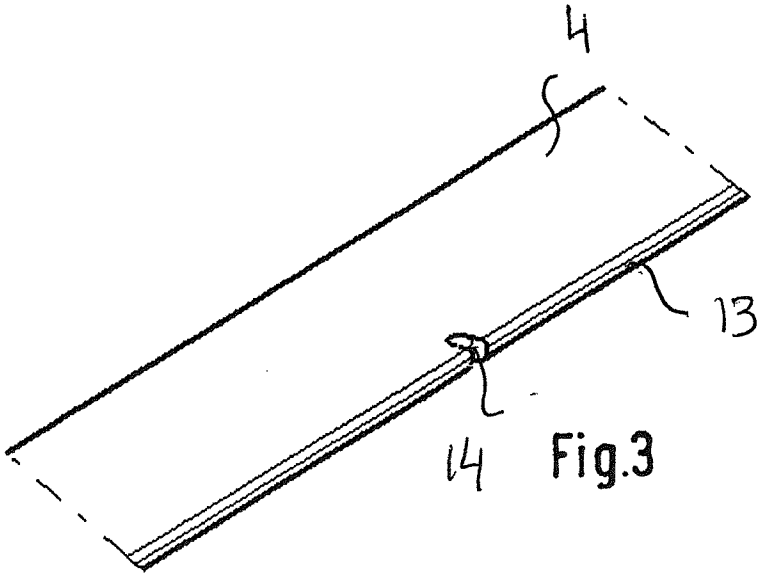

Fig.3

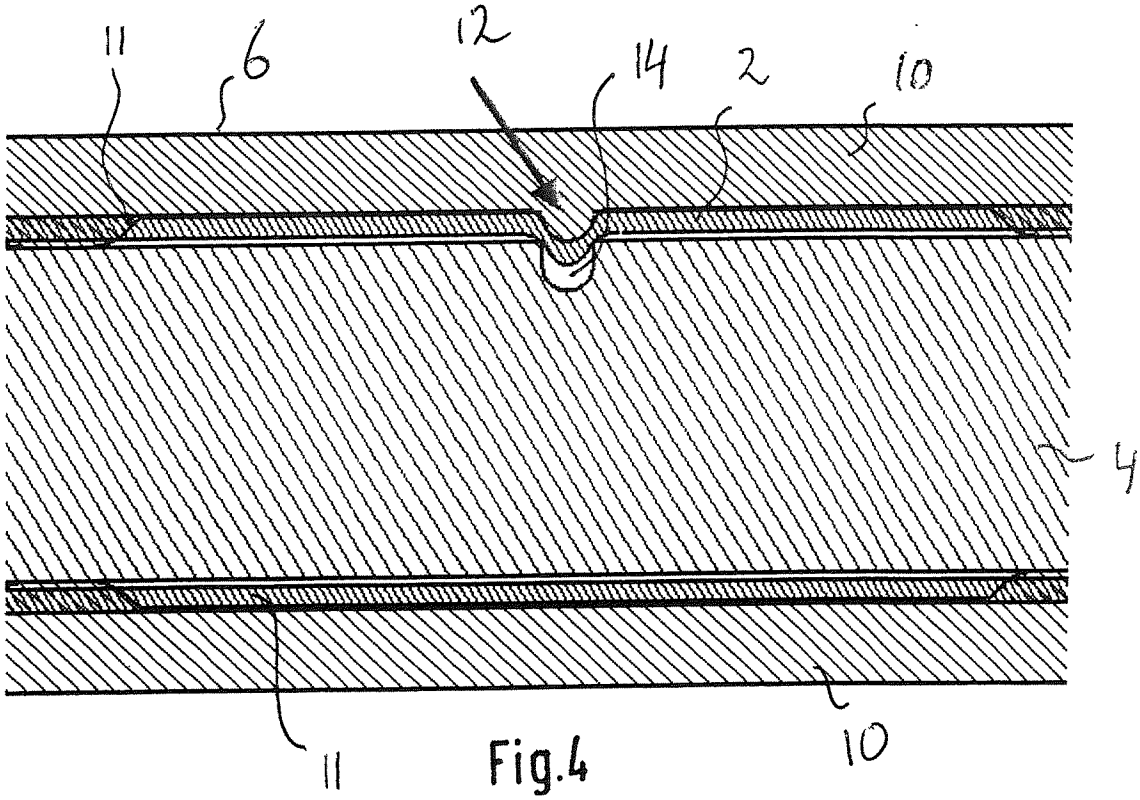

Fig.4

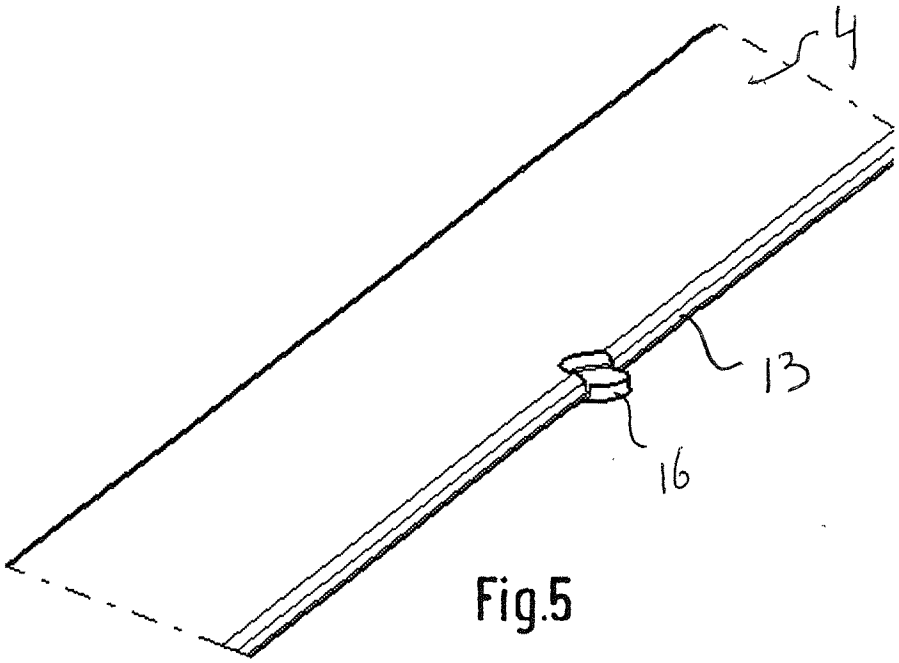

Fig.5

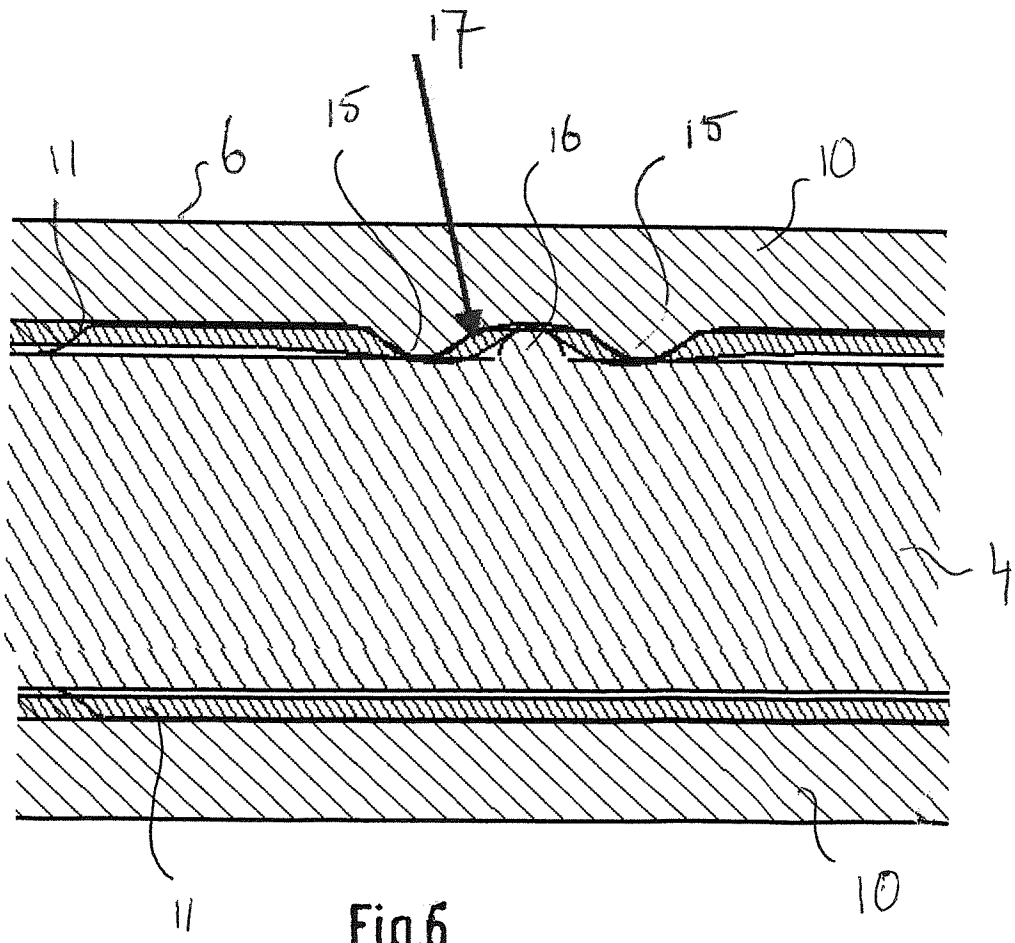

Fig.6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/064561

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60S1/38 B60S1/40
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)
B60S

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2007/113366 A1 (WALWORTH VAN T [US] ET AL) 24 May 2007 (2007-05-24) page 3, paragraphs 78-79,85; figures A1-A3, E5, E6	1-7,13 8-12
Y	EP 1 876 073 A1 (FEDERAL MOGUL SA [BE]) 9 January 2008 (2008-01-09) figures	8-12
X	FR 2 868 376 A1 (VALEO SYSTEMES ESSUYAGE [FR]) 7 October 2005 (2005-10-07) page 6, line 4 - page 8, line 30; figures 1-3	1-7,13
E	EP 2 236 366 A1 (FEDERAL MOGUL SA [BE]) 6 October 2010 (2010-10-06) figures 8,9	1-13

-/--

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

[X] 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

"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
17 June 2011	29/06/2011

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, Fax: (+31-70) 340-3016	Blandin, Béatrice

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/064561

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 005 532 A (AGUIARI O) 25 April 1979 (1979-04-25) page 1, lines 107-111; figures -----	1,13
X	DE 202 20 355 U1 (BOSCH GMBH ROBERT [DE]) 1 April 2004 (2004-04-01) the whole document -----	1,13

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2010/064561

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007113366 A1	24-05-2007	BR PI0614127 A2	09-03-2011
		DE 112006002002 T5	26-06-2008
		GB 2441946 A	19-03-2008
		JP 2009502633 T	29-01-2009
		KR 20080042800 A	15-05-2008
		WO 2007014395 A2	01-02-2007
EP 1876073 A1	09-01-2008	CN 101535099 A	16-09-2009
		WO 2008003633 A1	10-01-2008
		ES 2332665 T3	10-02-2010
		JP 2009541134 T	26-11-2009
		US 2010011528 A1	21-01-2010
FR 2868376 A1	07-10-2005	AT 402847 T	15-08-2008
		BR PI0509609 A	18-09-2007
		CA 2561372 A1	17-11-2005
		CN 1950242 A	18-04-2007
		EP 1744940 A1	24-01-2007
		WO 2005108176 A1	17-11-2005
		ES 2311977 T3	16-02-2009
		HK 1105928 A1	27-08-2010
		JP 4681603 B2	11-05-2011
		JP 2007531663 T	08-11-2007
		KR 20060133055 A	22-12-2006
		RU 2359850 C2	27-06-2009
		US 2009056049 A1	05-03-2009
EP 2236366 A1	06-10-2010	WO 2010112579 A1	07-10-2010
GB 2005532 A	25-04-1979	DE 2843164 A1	19-04-1979
		FR 2405845 A1	11-05-1979
		IT 1091440 B	06-07-1985
DE 20220355 U1	01-04-2004	WO 2004045927 A1	03-06-2004
		EP 1562804 A1	17-08-2005
		EP 2039571 A1	25-03-2009