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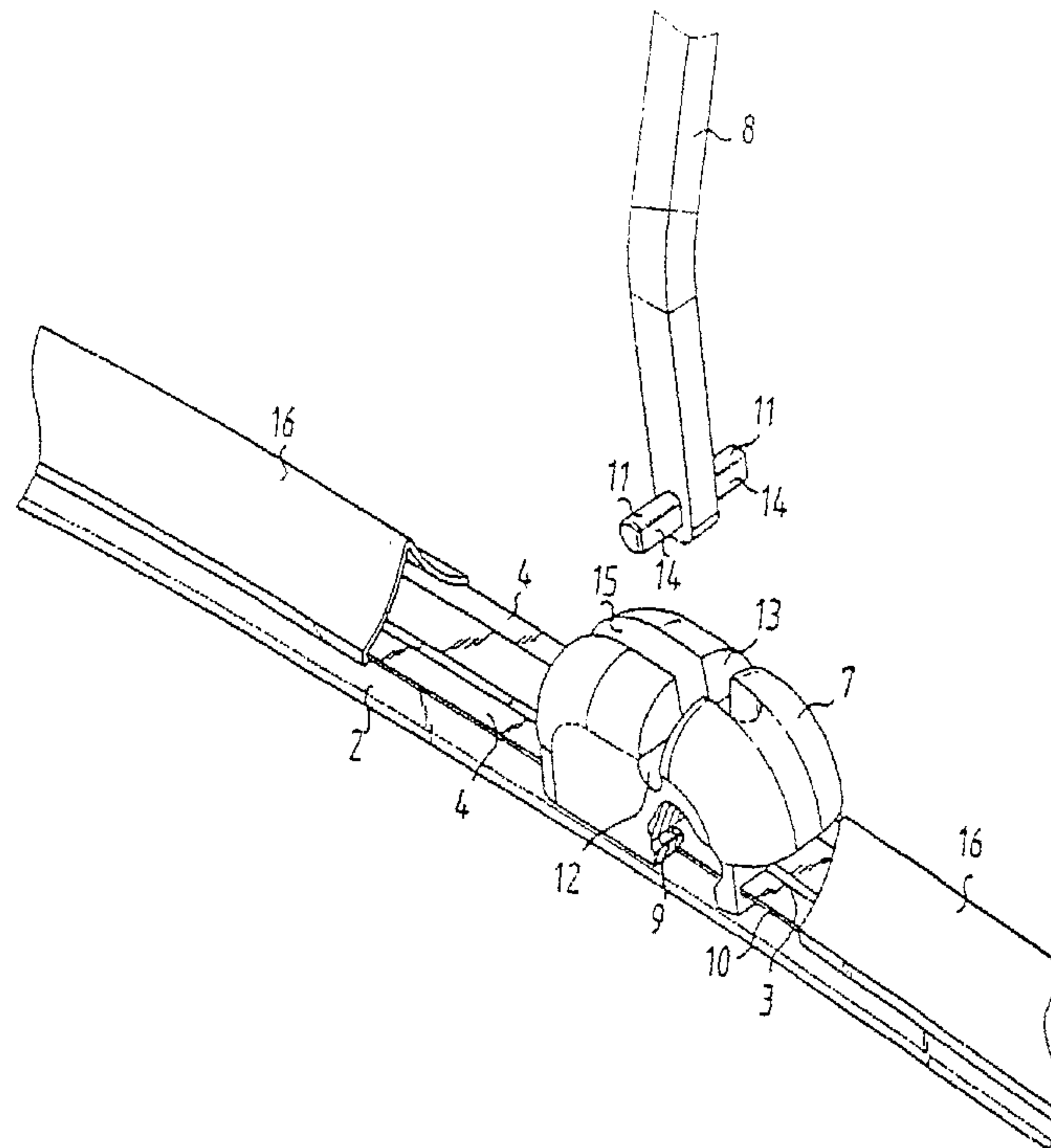
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(54) Title: WINDSCREEN WIPER DEVICE



(57) **Abrégé/Abstract:**

A windscreen wiper device (4) 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 (1) includes opposing longitudinal grooves (3) on its longitudinal sides, in which grooves spaced-apart longitudinal strips (4) of the carrier element are disposed, wherein neighbouring ends of said longitudinal strips (4) are interconnected by a respective connecting piece (6), which windscreen wiper device (1) comprises a connecting device (7) for an oscillating wiper arm (8), wherein said oscillating arm (8) is pivotally connected to said connecting device (7) about a pivot axis near one end, a special feature of which is that the end of the oscillating wiper arm (8) includes two at least substantially cylindrical protrusions (11), which form bearing surfaces, at the location of the pivot axis, which protrusions extend in lateral direction with respect to the oscillating wiper arm.



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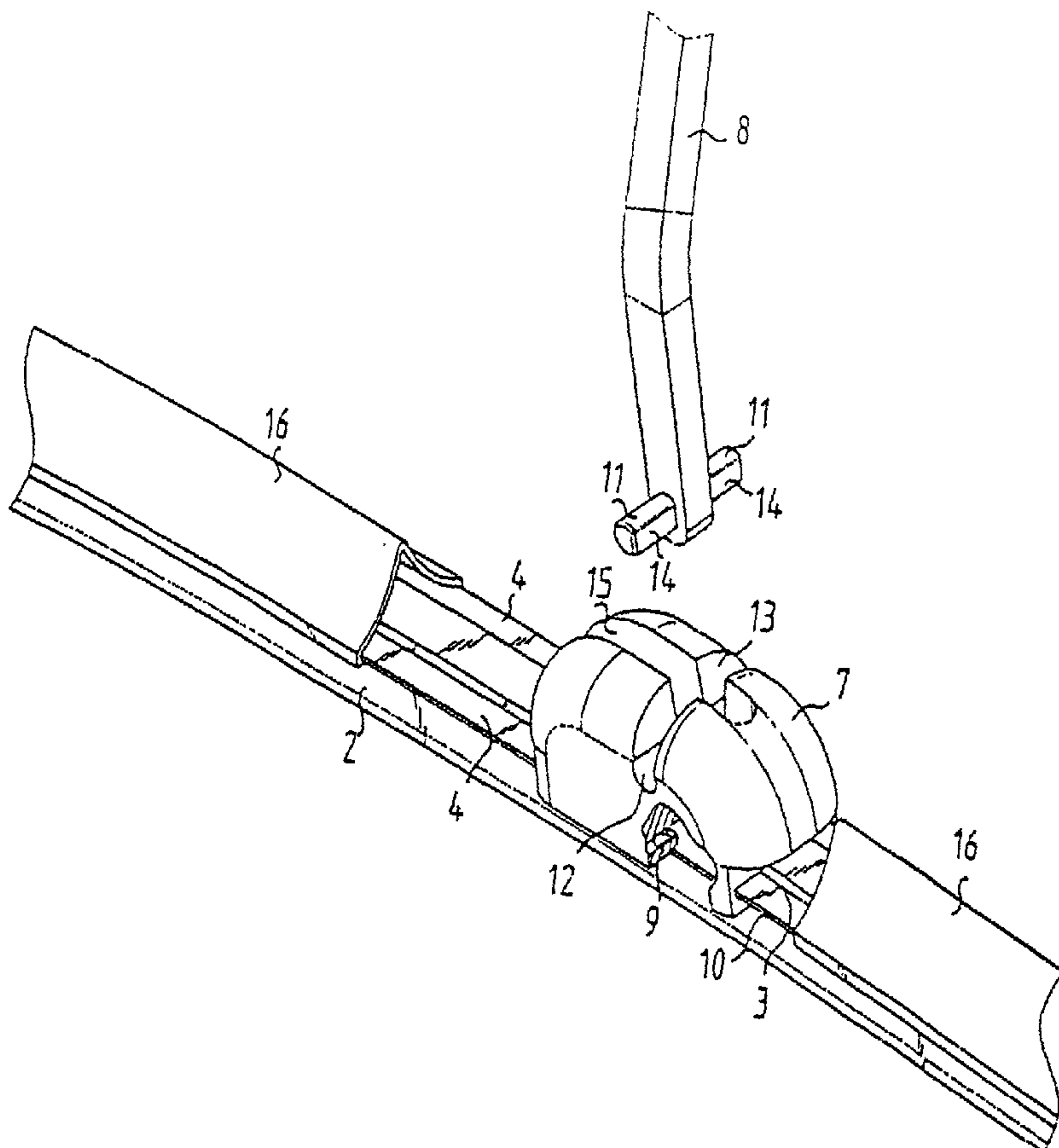
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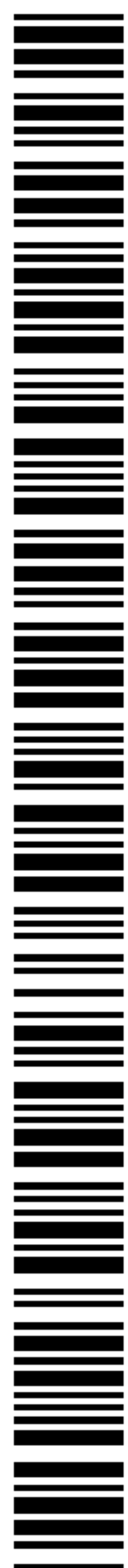
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(54) Title: WINDSCREEN WIPER DEVICE



(57) Abstract: A windscreen wiper device (4) 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 (1) includes opposing longitudinal grooves (3) on its longitudinal sides, in which grooves spaced-apart longitudinal strips (4) of the carrier element are disposed, wherein neighbouring ends of said longitudinal strips (4) are interconnected by a respective connecting piece (6), which windscreen wiper device (1) comprises a connecting device (7) for an oscillating wiper arm (8), wherein said oscillating arm (8) is pivotally connected to said connecting device (7) about a pivot axis near one end, a special feature of which is that the end of the oscillating wiper arm (8) includes two at least substantially cylindrical protrusions (11), which form bearing surfaces, at the location of the pivot axis, which protrusions extend in lateral direction with respect to the oscillating wiper arm.



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WINDSCREEN WIPER DEVICE

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The 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 opposing longitudinal grooves on its longitudinal sides, in which grooves spaced-apart longitudinal strips of the carrier element are disposed, wherein neighbouring ends of said longitudinal strips are interconnected by a respective connecting piece, which windscreen wiper device comprises a connecting device for an oscillating wiper arm, wherein said oscillating arm is pivotally connected to said connecting device about a pivot axis near one end.

Such a windscreen wiper device is generally known. The prior art windscreen wiper device is in particular designed as a "yokeless" wiper device, 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 oscillating arm of the prior art windscreen wiper device comprises a projecting pin on one side thereof, which is inserted sideways into a through hole of the connecting device.

One drawback of the prior art windscreen wiper device is the fact that in practice the forces (torques) that are exerted on the connection between the connecting device and the oscillating arm appear to be relatively high, as a result of which the reliability of said connection appears to diminish with the passage of time. In

addition, said forces (torques) will be extra high if (as is the case with the prior art windscreen wiper device) the pin of the oscillating arm, which projects in one direction, is inserted into the through hole of the connecting device at a high point relative to the wiper blade.

The object of the invention is to overcome the drawbacks of the prior art as indicated above, in particular to provide a windscreen wiper device wherein the oscillating wiper and the connecting device are interconnected in a durable, solid manner.

In order to accomplish that objective, a windscreen wiper device of the kind referred to in the introduction is characterized in that the end of the oscillating wiper arm includes two at least substantially cylindrical protrusions, which form bearing surfaces, at the location of the pivot axis, which protrusions extend in lateral direction with respect to the oscillating wiper arm. As a result, the two protrusions that function as bearing surfaces are spaced far apart, so that the forces that are exerted on said bearing surfaces will be relatively low. In particular, the protrusions can be pivotally fitted in correspondingly shaped recesses in the connecting device.

In one preferred embodiment of a windscreen wiper device according to the invention, the protrusions can be snapped into said recesses.

In another preferred embodiment of a windscreen wiper device according to the invention, the protrusions are dimensioned such that they can be passed through insertion openings of the recesses from an at least substantially perpendicular position of the oscillating arm with respect to the wiper blade, and be locked in

position in said recesses from an at least substantially parallel position of the oscillating wiper arm with respect to the wiper blade. This makes it possible to move, in particular pivot, the oscillating wiper arm from a mounting position (that is, a (vertical) position perpendicularly to the wiper blade or the plane of a windscreen to be wiped) to an operative position (that is, a (horizontal) position parallel to the wiper blade or the plane of a windscreen to be wiped). In the mounting position, the protrusions can be freely inserted into the insertion openings of the recesses and subsequently be mounted in said recesses, whilst in the operative position the protrusions are locked in position in said recesses, so that they cannot move out of said recesses via the insertion openings.

In another preferred embodiment of a windscreen wiper device according to the invention, the connecting device includes a guide groove for the oscillating wiper arm. Since the oscillating wiper arm is at least partially disposed in said guide groove in the aforesaid operative position, the oscillating wiper arm comprises additional capability of withstanding relatively high torques in that position.

In another preferred embodiment of a windscreen wiper device according to the invention, said connecting pieces are clamping members, which form separate constructional elements. In particular, said connecting pieces are form-locked ("positive locking" or "having positive fit") or force-locked to the adjacent ends of the longitudinal strips.

In another preferred embodiment of a windscreen wiper device according to the invention, said connecting pieces are in one piece with said longitudinal strips.

In another preferred embodiment of a windscreen wiper device according to the invention, at least said longitudinal strips are made of spring band material, preferably steel.

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In another preferred embodiment of a windscreen wiper device according to the invention, said connecting device comprises clamping members, which engage round longitudinal sides of said longitudinal strips that face away from each other. In particular, said connecting device and said clamping members are made in one piece.

The invention furthermore relates to a method for manufacturing a windscreen wiper device according to the invention, wherein opposing longitudinal grooves are formed in the longitudinal sides of an elongated wiper blade of a flexible material, which can be placed in abutment with a windscreen to be wiped, in which grooves longitudinal strips of a carrier element are subsequently fitted in spaced-apart relationship, wherein neighbouring ends of said longitudinal strips are interconnected by a respective connecting piece, wherein an oscillating arm is pivotally connected to a connecting device of the windscreen wiper device about a pivot axis near one end thereof, characterized in that the end of the oscillating wiper arm is fitted with two at least substantially cylindrical protrusions, which form bearing surfaces, at the location of the pivot axis, which protrusions extend in lateral direction with respect to the oscillating wiper arm.

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

- 35 - Figure 1 is a perspective, schematic view of a preferred embodiment of a windscreen wiper device according to the invention;

- Figures 2 and 3 show details of the windscreen wiper device of Figure 1, wherein various successive steps for fitting an oscillating wiper arm to a connecting device of the windscreen wiper device of Figure 1.

Figures 1, 2 and 3 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 functioning as clamping members. In this embodiment, the connecting pieces 6 are separate constructional elements, which may be form-locked ("positive locking" or "having positive fit") as well as force-locked to the ends 5 of strips 4. In another preferred variant, said connecting pieces 6 are in one piece with the strips 4 made of spring band steel. In the latter case said connecting pieces form transverse bridges for the strips 4, as it were.

The windscreen wiper device 1 is furthermore built up of a connecting device 7 of plastic material for an oscillating wiper arm 8. Connecting device 7 comprises clamping members 9 that are integral therewith, which engage round longitudinal sides 10 of the strips 4 that face away from each other, as a result of which the connecting device 7 is firmly attached to the unit consisting of wiper blade 2 and strips 4. The

oscillating wiper arm 8 is pivotally connected to the connecting device 7 about a pivot axis near one end, and that in the following manner. The end of oscillating wiper arm 8 includes two at least substantially
5 cylindrical protrusions 11, which form bearing surfaces, at the location of the pivot axis. Said protrusions 11 can be readily inserted into correspondingly shaped recesses 12 in the connecting device 7 from a vertical position of the oscillating wiper arm 8. This can take
10 place freely from said vertical position, because the width of said protrusions 11 is smaller than that of the insertion openings 13 of the recesses 12 in that position: it so happens that both protrusions 11 have a flat guide surface 14 (Figure 2). Then the oscillating
15 wiper arm 8 is pivoted through 90 degrees about the pivot axis, from its vertical position to a horizontal position (Figure 3). In the horizontal position of the oscillating wiper arm 8, the width of said protrusions 11 is smaller than the width of the insertion openings
20 13 of recesses 12, so that the oscillating wiper arm 8 is locked with respect to the connecting device 7 in that position (Figure 3). Figures 2 and 3 clearly show that the connecting device 7 includes a longitudinal guide groove or guide slot 15, in which the end of the
25 oscillating wiper arm 8 rests in its horizontal position. In another preferred variant, the protrusions 11 can be snapped, that is, clipped into said recesses. Possibly, a spoiler 16 is furthermore provided.

30 In order to prevent the occurrence of wear on protrusions 11, said protrusions are preferably each fitted with a joint part or spacer of a wear-resistant plastic material, which surrounds said protrusions, so that the pivoting movement of connecting device 7 and
35 oscillating wiper arm 8 with respect to each other takes place substantially without friction. Such a joint part is not necessarily mounted entirely around said

protrusions: only these parts of said protrusions that during use make mechanical contact with (parts of) the connecting device 7 are surrounded by a joint part. When using joint parts said protrusions 11 may have an
5 entirely round form (i.e. without a guide surface), seen in cross-section. Preferably, the end of the oscillating arm 8 that rests in the guide groove 15 is also surrounded by a joint part or spacer of a wear-resistant plastic material.

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The invention is not restricted to the variants as shown in the drawing, but it also extends to other embodiments that fall within the scope of the appended claims.

Annex to letter dated 18 June 2003 to the European Patent
Office concerning international (PCT-) patent application no.
PCT/EP02/04941 in the name of Federal-Mogul S.A. -
"Windscreen wiper device"

EPO - DG 1

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AMENDED MAIN CLAIM AUXILIARY REQUEST

19.06.2003

(102)

1. A windscreen wiper device (1) comprising an elastic,
elongated carrier element, as well as an elongated wiper
10 blade (2) of a flexible material, which can be placed in
abutment with a windscreen to be wiped, which wiper blade
(2) includes opposing longitudinal grooves (3) on its
longitudinal sides, in which grooves spaced-apart
longitudinal strips (4) of the carrier element are
15 disposed, wherein neighbouring ends of said longitudinal
strips (4) are interconnected by a respective connecting
piece (6), which windscreen wiper device (1) comprises a
connecting device (7) for an oscillating wiper arm (8),
wherein said oscillating arm is pivotally connected to
20 said connecting device (7) about a pivot axis near one
end, characterized in that the end of the oscillating
wiper arm (8) includes two at least substantially
cylindrical protrusions (11), which form bearing
surfaces, at the location of the pivot pin, which
25 protrusions extend in lateral direction with respect to
the oscillating wiper arm (8) and are spaced far apart,
so that forces exerted on said bearing surfaces will be
relatively low.

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 opposing longitudinal grooves (3) on its longitudinal sides, in which grooves spaced-apart longitudinal strips (4) of the carrier element are disposed, wherein neighbouring ends of said longitudinal strips (4) are interconnected by a respective connecting piece (6), which windscreen wiper device (1) comprises a connecting device (7) for an oscillating wiper arm (8), wherein said oscillating arm is pivotally connected to said connecting device (7) about a pivot axis near one end, characterized in that the end of the oscillating wiper arm (8) includes two at least substantially cylindrical protrusions (11), which form bearing surfaces, at the location of the pivot pin, which protrusions extend in lateral direction with respect to the oscillating wiper arm (8).
2. A windscreen wiper device according to claim 1, wherein said protrusions (11) can be pivotally mounted in correspondingly shaped recesses (12) in the connecting device (7).
3. A windscreen wiper device according to claim 2, wherein said protrusions (11) can be snapped into said recesses (12).
4. A windscreen wiper device according to claim 2, wherein said protrusions (11) are dimensioned such that they can be passed through insertion openings (13) of the recesses (12) from an at least

substantially perpendicular position of the oscillating arm (8) with respect to the wiper blade (2), and be locked in position in said recesses (12) from an at least substantially parallel position of the oscillating wiper arm (8) with respect to the wiper blade (2).

5. A windscreen wiper device according to any one of the preceding claims 1 - 4, wherein said connecting device (7) includes a guide groove for the oscillating wiper arm (8).

6. A windscreen wiper device according to any one of the preceding claims 1 - 5, wherein said connecting pieces (6) are clamping members, which form separate constructional elements.

7. A windscreen wiper device according to claim 6, wherein said connecting pieces (6) are form-locked or force-locked to the adjacent ends of said longitudinal strips (4).

8. A windscreen wiper device according to any one of the preceding claims 1 - 5, wherein said connecting pieces (6) are in one piece with said longitudinal strips (4).

9. A windscreen wiper device according to any one of the preceding claims 1 - 8, wherein at least said longitudinal strips (4) are made of spring band material.

10. A windscreen wiper device according to any one of the preceding claims 1 - 9, wherein said connecting device (7) comprises clamping members, which engage round longitudinal sides (10) of said longitudinal strips (4) that face away from each other.

11. A windscreen wiper device according to claim 10, wherein said connecting device (7) and said clamping members (9) are made in one piece.
- 5 12. A method for manufacturing a windscreen wiper device according to any one of the preceding claims 1 - 11, wherein opposing longitudinal grooves (3) are formed in the longitudinal sides of an elongated wiper blade (2) of a flexible material, which can be placed in abutment with a windscreen to be wiped, in which grooves longitudinal strips (4) of a carrier element are subsequently fitted in spaced-apart relationship, wherein neighbouring ends of said longitudinal strips (4) are interconnected by a respective connecting piece (6), wherein an oscillating arm (8) is pivotally connected to a connecting device (7) of the windscreen wiper device (1) about a pivot axis near one end thereof, characterized in that the end of the oscillating wiper arm (8) is fitted with two at least substantially cylindrical protrusions (11), which form bearing surfaces, at the location of the pivot axis, which protrusions (11) extend in lateral direction with respect to the oscillating wiper arm (8).
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