



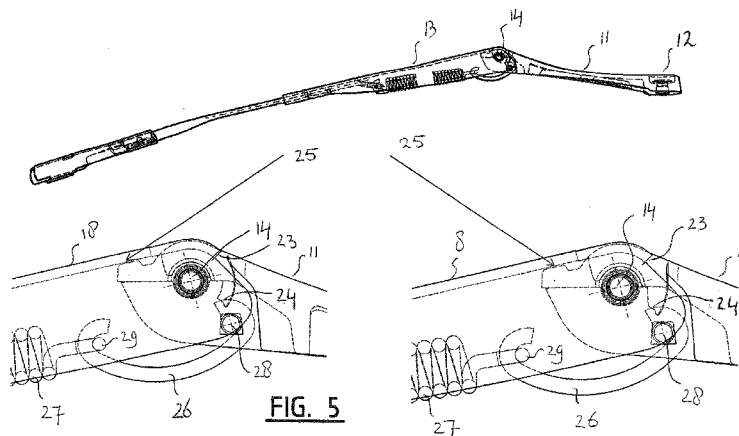
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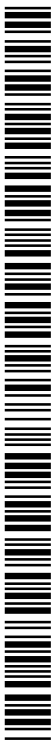
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(54) **Title:** A WINDSCREEN WIPER ARM AND METHOD FOR PRODUCING THE SAME



(57) **Abstract:** A windscreen wiper arm (8), particularly for automobiles, comprising a mounting head (11) mountable on a drive shaft (12) and an arm member (13) pivotally connected to the mounting head (11) by means of a pivot pin (14), wherein the arm member (13) has a substantially U-shaped cross-section near said pivot pin (14) comprising two side walls (16, 17), wherein a part of the mounting head (11) extends between the side walls (16, 17) and beyond said pivot pin (14), wherein said part is provided with opposite abutting surfaces (20,21) for abutting against the side walls (16, 17) of the arm member (13), wherein means are provided on said mounting head (11) and said arm member (13) for limiting a pivot angle of the arm member (13), wherein said means comprise at least one guiding groove (22) on one of said abutting surfaces (20, 21) of said part of said mounting head (11), as well as at least one outwardly extending finger (19) on said arm member (13) cooperating with said guiding groove (22), wherein said finger (19) is movable in said guiding groove (22) between a first position corresponding with a wiping position of the arm member (13) and a second position corresponding with a mounting position of the arm member (13), and wherein said finger (19) extends outwardly from a base (18) of the U-shaped cross-section of said arm member (13) in a direction towards said drive shaft (12).



A WINDSCREEN WIPER ARM AND METHOD FOR PRODUCING THE SAME

5 The present invention relates to a windscreen wiper arm,
particularly for automobiles, comprising a mounting head
mountable on a drive shaft and an arm member pivotally
connected to the mounting head by means of a pivot pin,
wherein the arm member has a substantially U-shaped cross-
10 section near said pivot pin comprising two side walls,
wherein a part of the mounting head extends between the side
walls and beyond said pivot pin, wherein said part is
provided with opposite abutting surfaces for abutting
against the side walls of the arm member, wherein means are
15 provided on said mounting head and said arm member for
limiting a pivot angle of the arm member.

Such a windscreen wiper arm is known from European patent
publication no. 1 095 830. The wiper arm described therein
20 has an arm part and a so-called fastener part with
connecting joint, and a stop unit to limit a relative
movement. The stop unit consists of two stops at a distance
to each other, and a stop element. The stop element is moved
into contact with the stops during relative movement of arm
25 part and/or fastener part. The stops are formed integral
with arm or fastener part, and the stop element is integral
with the other of the two components.

A disadvantage of the windscreen wiper arm known from the
30 above European patent publication is that, due to the fact
that many cars have their own specifications as to a maximum
pivot angle referred to above, for those cars a specific
windscreen wiper arm and mounting head has to be designed

and manufactured. Obviously, this needs complex machinery, tools, with all the expenses involved.

It is an object of the invention to obviate this
5 disadvantage, in the sense that at minimum costs - without using complex machinery and additional tools - windscreen wiper arms with mutually minimum modifications are proposed, which can be mounted on different cars. It is noted that the present invention is not restricted to cars, but also refers
10 to rail coaches and other (fast) vehicles.

Thereto, according to the invention a windshield wiper arm mentioned in the preamble is characterized in that said means comprise at least one guiding groove on one of said
15 abutting surfaces of said part of said mounting head, as well as at least one outwardly extending finger on said arm member cooperating with said guiding groove, wherein said finger is movable in said guiding groove between a first position corresponding with a wiping position of the arm
20 member and a second position corresponding with a mounting position of the arm member, and wherein said finger extends outwardly from a base of the U-shaped cross-section of said arm member in a direction towards said drive shaft. This enables to mount windscreen wiper arms mutually only
25 differing in the sense that only the shape (particularly the effective length) of the groove is modified by using a small modification in the respective mould, on every type of car, if necessary.

30 Said finger is in one piece with said U-shaped arm member and directs in a direction towards said mounting head, i.e. away from a windscreen wiper blade to be attached to the arm member. Said finger is allowed to slide inside said groove

between said first and second positions. In the second position or "service position" of said arm member (that is a mounting, cleaning and/or repair position, wherein said arm member is in an upright position relative to said mounting head) a free end of said finger abuts against an end wall of said groove, whereas in the first position or "work position" of said arm member (that is a wiping position, wherein said arm member extends parallel to a windscreen to be wiped) said free end of said finger is spaced-apart from said end wall of said groove. Said free end of said finger and said end wall of said groove each form a stop surface avoiding that in the second position the arm member is allowed to be pivoted beyond a predetermined angle with respect to the mounting head. As both stop surfaces are part of rigid elements of the windscreen wiper arm, namely the rigid arm member and the rigid mounting head, respectively, both stop surfaces are relatively large and strong and thus very effective. Further, no extra tool step in manufacturing the U-shaped arm member is now needed, whereas no extra raw material is now used.

In a preferred embodiment of a windscreen wiper device in accordance with the invention said finger is curved. Particularly, said finger is curved near its free end. Preferably, said guiding groove is curved as well. More preferably, said finger and said guiding groove are correspondingly shaped, as far as their curvatures are concerned.

In another preferred embodiment of a windscreen wiper device according to the invention, in a wiping position of the arm member, one of the side walls of the arm member covers said groove from the outside. Particularly, in order to ensure

that the arm member and thus the wiper blade connected thereto is pressed onto a windscreen to be wiped, a hook-shaped bracket connected to a spring is hooked with its first end on a pin on the mounting head and with its second end onto a part of the arm member, wherein both the pivot pin and the pin on the mounting head are located above said hook-shaped element, that is on one side thereof above a central axis of said spring (line 30), shown in figure 7. Said pivot pin is located on the other side of said line 30. Consequently, the groove is not visible from the outside. Further, dust and/or ice is prevented to enter the groove, so that an efficient and reliable articulation between said arm member and said mounting head is maintained at all times. Instead of or in addition thereto said groove is at least partly open at its bottom, so that dust and/or ice may leave said groove.

In another preferred embodiment of a windscreen wiper device in accordance with the invention said groove extends along a part of a circle. Said finger may have a similar shape, so that also said finger extends along a part of a circle.

In another preferred embodiment of a windscreen wiper device according to the invention said means comprise two guiding grooves on each abutting surface of said part of said mounting head, as well as two outwardly extending fingers on said arm member each cooperating with a guiding groove. Particularly, said fingers have a mutually corresponding shape and each extend outwardly from a base of the U-shaped cross-section of said arm member in a direction towards said drive shaft. Said fingers are thus spaced-apart. Preferably, said fingers are in one piece with said U-shaped arm member. More in particular, said fingers are located near

longitudinal edges of said base of the U-shape cross-section of said arm member.

In another preferred embodiment of a windscreen wiper device in accordance with the invention the arm member is made of a metal, such as steel. Preferably, the mounting head is made of aluminium. In the alternative, both the arm member and the mounting head are made of a plastic material.

10 The invention refers also to a mounting head and/or an arm member as defined in a windscreen wiper arm according to the invention.

The invention also relates to a windscreen wiper device comprising a windscreen wiper arm in accordance with the invention. Particularly, said windscreen wiper device comprises 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 a longitudinal strip of the carrier element is disposed, wherein ends of said longitudinal strip are connected with a respective connecting piece, which windscreen wiper device comprises a connecting device for the windscreen wiper arm in accordance with the invention. Such a windscreen wiper device is thus designed as a "yokeless" wiper device or "flat blade", wherein use is no longer made of several yokes pivotally connected to each other, but wherein the wiper blade is biased by the carrier element, as a result of which it exhibits a specific curvature. The present windscreen wiper arm may comprise a pivot pin on one side thereof, which is inserted sideways into a through hole of the connecting device. It is noted

that the present invention is not restricted to such a "flat blade", although being advantageous therein, but also extends to other types of windscreen wiper devices, such as the ones with yokes as referred to above.

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Finally, the invention also refers to a method for manufacturing a windscreen wiper arm, particularly for automobiles, comprising a mounting head mountable on a drive shaft and an arm member pivotally connected to the mounting head by means of a pivot pin, wherein the arm member has a substantially U-shaped cross-section near said pivot pin comprising two side walls, wherein a part of the mounting head extends between the side walls and beyond said pivot pin, wherein said part is provided with opposite abutting surfaces for abutting against the side walls of the arm member, wherein means are provided on said mounting head and said arm member for limiting a pivot angle of the arm member, characterized in that said means are provided with at least one guiding groove on one of said abutting surfaces of said part of said mounting head, as well as with at least one outwardly extending finger on said arm member cooperating with said guiding groove, wherein said finger is movable in said groove between a first position corresponding with a wiping position of the arm member and a second position corresponding with a mounting position of the arm member, and wherein said finger extends outwardly from a base of the U-shaped cross-section of said arm member in a direction towards said drive shaft.

30 The invention will now be explained in more 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 equipped with a windscreen wiper arm according to the invention, wherein the windscreen wiper arm is in a wiping position;

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- Figure 2 shows a detail of the windscreen wiper device of Figure 1;

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- Figure 3 is a perspective, schematic view of a standard arm member and an arm member used in the windscreen wiper arm shown in figure 1, respectively;

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- Figure 4 is a perspective, schematic view, as well as a cross-sectional view of two preferred embodiments of a mounting head according to the invention;

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- Figure 5 shows cross-sectional views of an interconnection of an arm member and a mounting head of two preferred embodiments of a windscreen wiper arm according to the invention in a "rest position"; and

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- Figures 6 and 7 correspond to figure 5, but now referring to a "working position" and a "service position" of the windscreen wiper arm.

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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, in the longitudinal sides of which opposing longitudinal grooves 3 are formed, and of longitudinal strips 4 made of spring band steel, which are fitted in said longitudinal grooves 3. Said strips 4 form a flexible carrier element for the rubber wiper blade 2, as it were, which is thus biased

in a curved position (the curvature in operative position being that of a windscreen to be wiped). Neighbouring ends 5 of strips 4 are interconnected on either side of the windscreen wiper device 1 by means of connecting pieces 6 or 5 "end caps". The windscreen wiper device 1 is further equipped with a connecting device 7 for an oscillating arm 8, and a spoiler 9.

Figure 2 shows a free end of the windscreen wiper device 1 10 of figure 1. Corresponding parts have been designated with the same reference numerals. As can be seen from figure 2, the connecting piece 6 is provided with an opening 10 in order to allow a relative movement of the wiper blade 2 along the strips 4 inside the connecting piece 6, so that 15 said connecting piece 6 does not block the wiper blade 2 during use. The connecting pieces 6 or "end caps" are made of one piece of plastic.

As illustrated in figure 1, the windscreen wiper arm 8 20 according to the invention comprises a aluminium mounting head 11 which can be fixed for rotation to a shaft 12 driven, via a mechanism not illustrated, by a small motor. Said windscreen wiper arm 8 further comprises a steel arm member 13 supported by the mounting head 18, wherein said 25 arm member 13 in turn supports the wiper blade 2 with the help of the connecting device 7. The arm member 13 is pivotally connected to the mounting head 11 by means of a pivot pin 14. In use, the shaft 12 rotates alternately in a clockwise and in a counter-clockwise sense carrying the 30 mounting head 11 into rotation also, which in turn draws the arm member 13 into rotation and by means of the connecting device 7 moves the wiper blade 2.

As illustrated in figure 3, a standard arm member 13 on the left and an arm member 13 according to the invention on the right each have a substantially U-shaped cross-section near said pivot pin 14 (inserted through co-axial openings 15 thereof) comprising two side walls 16,17 and a base 18.

5 According to the invention said arm member 13 (on the right in figure 3) comprises in one piece therewith two outwardly extending fingers 19 having a mutually corresponding shape and each extend outwardly from said base 18 of the U-shaped cross-section of said arm member 13 in a direction towards
10 said drive shaft 12. As depicted, said fingers 19 are spaced-apart and are located near longitudinal edges of said base 18 of the U-shape cross-section of said arm member 13. The function of said fingers 19 will be explained hereunder.

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With reference to figures 1 through 4, a part of the mounting head 11 extends between the side walls 16,17 of the arm member 13 and beyond said pivot pin 14. Said part is provided with opposite abutting surfaces 20,21 for abutting
20 against the side walls 16,17. Each abutting surface 20,21 of said part of said mounting head 11 is provided with a curved guiding groove 22. According to a first preferred embodiment of the invention said guiding groove 22 (on the left and on the right at the top in figure 4) has a shape of a part of a
25 circle, for example a half of a circle. In a second preferred embodiment of the invention said guiding groove 22 (on the left and on the right at the bottom in figure 4) extends along a straight line. The two outwardly extending fingers 19 (being somewhat curved near their free ends) on
30 said arm member 13 each cooperate with a guiding groove 22 on opposite sides of the mounting head 11. In other words, said fingers 19 are allowed to slide inside said grooves 22 between a "service position" (that is a mounting, cleaning

and/or repair position, for example) and a "working position" (that is a wiping position, see figure 1) of the oscillating arm 8, as will be explained in detail further with the help of figures 6 and 7. In the "service position" (figure 7) a free end 23 ("extremity") of each finger 19 abuts against an end wall 24 ("extremity") of a corresponding groove 22, whereas in the "working position" (figure 6) said free ends 23 of said fingers 19 are spaced-apart from said end walls 24 of said grooves 22. Said free ends 23 of said fingers 19 and said end walls 24 of said grooves 22 form stop surfaces avoiding that in the "service position" the arm member 19 is allowed to be pivoted beyond a predetermined angle with respect to the mounting head 11. Said first preferred embodiment is shown on the left at the bottom of figures 6 and 7, whereas said second preferred embodiment is shown on the right at the bottom of figures 6 and 7.

With reference to figure 5 said part of the mounting head 11 extends between the side walls 16,17 of the arm member 13 and beyond said pivot pin 14 is provided on its upper side with a blockage 25 acting as a stop surface to the base 18 of the U-shaped arm member 13 in a "rest position", that is in unmounted position.

As shown in figures 5 and 6, a hook-shaped bracket 26 connected to a spring 27 is hooked with its first end on a pin 28 on the mounting head 11 and with its second end onto a part 29 of the arm member 13 in order to ensure that the arm member 13 and thus the wiper blade 2 connected thereto is pressed onto a windscreen to be wiped. Both the pivot pin 14 and the pin 28 are located above said hook-shaped element 26, so that side walls 16,17 of the arm member 13 cover said

grooves 22 from the outside in all positions of the arm member 13 relative to the mounting head 11. Consequently, the grooves 22 are not visible from the outside. Further, dust and/or ice is prevented to enter the grooves 22, so
5 that an efficient and reliable articulation between said arm member 13 and said mounting head 11 is maintained at all times.

As shown in figure 7, in the "service position" of the arm member 13, said stop surfaces 23,24 are located at the other
10 side of a central axis 30 of the spring 27 than the pivot pin or rivet 14.

The invention is not restricted to the embodiment shown, but
15 extends also to other embodiments falling within the scope of the appended claims.

CLAIMS

1. A windscreen wiper arm (8), particularly for automobiles, comprising a mounting head (11) mountable
5 on a drive shaft (12) and an arm member (13) pivotally connected to the mounting head (18) by means of a pivot pin (14), wherein the arm member (13) has a substantially U-shaped cross-section near said pivot pin (14) comprising two side walls (16,17), wherein a part
10 of the mounting head (11) extends between the side walls (16,17) and beyond said pivot pin (14), wherein said part is provided with opposite abutting surfaces (20,21) for abutting against the side walls (16,17) of the arm member (13), wherein means are provided on said mounting
15 head (11) and said arm member (13) for limiting a pivot angle of the arm member (13), characterized in that said means comprise at least one guiding groove (22) on one of said abutting surfaces (20,21) of said part of said mounting head (11), as well as at least one outwardly
20 extending finger (19) on said arm member (13) cooperating with said guiding groove (22), wherein said finger (19) is movable in said guiding groove (22) between a first position corresponding with a wiping position of the arm member (13) and a second
25 position corresponding with a mounting position of the arm member (13), and wherein said finger (19) extends outwardly from a base (18) of the U-shaped cross-section of said arm member (13) in a direction towards said drive shaft (12).
- 30
2. A windscreen wiper arm (8) according to claim 1, wherein in a wiping position of the arm member (13) one of the side walls (16,17) of the arm member (13) covers said

guiding groove (22) from the outside, wherein in a mounting position of the arm member (13), a free end of said finger (13) and an end wall (24) of said guiding groove (22) are located on one side of a line (30) through a central axis of a spring (27), and wherein said pivot pin (14) is located on the other side thereof.

3. A windscreen wiper arm (8) according to claim 1 or 2, wherein said finger (19) is curved.
4. A windscreen wiper arm (8) according to claim 1, 2 or 3, wherein said guiding groove (22) is curved.
5. A windscreen wiper arm (8) according to claim 4, wherein said guiding groove (22) extends along a part of a circle.
6. A windscreen wiper arm (8) according to any of the preceding claims 1 through 5, wherein said means comprise two guiding grooves (22) on each abutting surface (20,21) of said part of said mounting head (11), as well as two outwardly extending fingers (19) on said arm member (13) each cooperating with a guiding groove (22).
7. A windscreen wiper arm (8) according to any of the preceding claims 1 through 6, wherein the arm member (13) is made of a metal, such as steel.
8. A mounting head (11) and/or an arm member (13) as defined in a windscreen wiper arm (8) according to any of the preceding claims 1 through 7.

9. A windscreen wiper device (1) comprising a windscreen wiper arm (8) according to any of the preceding claims 1 through 7.

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10. A windscreen wiper device (1) according to claim 9, wherein it comprises 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) a longitudinal strip (4) of the carrier element is disposed, wherein ends (5) of said longitudinal strip (4) are connected with a respective connecting piece (6), which windscreen wiper device (1) comprises a connecting device (7) for the windscreen wiper arm (8) according to any of the preceding claims 1 through 7.

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11. Method for manufacturing a windscreen wiper arm (8), particularly for automobiles, comprising a mounting head (11) mountable on a drive shaft (12) and an arm member (13) pivotally connected to the mounting head (11) by means of a pivot pin (14), wherein the arm member (13) has a substantially U-shaped cross-section near said pivot pin (14) comprising two side walls (16,17), wherein a part of the mounting head (11) extends between the side walls (16,17) and beyond said pivot pin (14), wherein said part is provided with opposite abutting surfaces (20,21) for abutting against the side walls (16,17) of the arm member (13), wherein means are provided on said mounting head (11) and said arm member (13) for limiting a pivot angle of the arm member (13), characterized in that said means are provided with at

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least one guiding groove (22) on one of said abutting surfaces (20,21) of said part of said mounting head (11), as well as with at least one outwardly extending finger (19) on said arm member (13) cooperating with said guiding groove (22), wherein said finger (19) is movable in said groove (22) between a first position corresponding with a wiping position of the arm member (13) and a second position corresponding with a mounting position of the arm member (13), and wherein said finger (19) extends outwardly from a base (18) of the U-shaped cross-section of said arm member (13) in a direction towards said drive shaft (12).

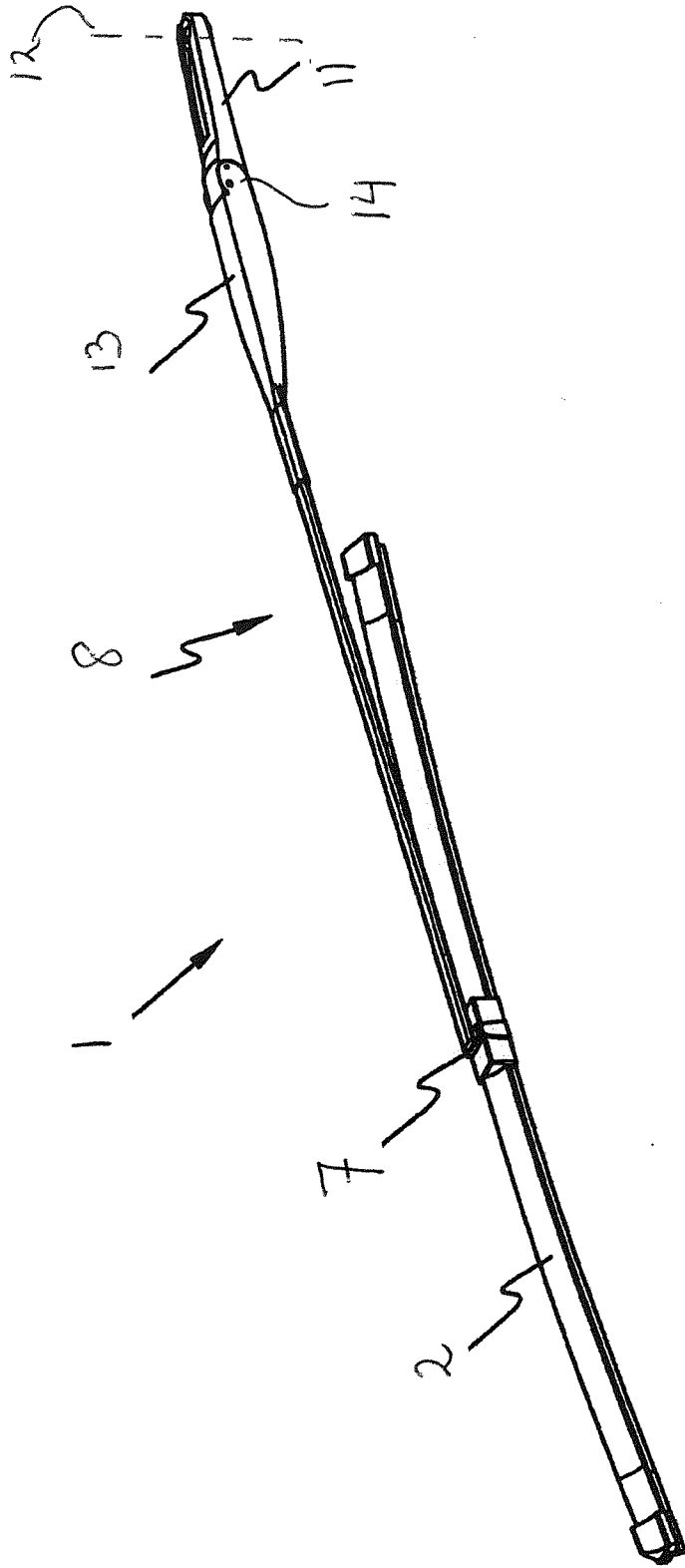


FIG. 1

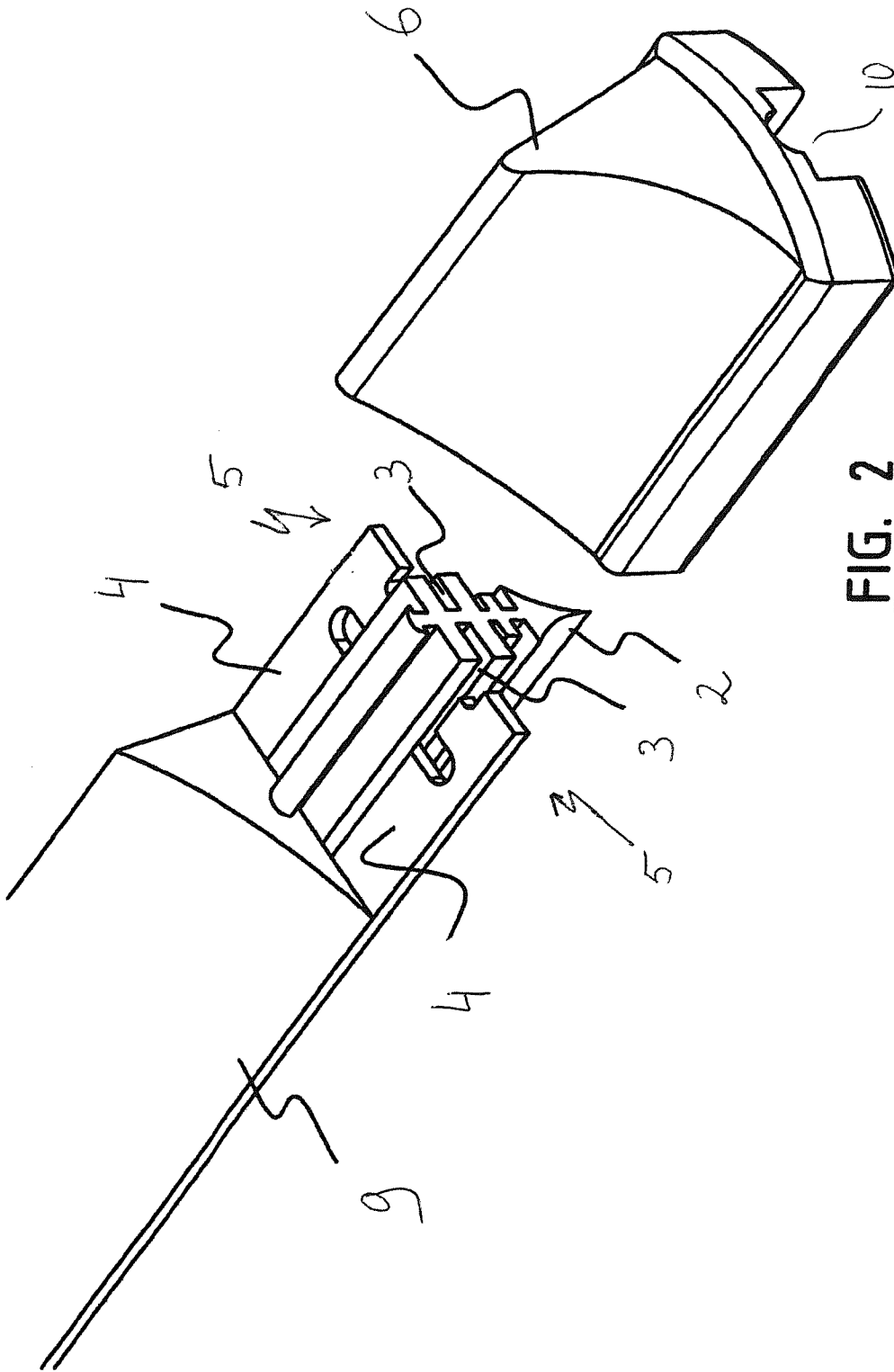


FIG. 2

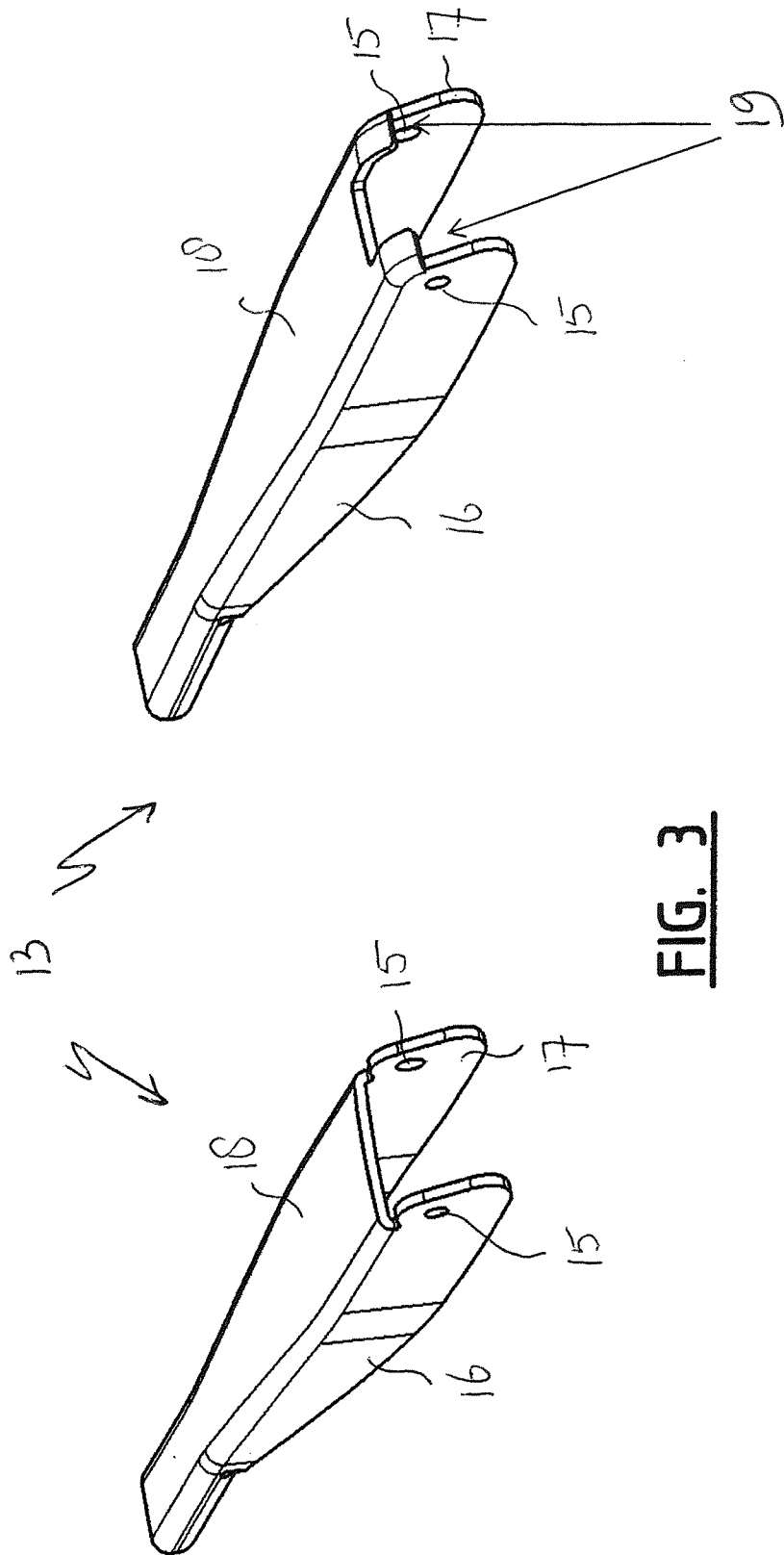


FIG. 3

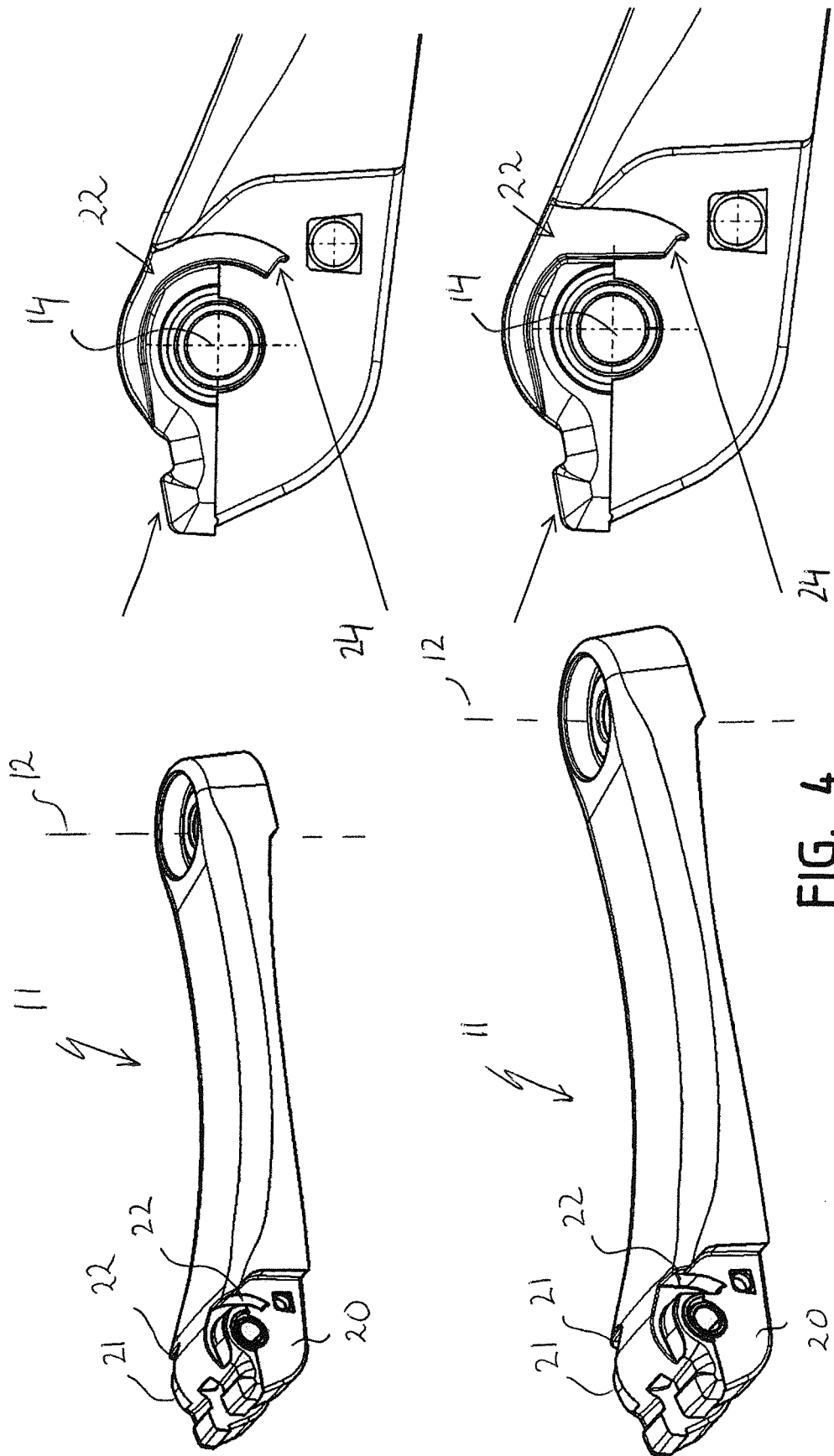


FIG. 4

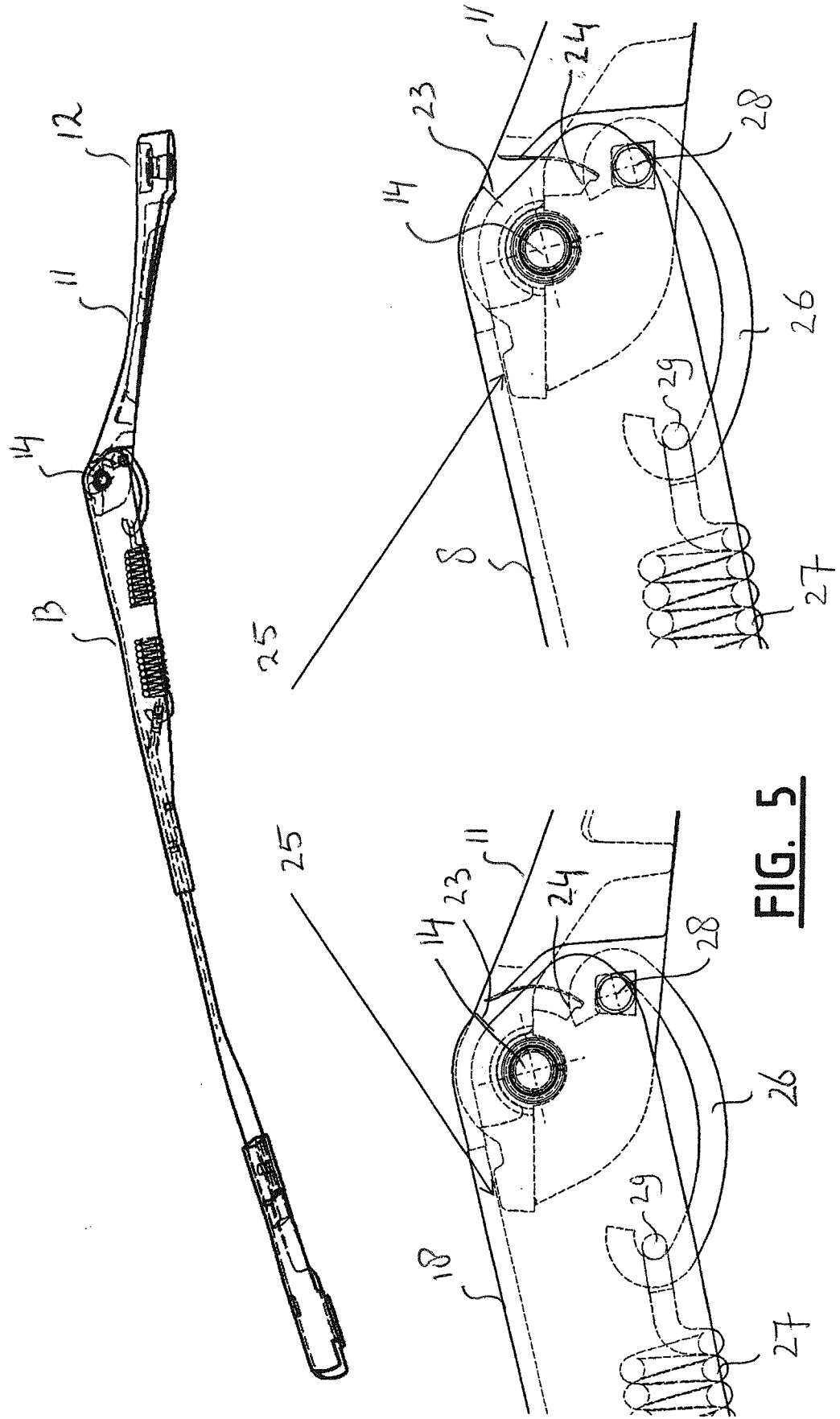


FIG. 5

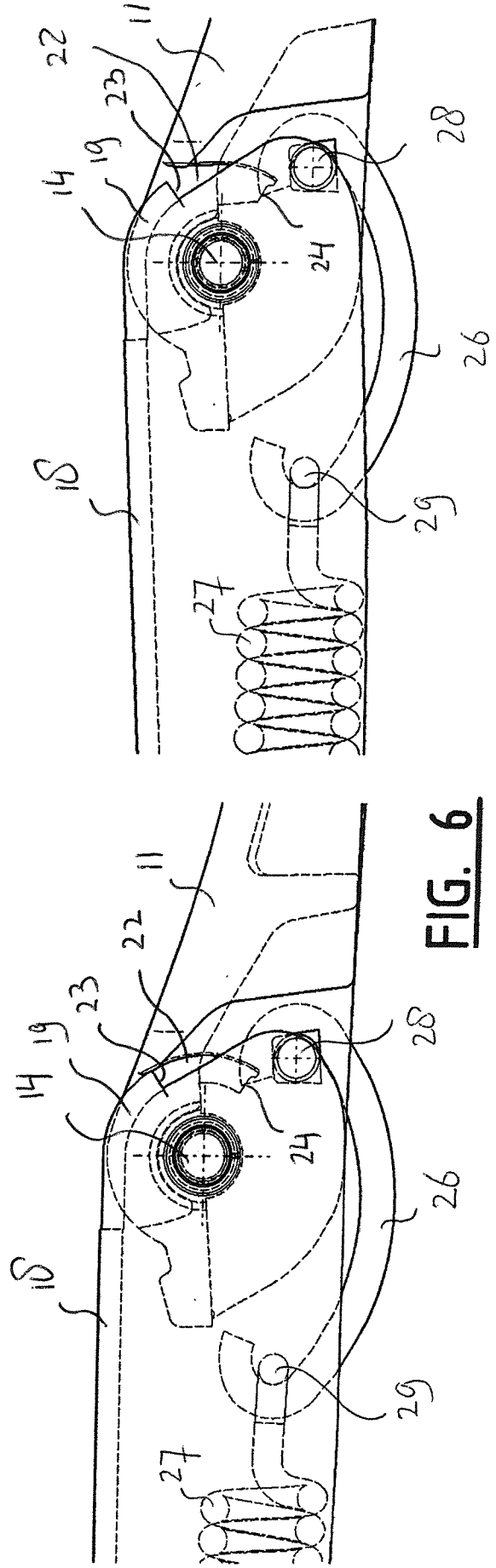
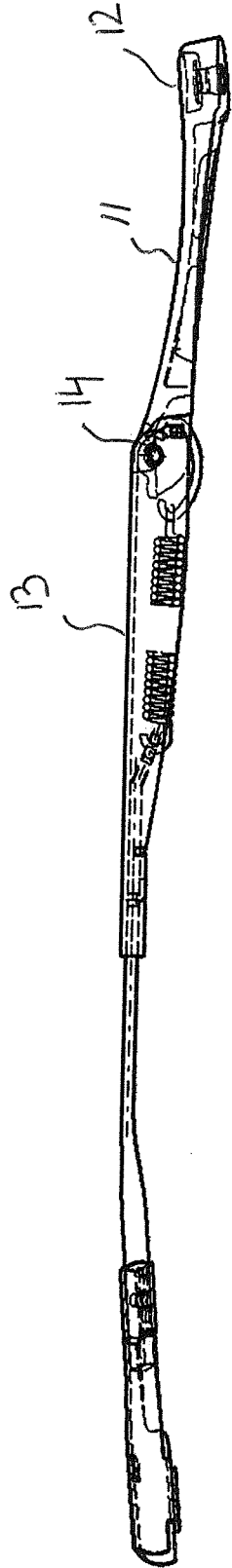


FIG. 6

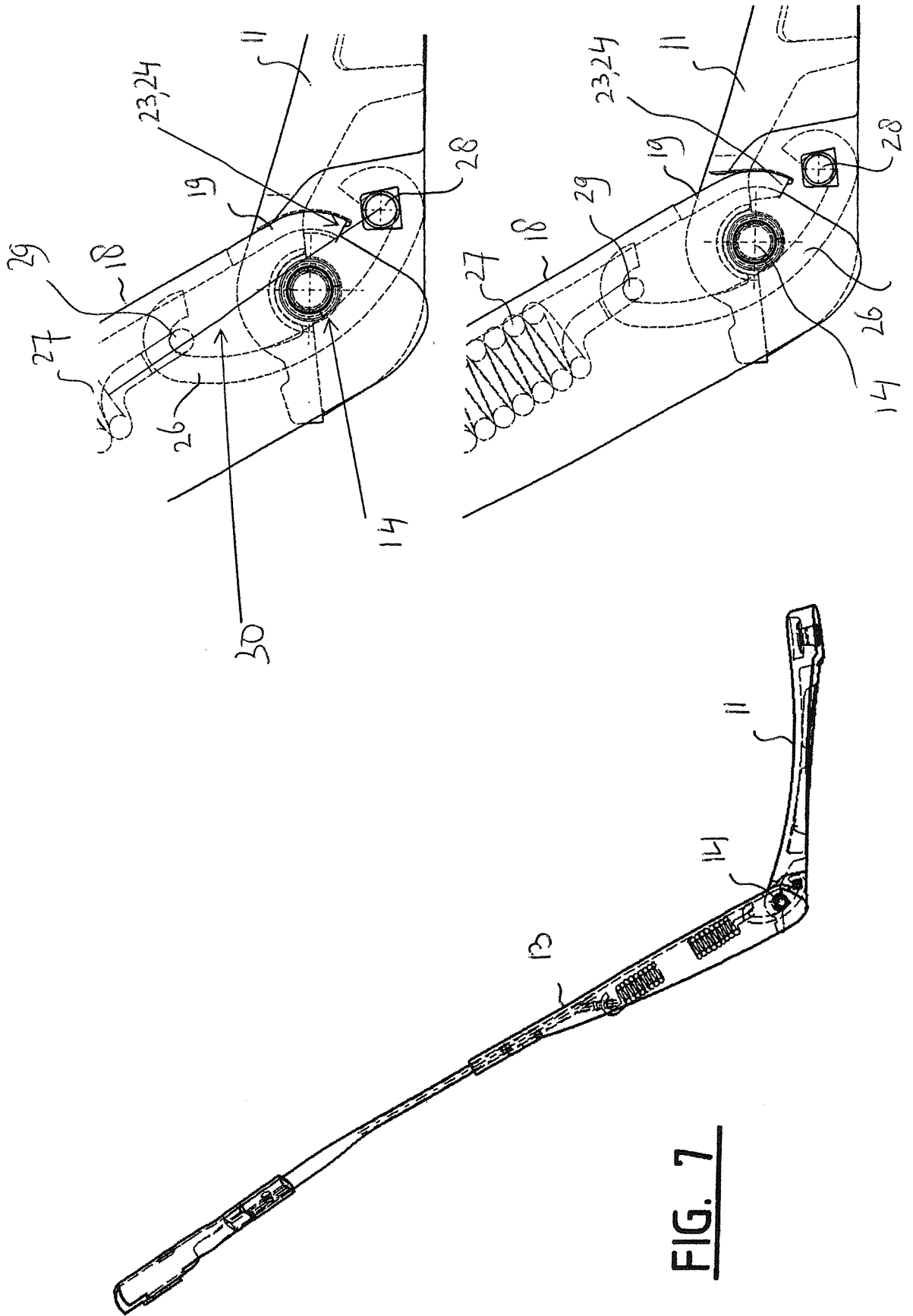


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/056356

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60S1/34
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 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.
A	JP 2009 269442 A (ICHIKOH INDUSTRIES LTD) 19 November 2009 (2009-11-19) abstract; figures -----	1-11
A	US 2 838 782 A (WALLIS CYRIL T) 17 June 1958 (1958-06-17) column 2, line 15 - column 3, line 30; figures -----	1-11
A	EP 1 095 830 A2 (BOSCH GMBH ROBERT [DE]) 2 May 2001 (2001-05-02) cited in the application paragraph [0020] - paragraph [0029]; figures -----	1-11
A	US 2002/178527 A1 (HEINRICH LAURENT [FR] ET AL) 5 December 2002 (2002-12-05) paragraph [0013] - paragraph [0017]; figures -----	1-11

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
- "E" earlier application or patent but published on or after the international filing date
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- "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 31 October 2012	Date of mailing of the international search report 21/11/2012
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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 Sangiorgi, Massimo
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/EP2012/056356

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2009269442 A	19-11-2009	JP 4985538 B2 JP 2009269442 A	25-07-2012 19-11-2009

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