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(71) Demandeur/Applicant:
FEDERAL-MOGUL SA, BE

(72) Inventeur/Inventor:
BOLAND, XAVIER, BE

(74) Agent: SMART & BIGGAR

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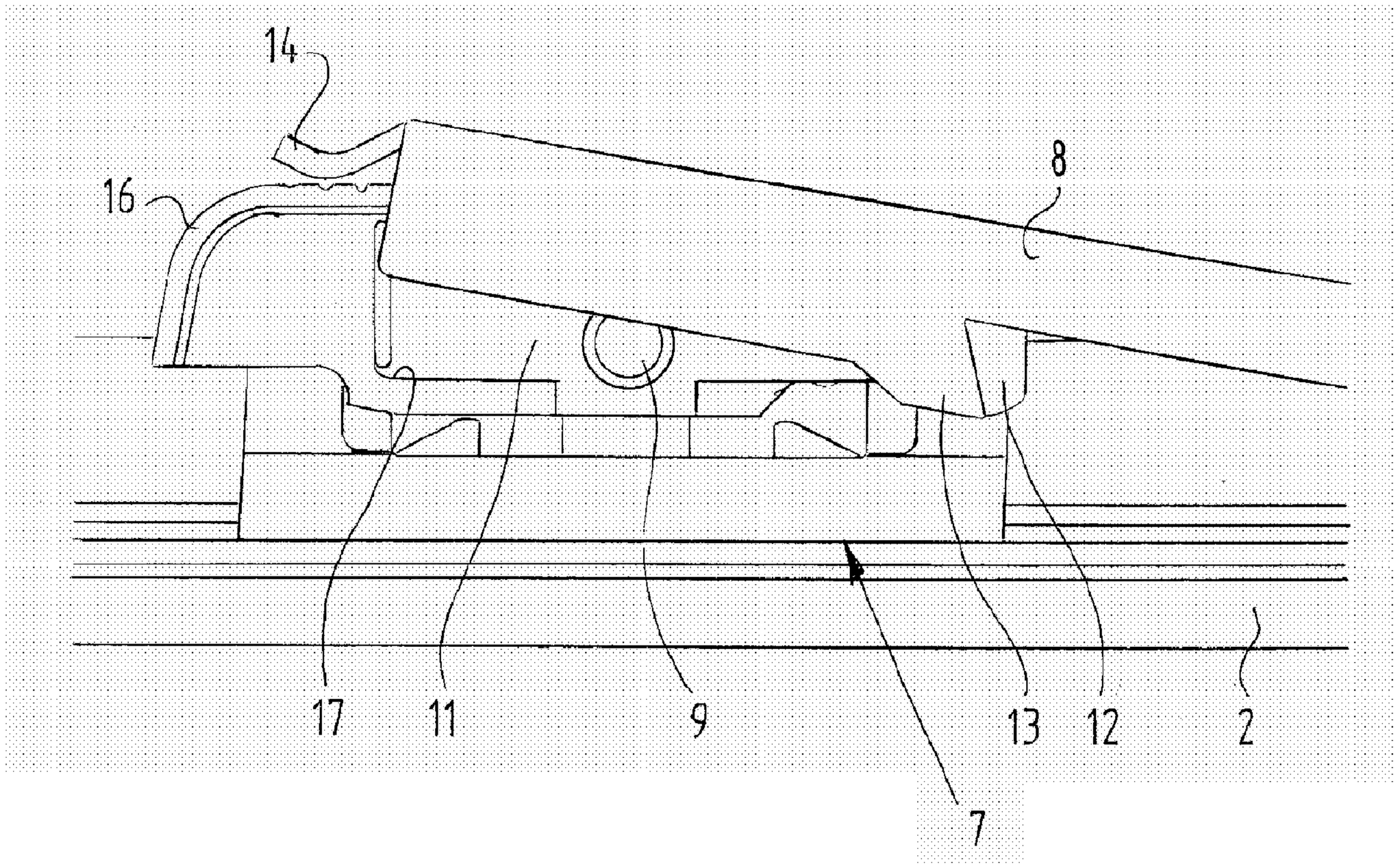
(54) Title: A WINDSCREEN WIPER DEVICE



(57) Abrégé/Abstract:
A windscreen wiper device (1) comprising a carrier element, as well as an elongated wiper blade (2) of a flexible material, which windscreen wiper device (1) comprises a connecting device (7) for an oscillating arm (8), wherein said oscillating arm (8) is pivotally connected to said connecting device (7) about a pivot axis near one end, with the interposition of a joint part (11), with the special feature that said connecting device (7) and said joint part (11) are provided with mutually cooperating pivot means (9,10) for pivotally connecting said joint part (11) to said connecting device (7), said joint part (11) having an at least substantially U-shaped cross-section at wherein said joint part (11) comprises a recess (15) in the base of the U-shaped cross-section for snappingly connecting said oscillating arm (8) to said joint part (11).

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

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **BOLAND, Xavier** [BE/BE]; B-6700 Arlon (BE).

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

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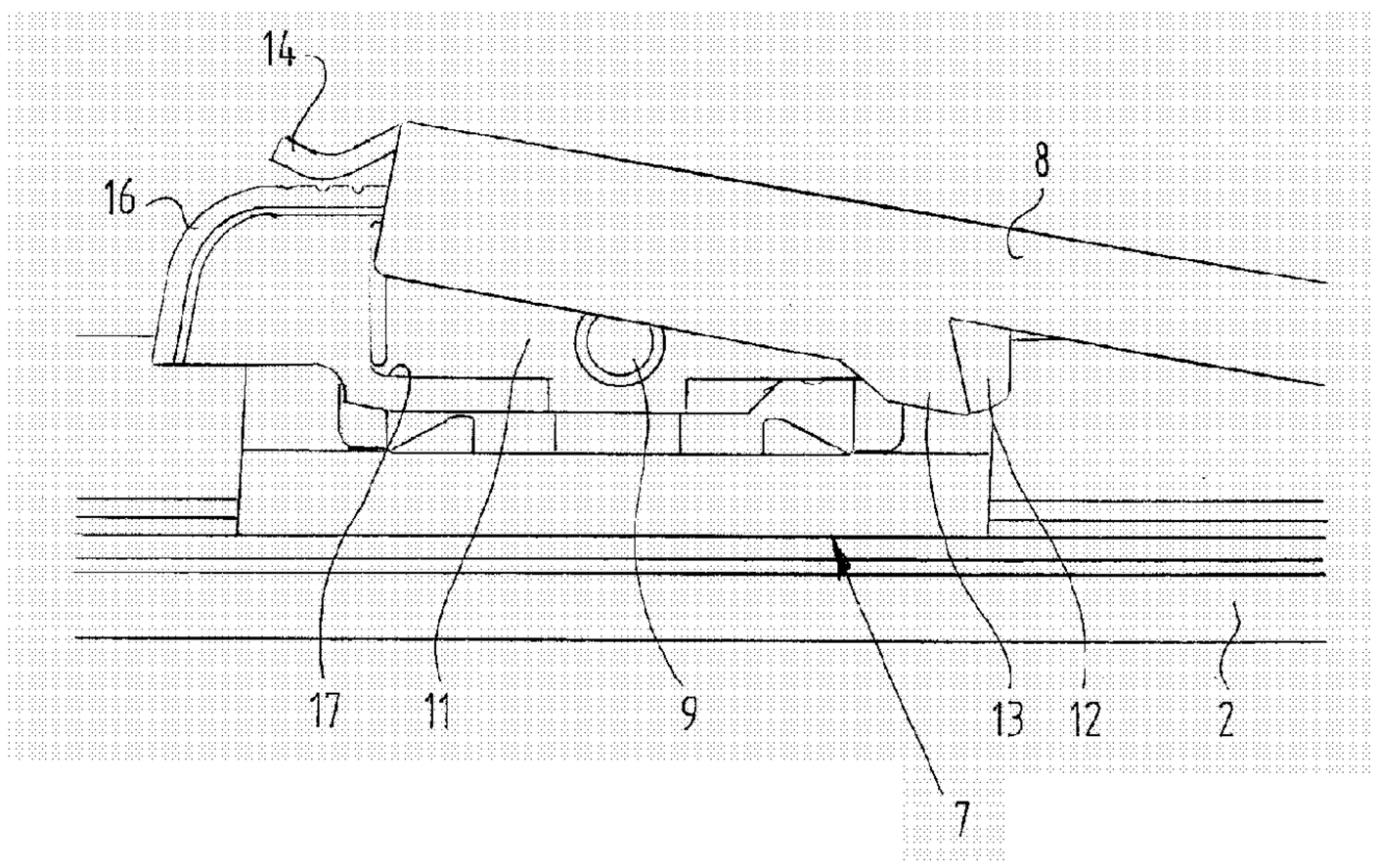
(54) Title: A WINDSCREEN WIPER DEVICE



(57) Abstract: A windscreen wiper device (1) comprising a carrier element, as well as an elongated wiper blade (2) of a flexible material, which windscreen wiper device (1) comprises a connecting device (7) for an oscillating arm (8), wherein said oscillating arm (8) is pivotally connected to said connecting device (7) about a pivot axis near one end, with the interposition of a joint part (11), with the special feature that said connecting device (7) and said joint part (11) are provided with mutually cooperating pivot means (9,10) for pivotally connecting said joint part (11) to said connecting device (7), said joint part (11) having an at least substantially U-shaped cross-section at wherein said joint part (11) comprises a recess (15) in the base of the U-shaped cross-section for snappingly connecting said oscillating arm (8) to said joint part (11).

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A 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 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 arm, wherein said oscillating arm is pivotally connected to said connecting device about a pivot axis near one end, with the interposition of a joint part.

Such a windscreen wiper device is known from European patent publication no. 1 403 156 of the same Applicant. This prior art windscreen wiper device is designed as a "yokeless" wiper device, 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. In this prior art windscreen wiper device the joint part comprises at least one resilient tongue engaging in a correspondingly shaped hole provided in the oscillating arm, wherein the resilient tongue is rotatable along an hinge axis between an outward position retaining the wiper blade onto the oscillating arm and an inward position releasing the wiper blade from the oscillating arm. 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 object of the invention is to provide an alternative, 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 connecting device and said joint part are provided with mutually cooperating pivot means for pivotally connecting said joint part to said connecting device, said joint part having an at least substantially U-shaped cross-section at the location of its connection to said connecting device, wherein said joint part comprises a recess in the base of the U-shaped cross-section for snappingly connecting said oscillating arm to said joint part. Said connecting device is preferably fixedly connected to the longitudinal strips through a welding, brazing ("soldering"), glueing or clamping operation.

In one preferred embodiment of a windscreen wiper device in accordance with the invention a resilient free end of said joint part can pivot about a hinge axis for snappingly connecting said oscillating arm to said joint part. Particularly, said resilient free end of said joint part can pivot about said hinge axis between a first position for mounting or dismounting a free end of said oscillating arm into or from said recess in the base of the U-shaped cross-section of said joint part, and a second position for

connecting said free end of said of said oscillating arm to said joint part.

In another preferred embodiment of a windscreen wiper according to the invention said joint part comprises at least one protrusion extending laterally from a longitudinal side of said joint part, said protrusion hooking behind a correspondingly shaped protrusion on said oscillating arm for blocking a longitudinal movement of said wiper blade with respect to said oscillating arm. In order to connect said oscillating arm to said joint part said oscillating arm is preferably pivoted relative to said joint part in an inclined position with respect to said wiper blade, so that said protrusion on said joint part is hooking behind said correspondingly shaped protrusion on said oscillating arm, wherein said oscillating arm is pivoted back relative to said joint part in a parallel position with respect to said wiper blade, so that a free end of said oscillating arm is snapped in said recess at the free end of said joint part.

In another preferred embodiment of a windscreen wiper device in accordance with the invention said oscillating arm is provided with a stop abutting a free end of said joint part for blocking a longitudinal movement of said wiper blade with respect to said oscillating arm. Particularly, said oscillating arm has an at least substantially U-shaped cross-section at the location of its connection to said joint part, wherein the base of the U-shaped cross-section is provided with a protrusion acting as said stop, and wherein said protrusion is mounted in a recess provided on said free end of said joint part that abuts said protrusion. This enhances the retention of the connection device/joint part onto the

oscillating arm in all possible directions, particularly both horizontally and vertically.

In another preferred embodiment of a windscreen wiper device according to the invention said joint part is detachably connected to said connecting device. More in particular, said joint part is detachably connected to said connecting device through a snapping/clipping operation.

In another preferred embodiment of a windscreen wiper device in accordance with the invention said joint part is connected to said second part by pivotally engaging protrusions of said second part, at the location of said pivot axis, in recesses provided in said joint part. These protrusions that function as bearing surfaces are spaced far apart, so that the forces exerted thereon will be relatively low. Preferably, said joint part has an at least substantially U-shaped cross-section at the location of its connection to said second part, wherein said joint part in each leg of said U-shaped cross-section is provided with a recess provided coaxially with said pivot axis. More in particular, the protrusions extend outwards on either side of said second part, wherein the protrusions are at least substantially cylindrical. In the alternative, said protrusions are at least substantially spherical or frusto-conical.

In another preferred embodiment of a windscreen wiper device according to the invention said joint part is connected to said second part by pivotally engaging protrusions of said joint part, at the location of said pivot axis, in recesses provided in said second part. Particularly, said joint part has an at least substantially U-shaped cross-section at the location of its connection to said second part, and wherein

said joint part in each leg of said U-shaped cross-section is provided with a protrusion provided coaxially with said pivot axis. The protrusions preferably extend inwards on either side of said joint part, wherein the protrusions are at least substantially cylindrical. In the alternative, said protrusions are at least substantially spherical or frusto-conical. Particularly, the recesses are correspondingly shaped.

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 in accordance with the invention;

- Figure 2 shows various successive steps for fitting the connecting device, the joint part and the oscillating arm of figure 1 together; and

- Figure 3 corresponds to figure 2, but now relating to a different type of oscillating arm.

Figure 1 shows a preferred variant of a windscreen wiper device 1 according to the invention. Said windscreen wiper device 1 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 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).

Neighbouring ends 5 of the 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 a positive fit") or force-locked to the ends 5 of the strips 4. In another preferred embodiment, said connecting pieces 6 are in one piece with the strips 4 made of spring band steel. In the latter case said connecting pieces 6 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 arm 8. Alternatively, the connecting device 7 may also be made of metal, such as steel or aluminum. The connecting device 7 is particularly welded, brazed (“soldered”), glued or clamped onto said strips 4. The oscillating arm 8 is pivotally connected to said unit about a pivot axis near one end, as will be described hereunder.

With reference to figure 2A the connecting device 7 comprises two cylindrical protrusions 9 extending outwards on either side of said connecting device 7. Alternatively, said protrusions may have a spherical or frusto-conical shape. These protrusions 9 pivotally engage in identically shaped cylindrical recesses 10 of a plastic joint part 11. In the alternative the recesses 10 may have a non-closed shape (i.e. open circumference). Said protrusions 9 act as bearing surfaces at the location of a pivot axis in order to pivot the joint part 11 (and the oscillating arm 8 attached thereto) about said pivot axis near one end of the oscillating arm 8. The protrusions 9 are preferably in one

piece with the connecting device 7; in the alternative, the protrusions 9 are part of a single pivot pin perpendicular to the connecting device 7.

Figure 2 shows the steps of mounting the wiper blade 2 onto the oscillating arm 8. Starting with the connecting device 7 being fixedly connected by gluing onto the strips 4 of the wiper blade 2 (figure 2A), the joint part 11 is first clipped onto the connecting device 7 (figures 2B and 2C), while said oscillating arm 8 is subsequently pivoted relative to said joint part 11 in an inclined position with respect to said wiper blade 2, so that protrusions 12 each extending sidewards from a longitudinal side of said joint part 11 are hooking behind correspondingly shaped protrusion 13 on said oscillating arm 8 (figures 2D and 2E). As can be seen from figure 2, said oscillating arm 8 has an U-shaped cross-section at the location of its connection to said joint part 11, whereas said protrusions 13 each extend downwards from a leg of said U-shaped cross-section. Finally, said oscillating arm 8 may then be pivoted back relative to said joint part 11 in a position parallel to the wiper blade 2 (figure 2F). As a consequence thereof a top surface of said free end of said oscillating arm 8 together with a stiff finger 14 will be clipped/snapped in a recess 15 at a free end 16 of said joint part 11, so that the present windscreen wiper device 1 is ready for use (figures 2G and 2H). By a reciprocal movement the wiper blade 2 can be released from the oscillating arm 8. Said snapping movement is realized, as said free end 16 of said joint part 12 is made resiliently, so that it can pivot about a hinge axis 17 (figure 2F).

Figure 3 corresponds to figure 2, with the difference that the base 18 of the U-shaped cross-section of said oscillating

arm 8 is provided with a hole 19 having a closed circumference and being provided with a protrusion 20 extending from an edge of said hole 19 in a direction towards said joint part 11. Said protrusion 20 acting as a stop is mounted in a recess 21 provided on the free end 22 of said joint part 11 that abuts said protrusion 19. Accordingly, said stop blocks a longitudinal movement of said wiper blade 2 with respect to said oscillating arm 8.

An important aspect of the invention is that one universal joint part 11 may be used for two different types of oscillating arms 8, namely the one according to figure 2 and the other in accordance with figure 3.

Possibly, a spoiler 23 is furthermore present being made in one piece with said wiper blade 2.

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

CLAIMS

1. 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 arm, wherein said oscillating arm is pivotally connected to said connecting device about a pivot axis near one end, with the interposition of a joint part, **characterized in that** said connecting device and said joint part are provided with mutually cooperating pivot means for pivotally connecting said joint part to said connecting device, said joint part having an at least substantially U-shaped cross-section at the location of its connection to said connecting device, wherein said joint part comprises a recess in the base of the U-shaped cross-section for snappingly connecting said oscillating arm to said joint part.

2. A windscreen wiper device according to claim 1, wherein a resilient free end of said joint part can pivot about a hinge axis for snappingly connecting said oscillating arm to said joint part.

3. A windscreen wiper device according to claim 2, wherein said resilient free end of said joint part can pivot about said hinge axis between a first position for

mounting or dismounting a free end of said oscillating arm into or from said recess in the base of the U-shaped cross-section of said joint part, and a second position for connecting said free end of said of said oscillating arm to said joint part.

4. A windscreen wiper device according to claim 1, 2 or 3 wherein said joint part comprises at least one protrusion extending laterally from a longitudinal side of said joint part, said protrusion hooking behind a correspondingly shaped protrusion on said oscillating arm for blocking a longitudinal movement of said wiper blade with respect to said oscillating arm.

5. A windscreen wiper device according to claim 4, wherein for connecting said oscillating arm to said joint part said oscillating arm is pivoted relative to said joint part in an inclined position with respect to said wiper blade, so that said protrusion on said joint part is hooking behind said correspondingly shaped protrusion on said oscillating arm, and wherein said oscillating arm is pivoted back relative to said joint part in a parallel position with respect to said wiper blade, so that a free end of said oscillating arm is snapped in said recess at the free end of said joint part.

6. A windscreen wiper device according to any of the preceding claims 1 through 5, wherein said oscillating arm is provided with a stop abutting a free end of said joint part for blocking a longitudinal movement of said wiper blade with respect to said oscillating arm.

7. A windscreen wiper device according to claim 6, wherein said oscillating arm has an at least substantially U-shaped cross-section at the location of its connection to said joint part, and wherein the base of the U-shaped cross-section is provided with a protrusion acting as said stop, and wherein said protrusion is mounted in a recess provided on said free end of said joint part abutting said protrusion.

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

9. A windscreen wiper device according to claim 8, wherein said joint part is detachably connected to said connecting device through a snapping/clipping operation.

10 A windscreen wiper device according to any of the preceding claims 1 through 9, wherein said joint part is connected to said connecting device by pivotally engaging protrusions of said connecting device, at the location of said pivot axis, in recesses provided in said joint part.

11 A windscreen wiper device according to claim 10, wherein 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 in each leg of said U-shaped cross-section is provided with a recess provided coaxially with said pivot axis.

12 A windscreen wiper device according to claim 10 or 11, wherein the protrusions extend outwards on either side of

said connecting device, and wherein the protrusions are at least substantially cylindrical.

13 A windscreen wiper device according to any of the preceding claims 1 through 9, wherein said joint part is connected to said connecting device by pivotally engaging protrusions of said joint part, at the location of said pivot axis, in recesses provided in said connecting device.

14 A windscreen wiper device according to claim 13, wherein 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 in each leg of said U-shaped cross-section is provided with a protrusion provided coaxially with said pivot axis.

15 A windscreen wiper device according to claim 13 or 14, wherein the protrusions extend inwards on either side of said joint part, and wherein the protrusions are at least substantially cylindrical.

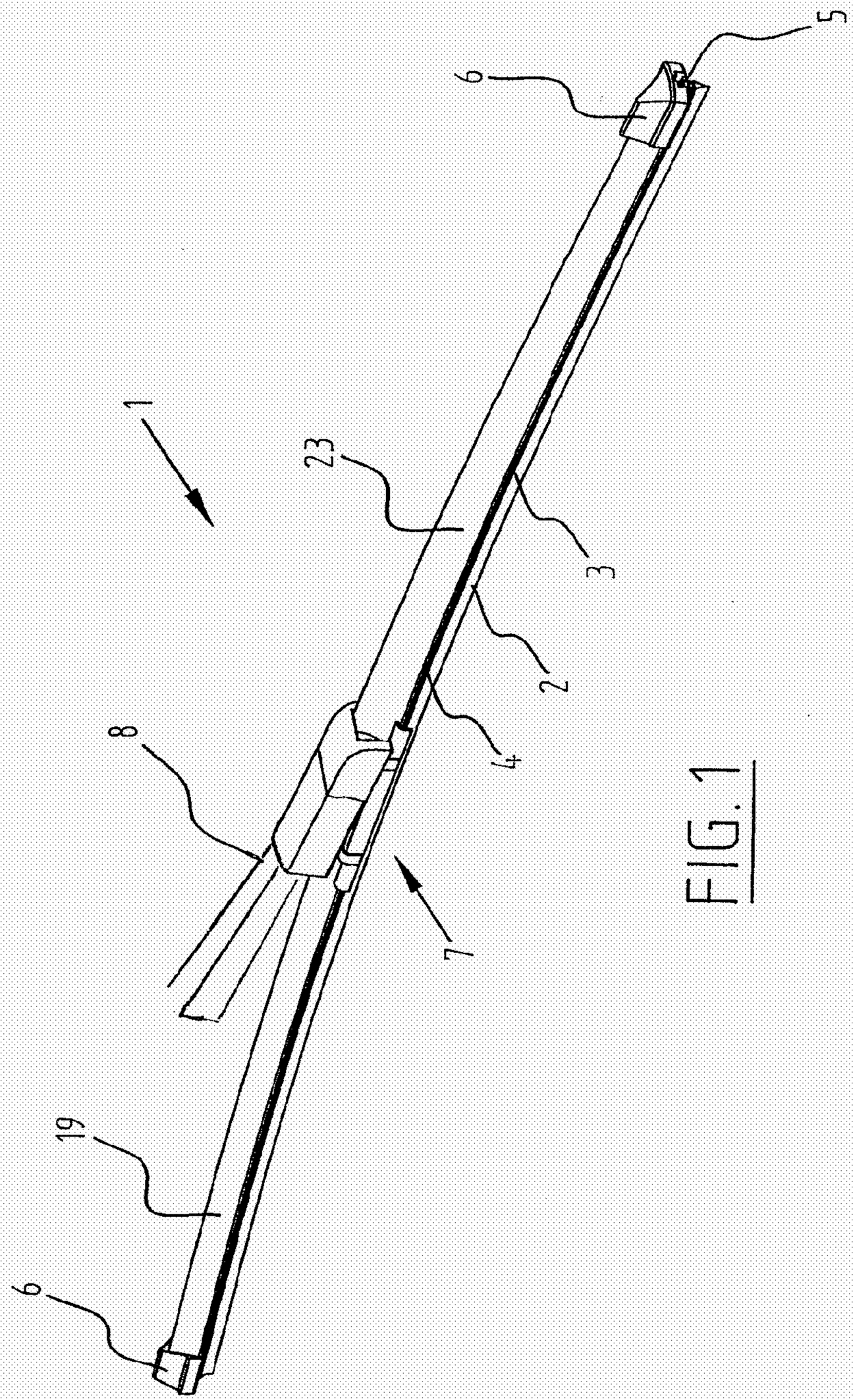

FIG.1

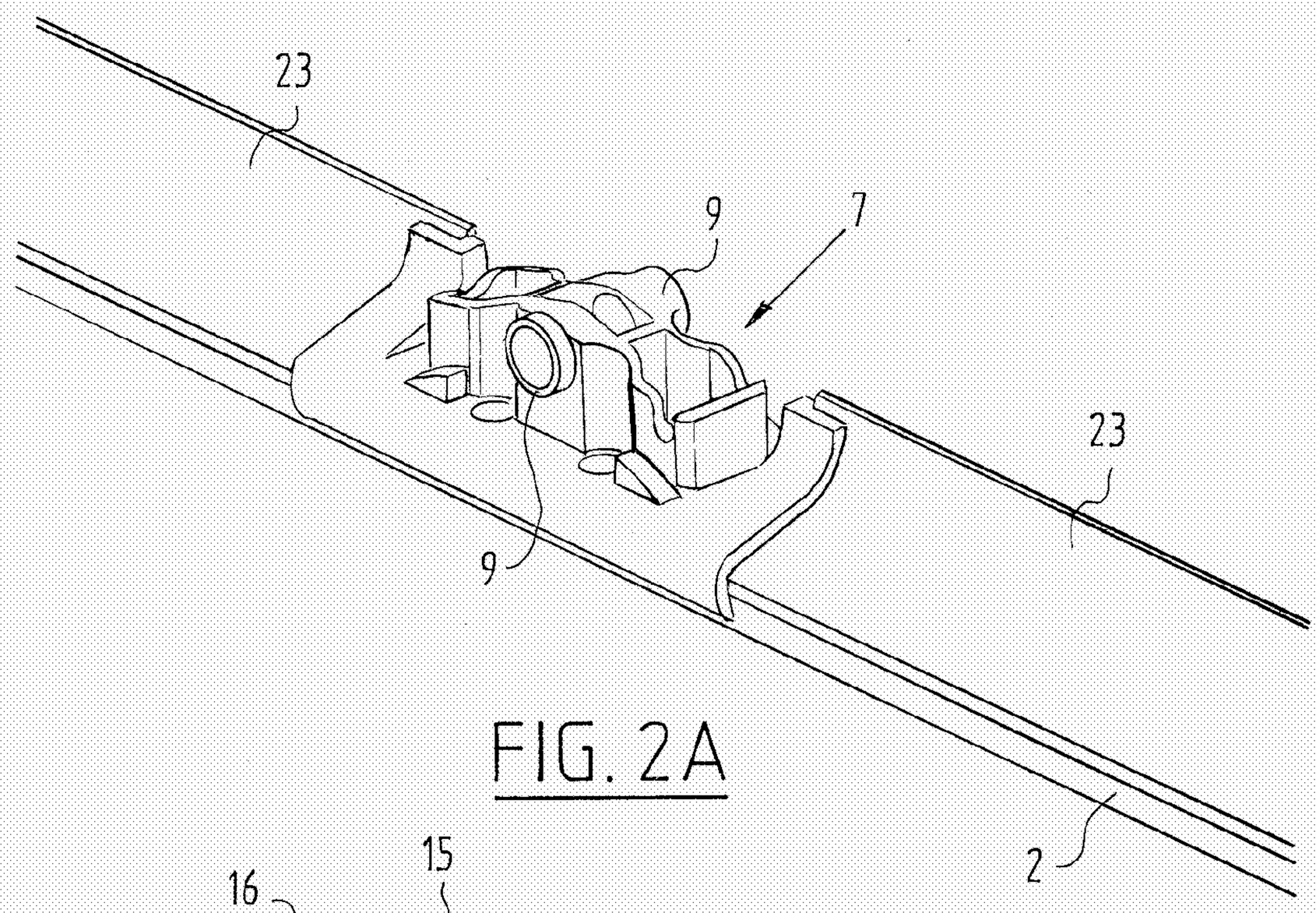

FIG. 2A

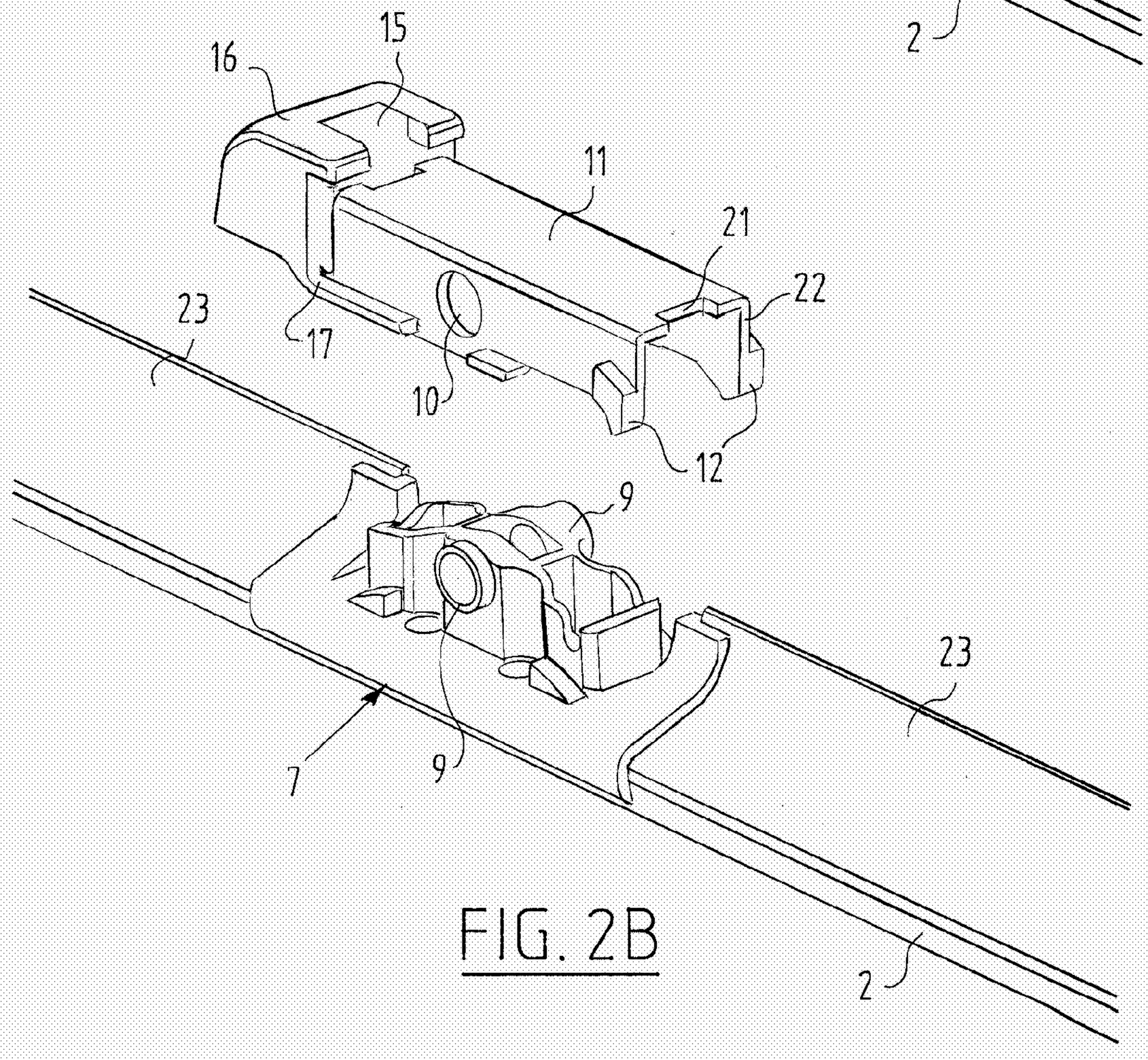

FIG. 2B

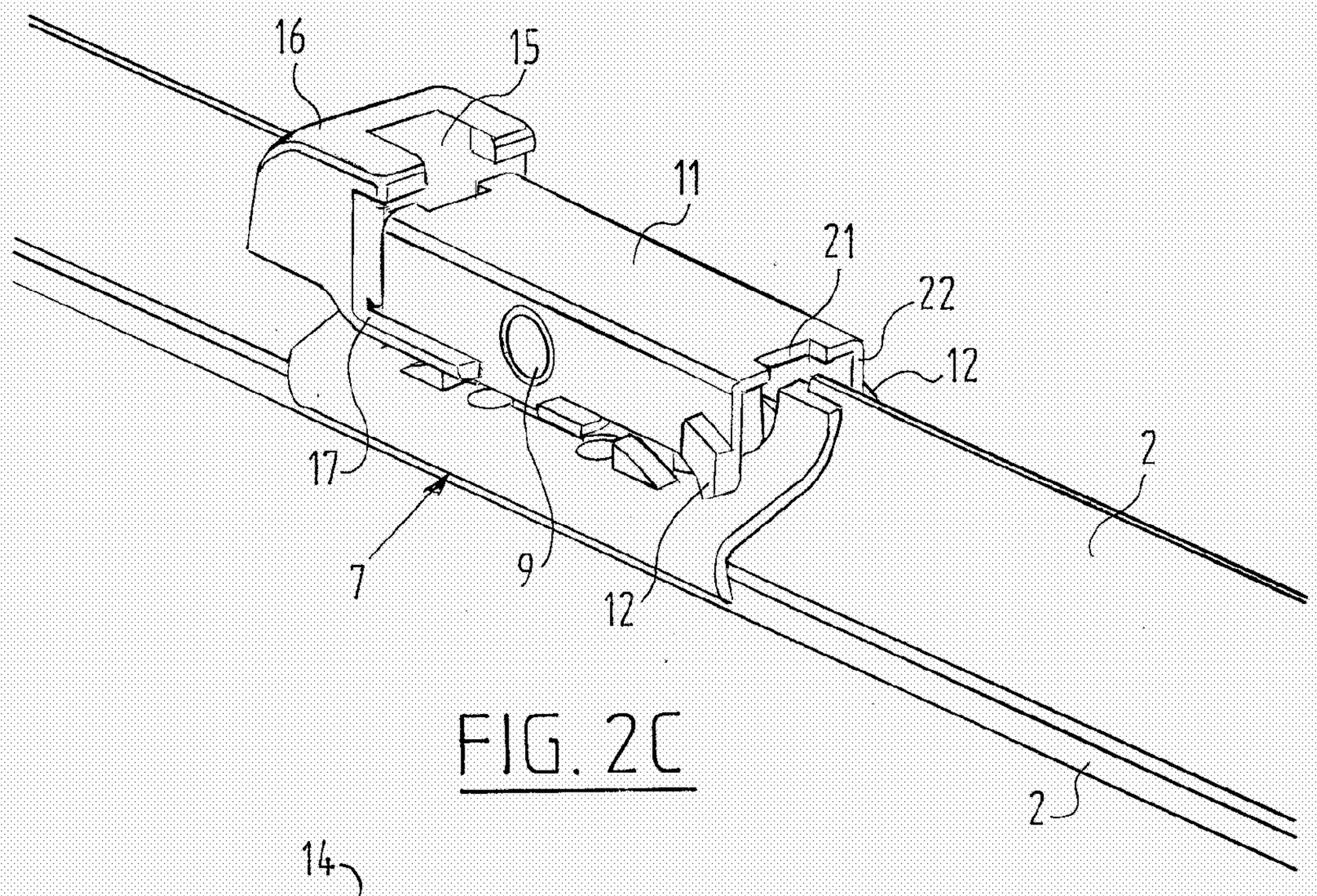

FIG. 2C

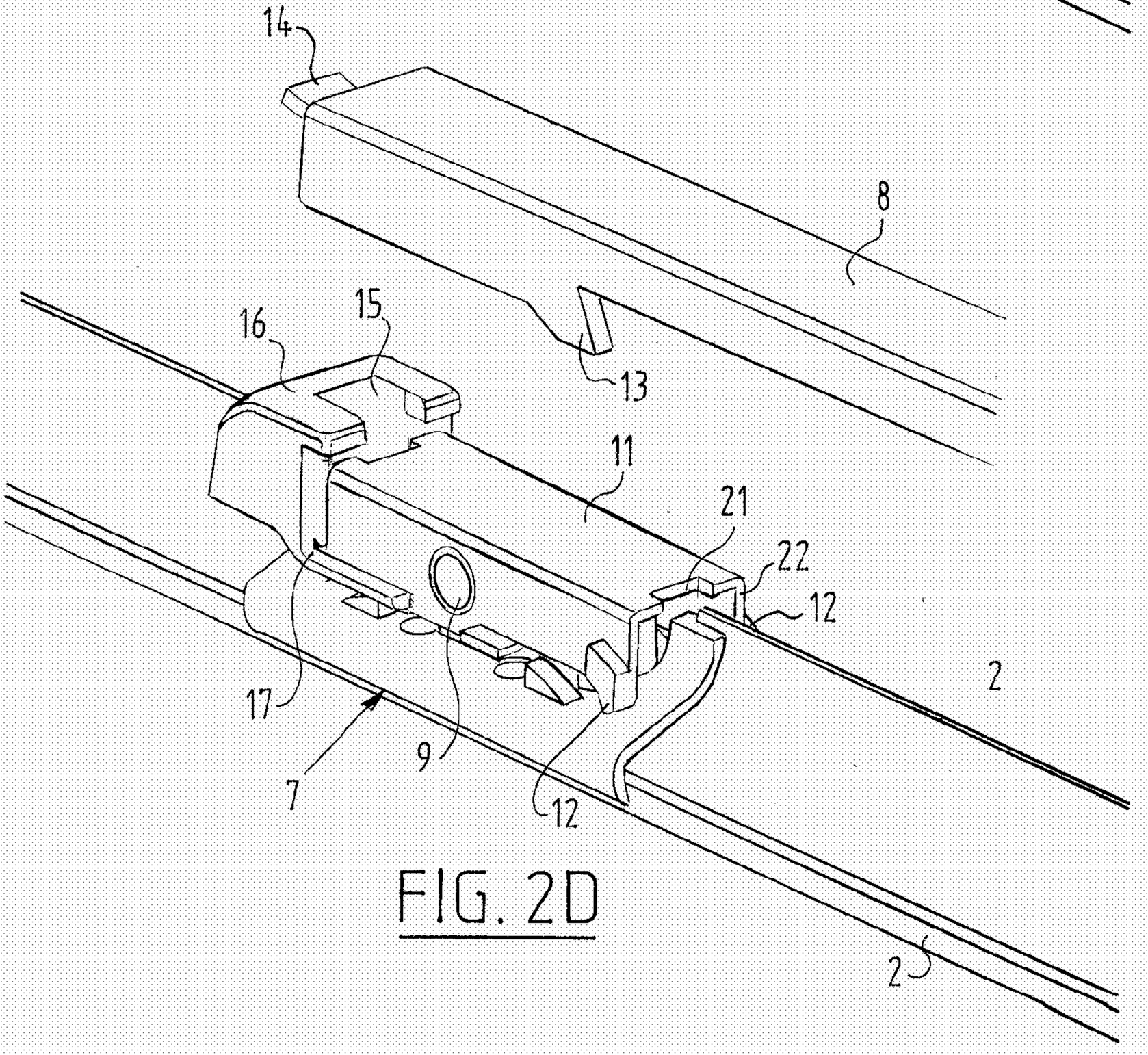

FIG. 2D

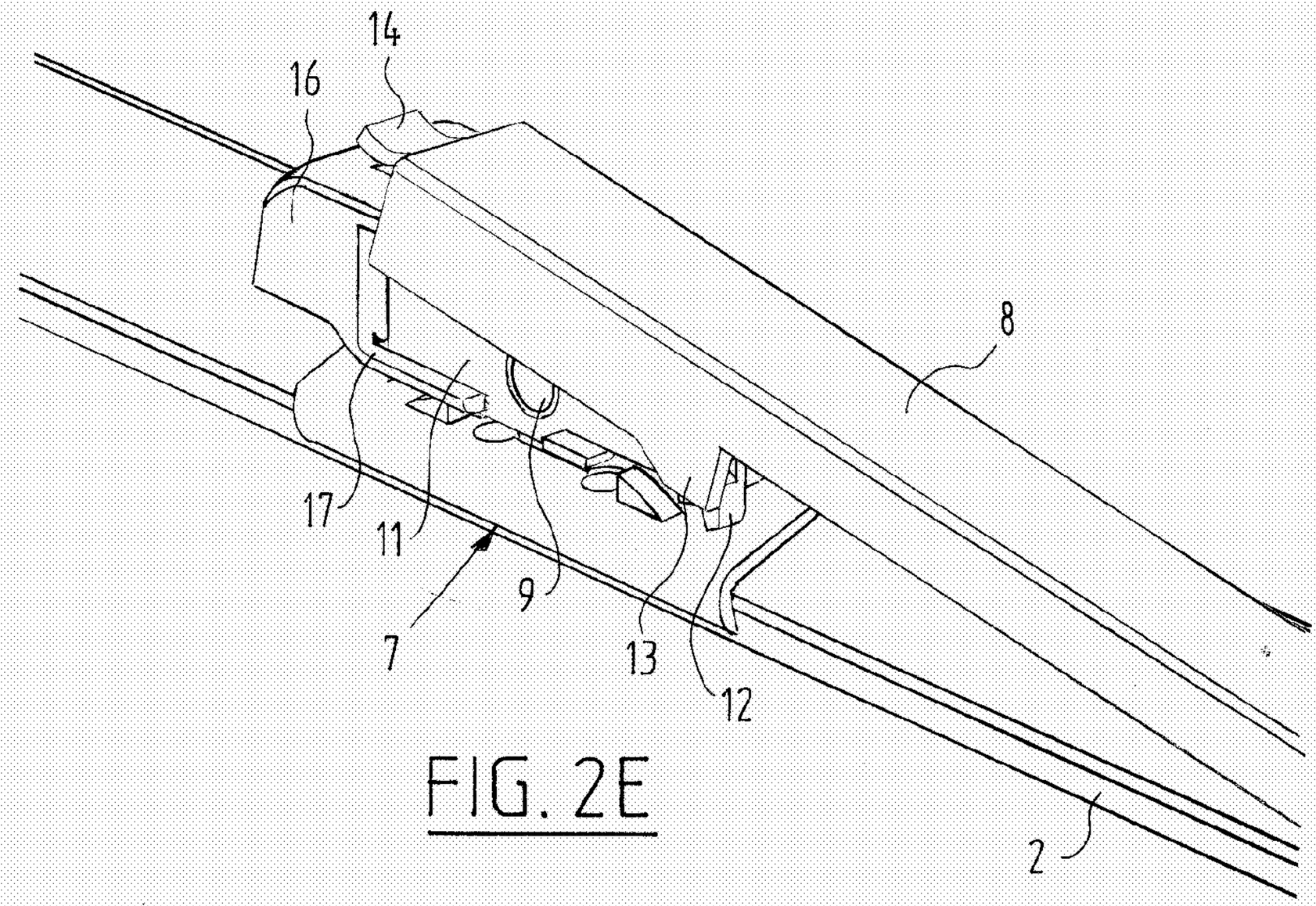

FIG. 2E

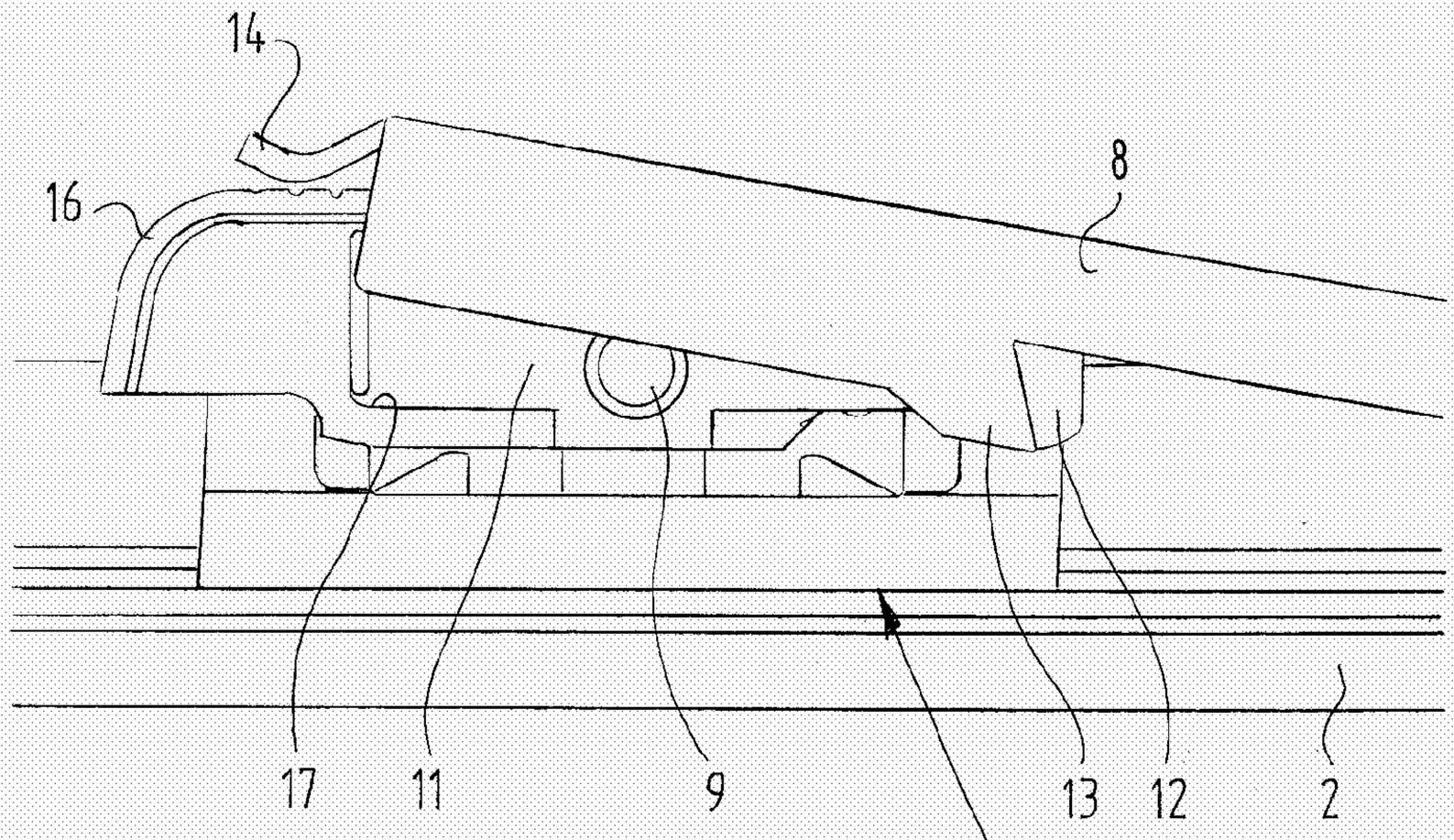

FIG. 2F

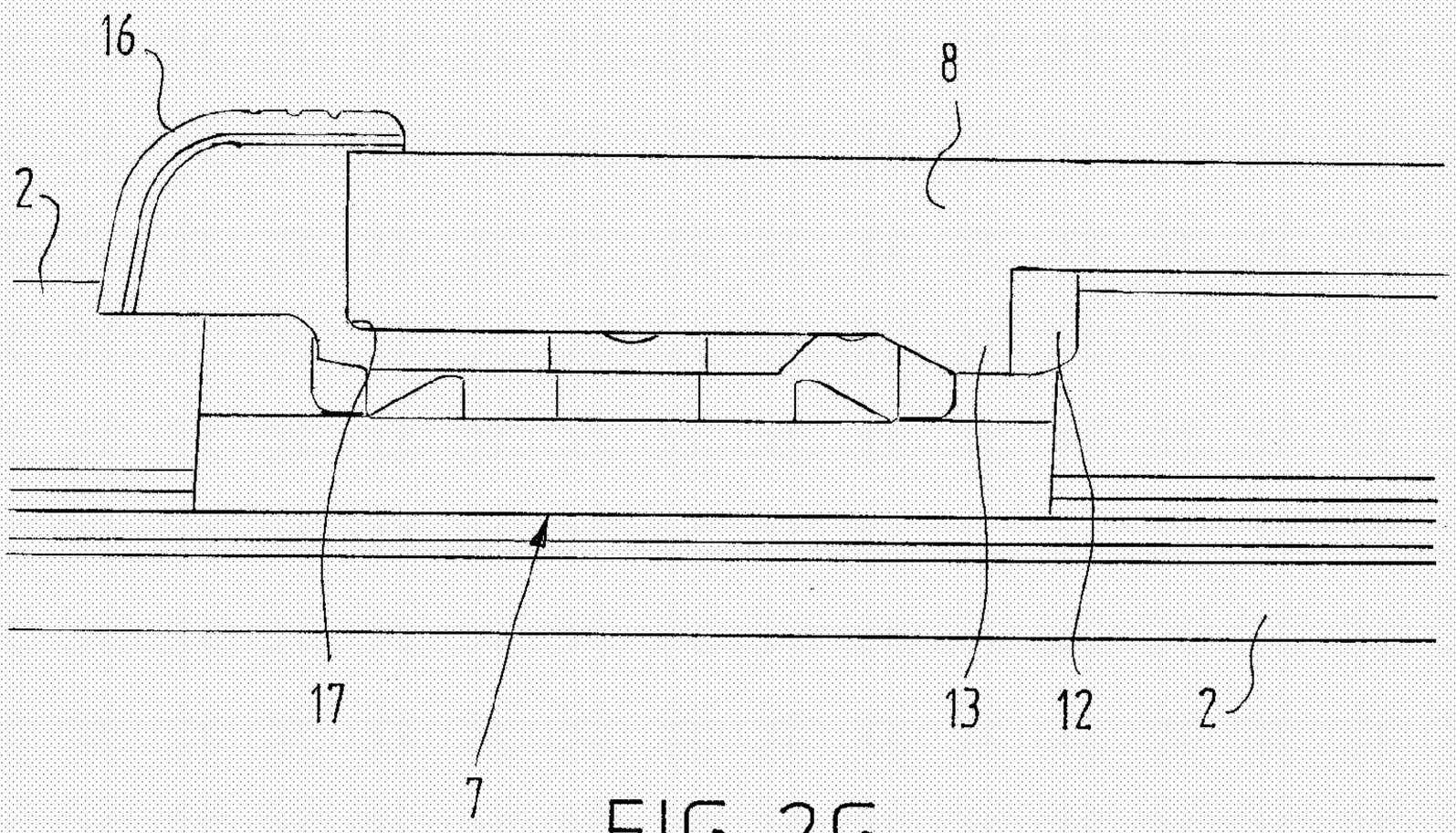

FIG. 2G

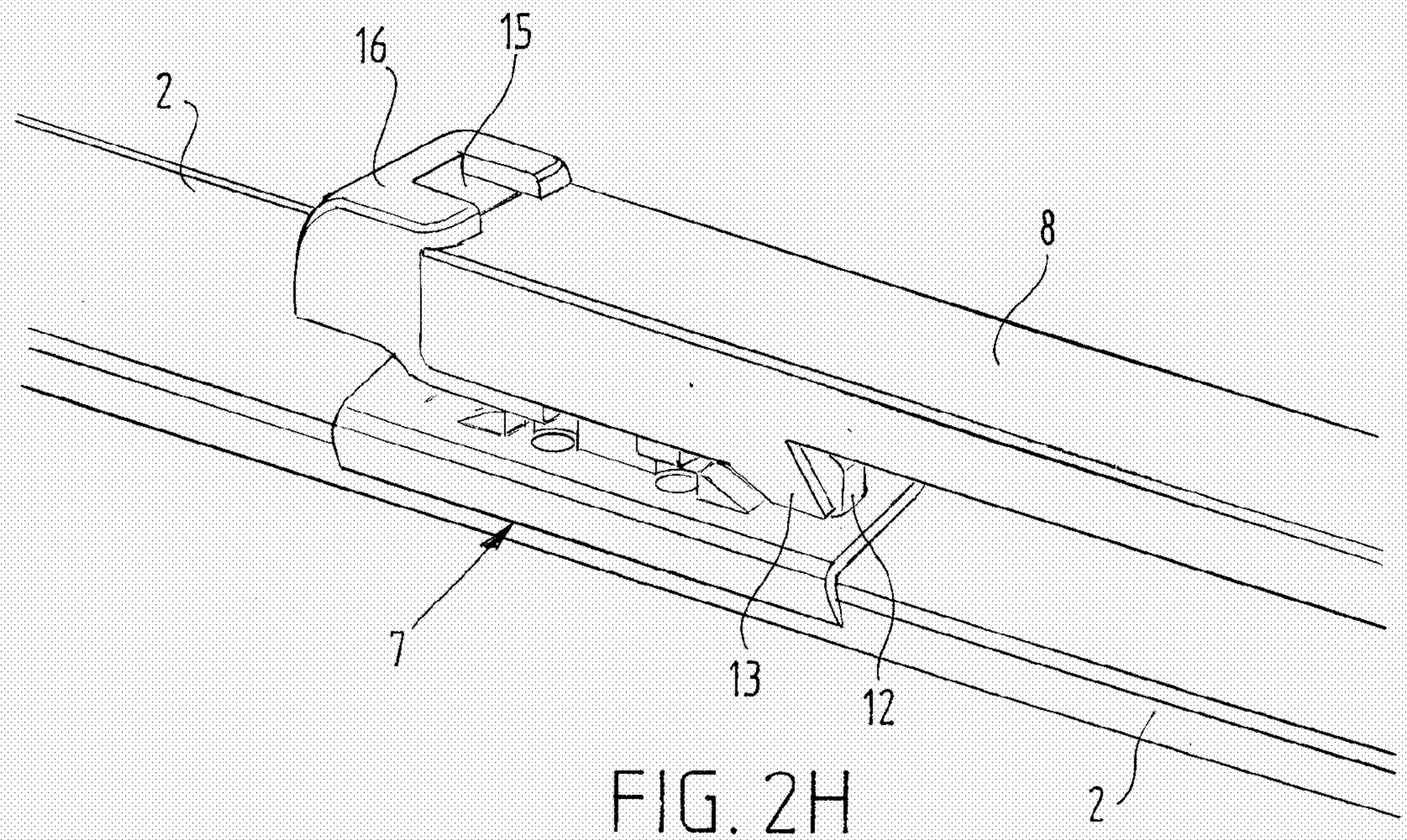

FIG. 2H

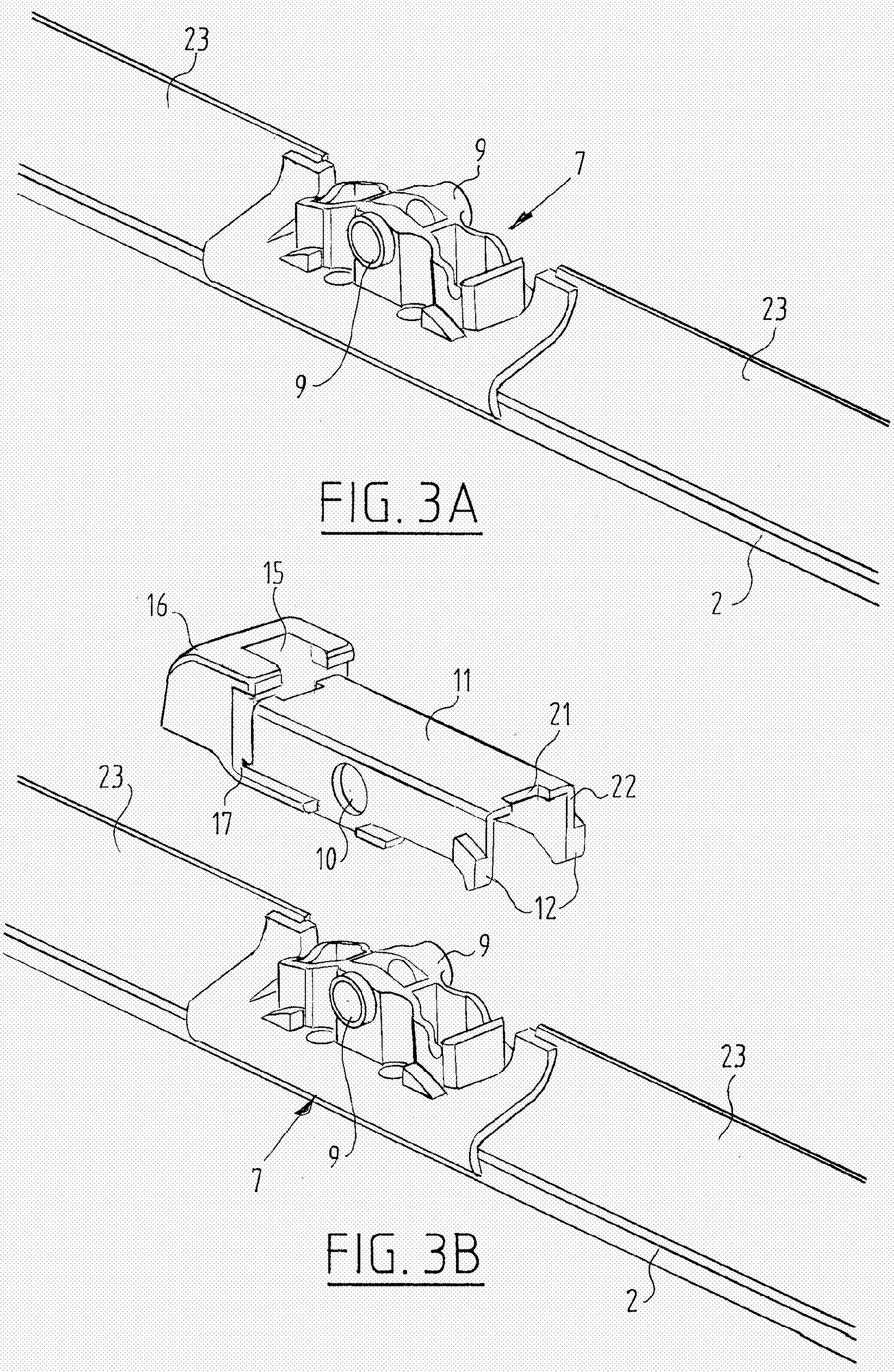

FIG. 3A

FIG. 3B

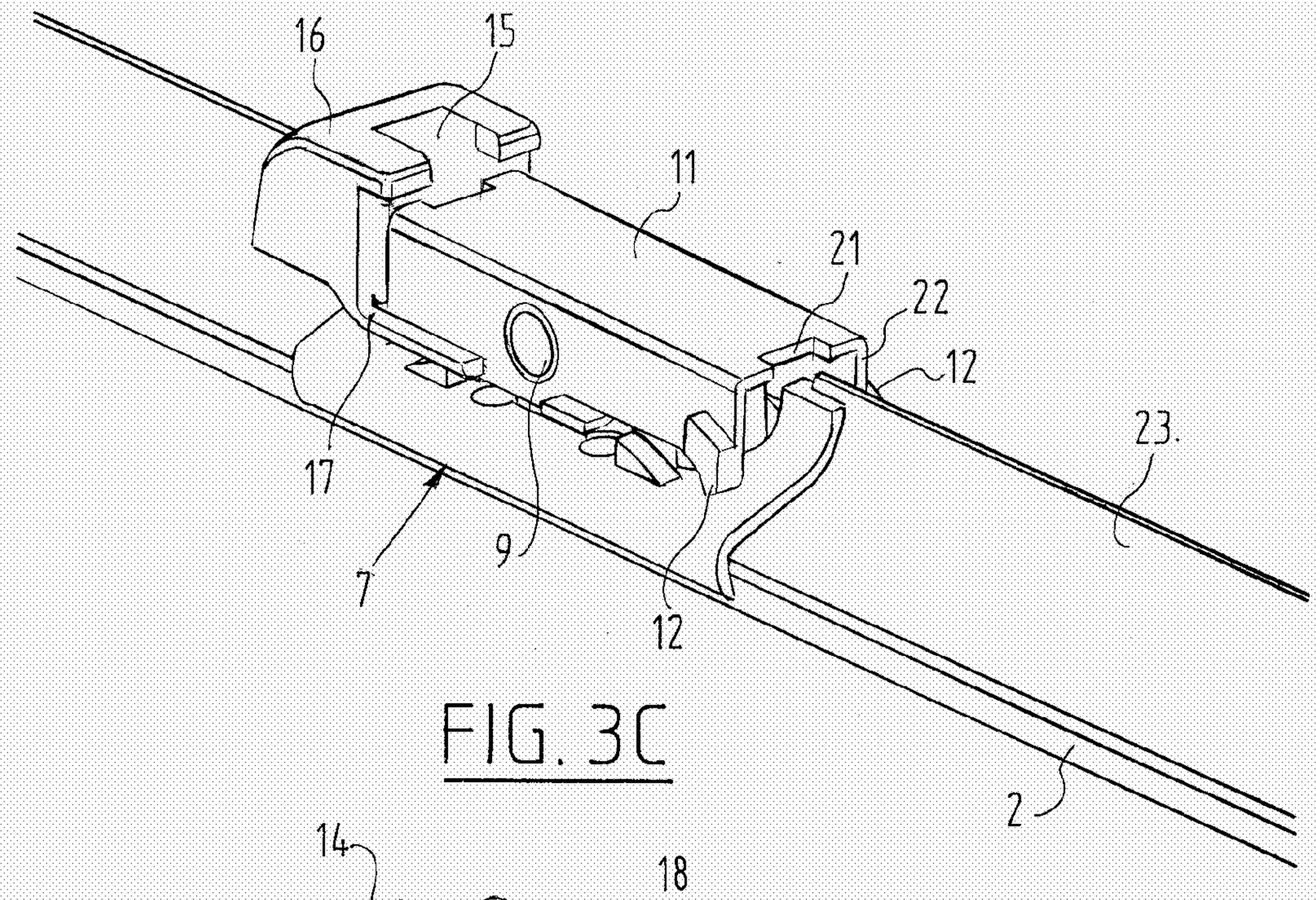
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FIG. 3C

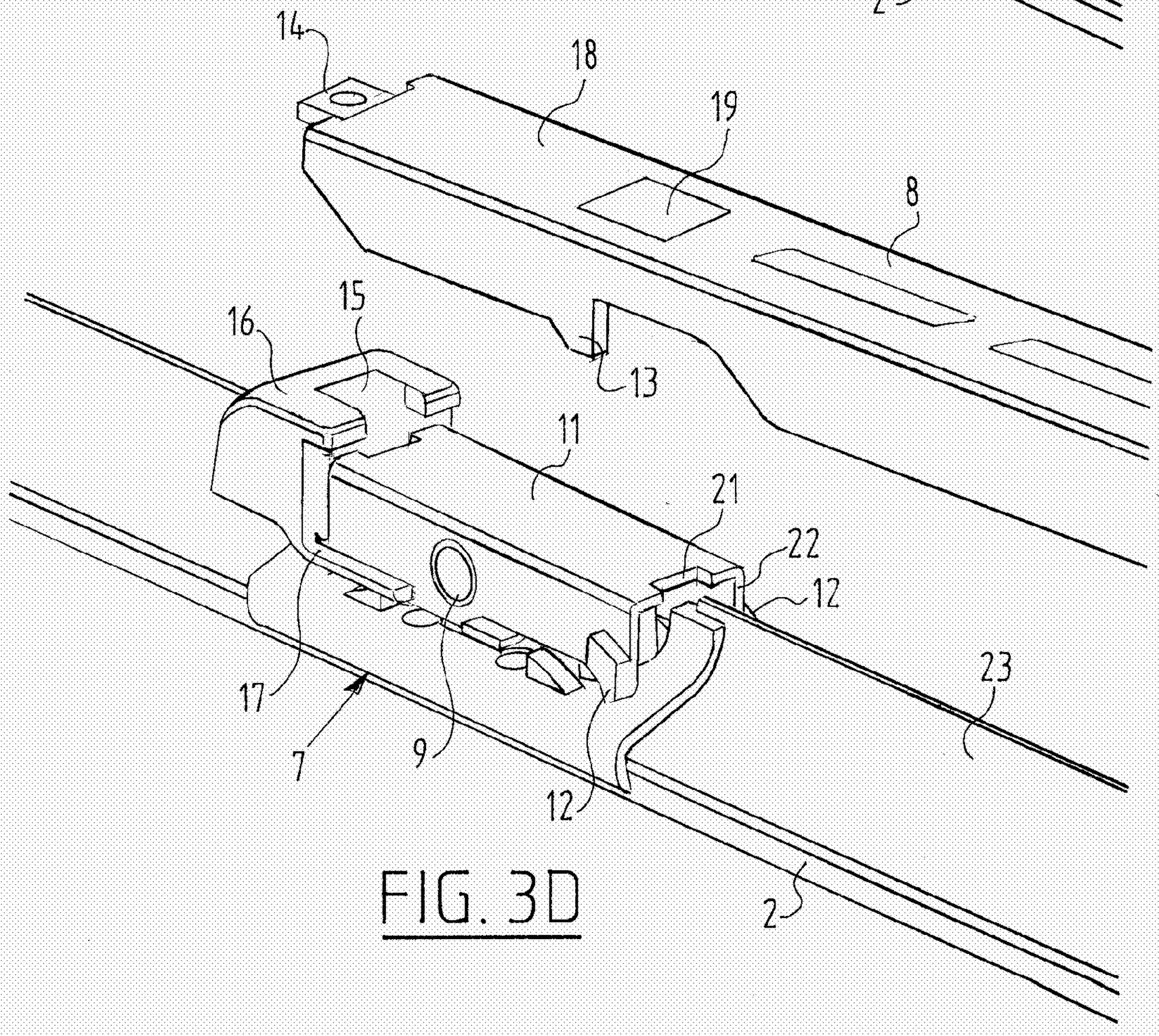
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FIG. 3D

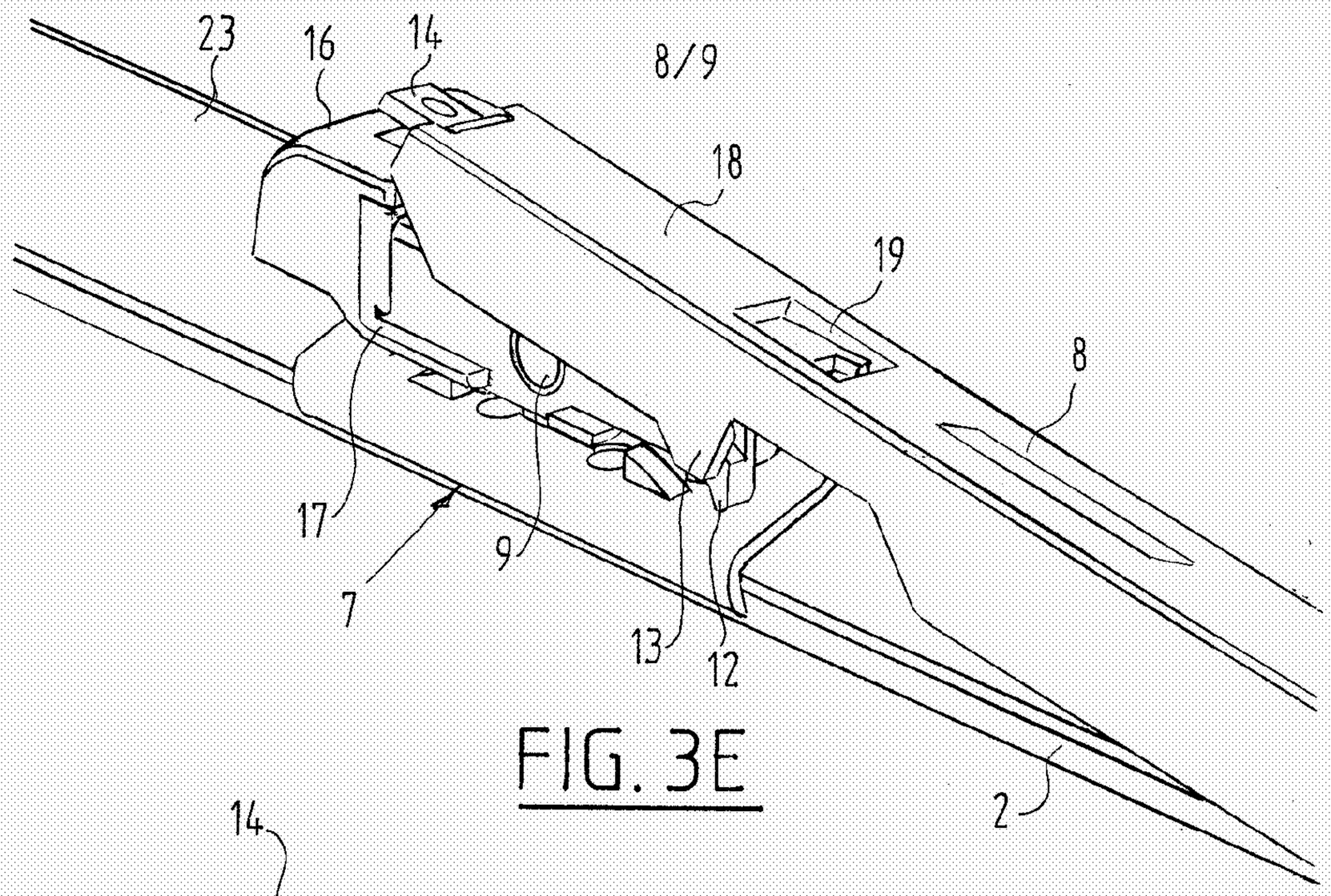


FIG. 3E

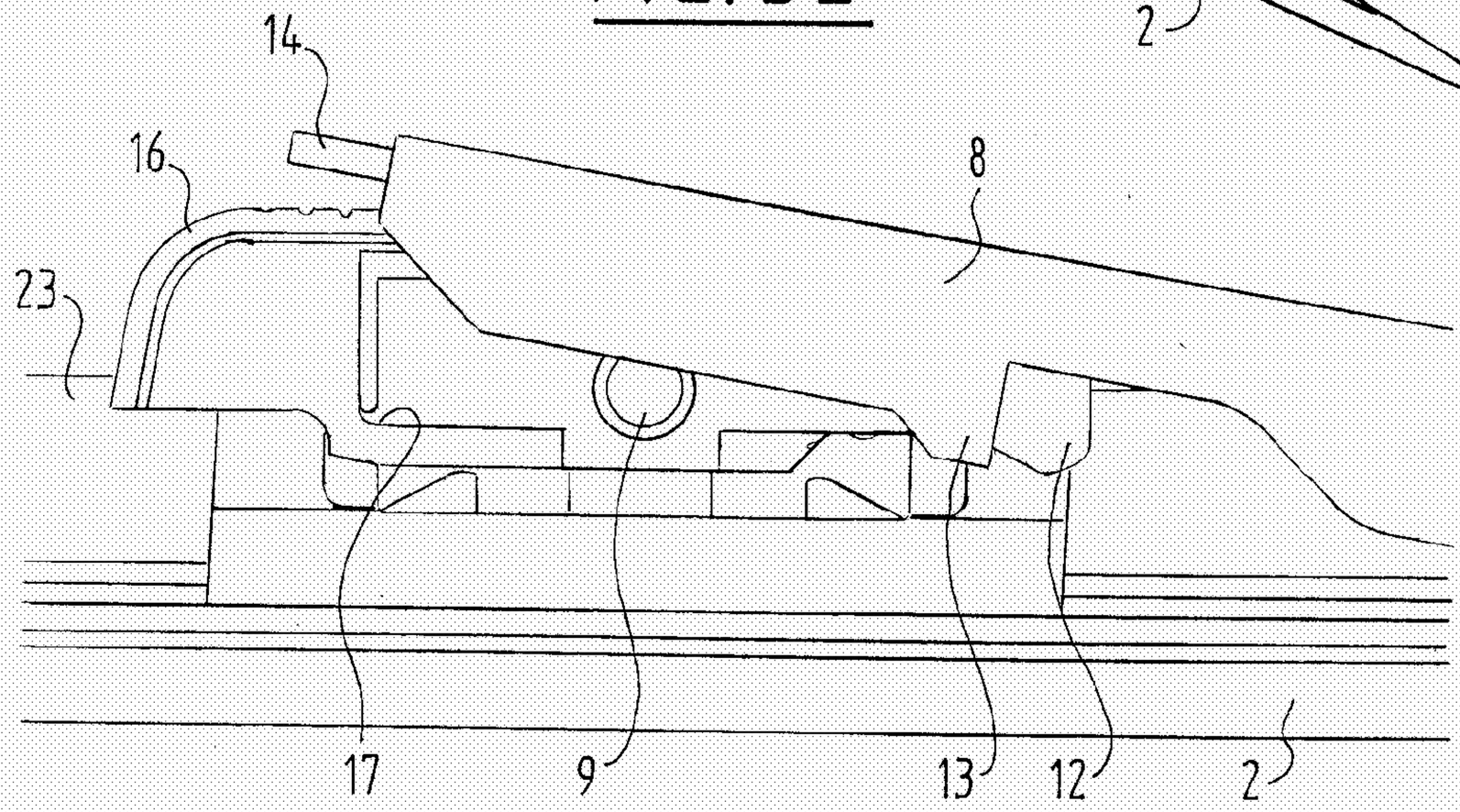


FIG. 3F

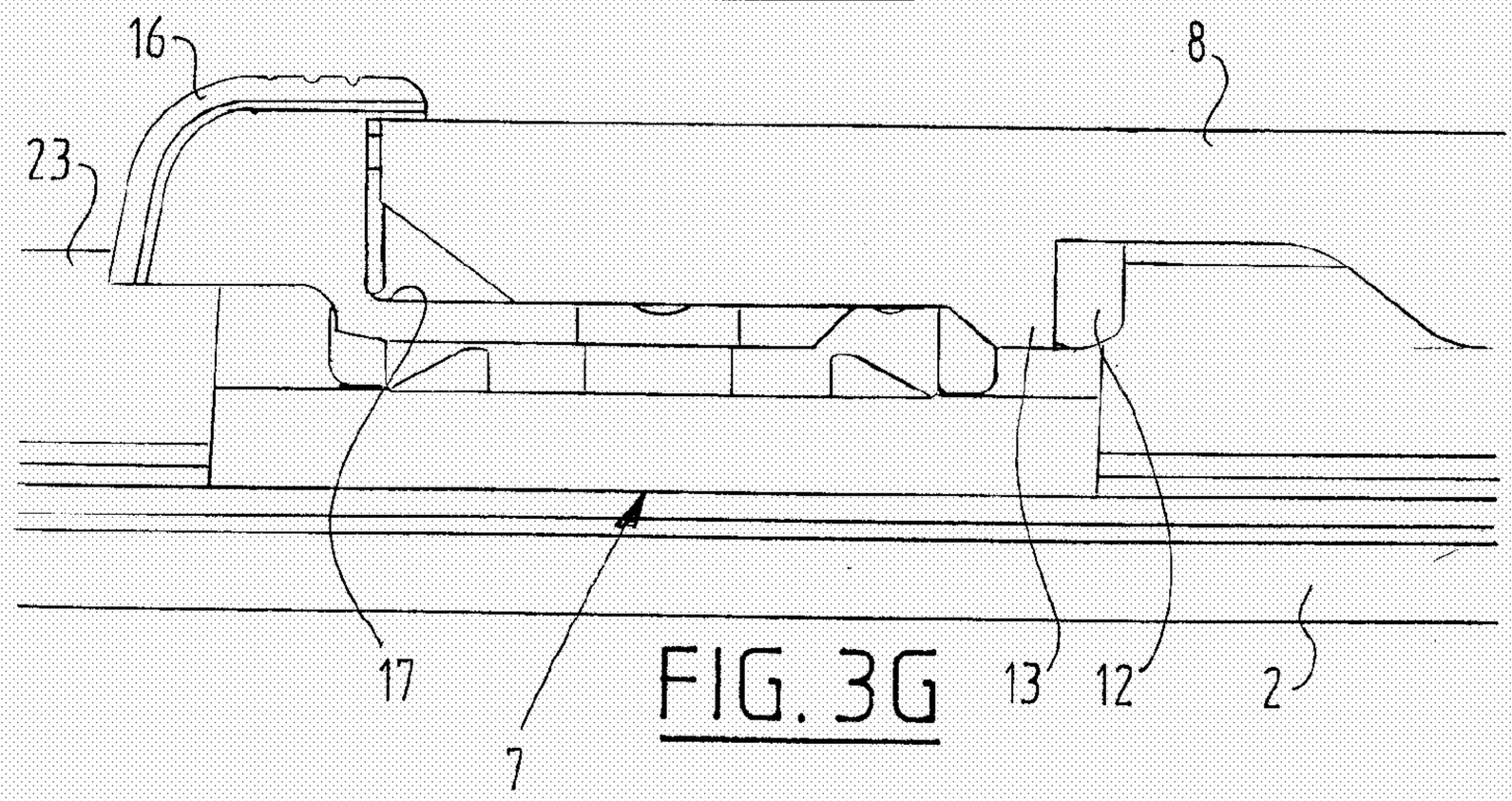


FIG. 3G

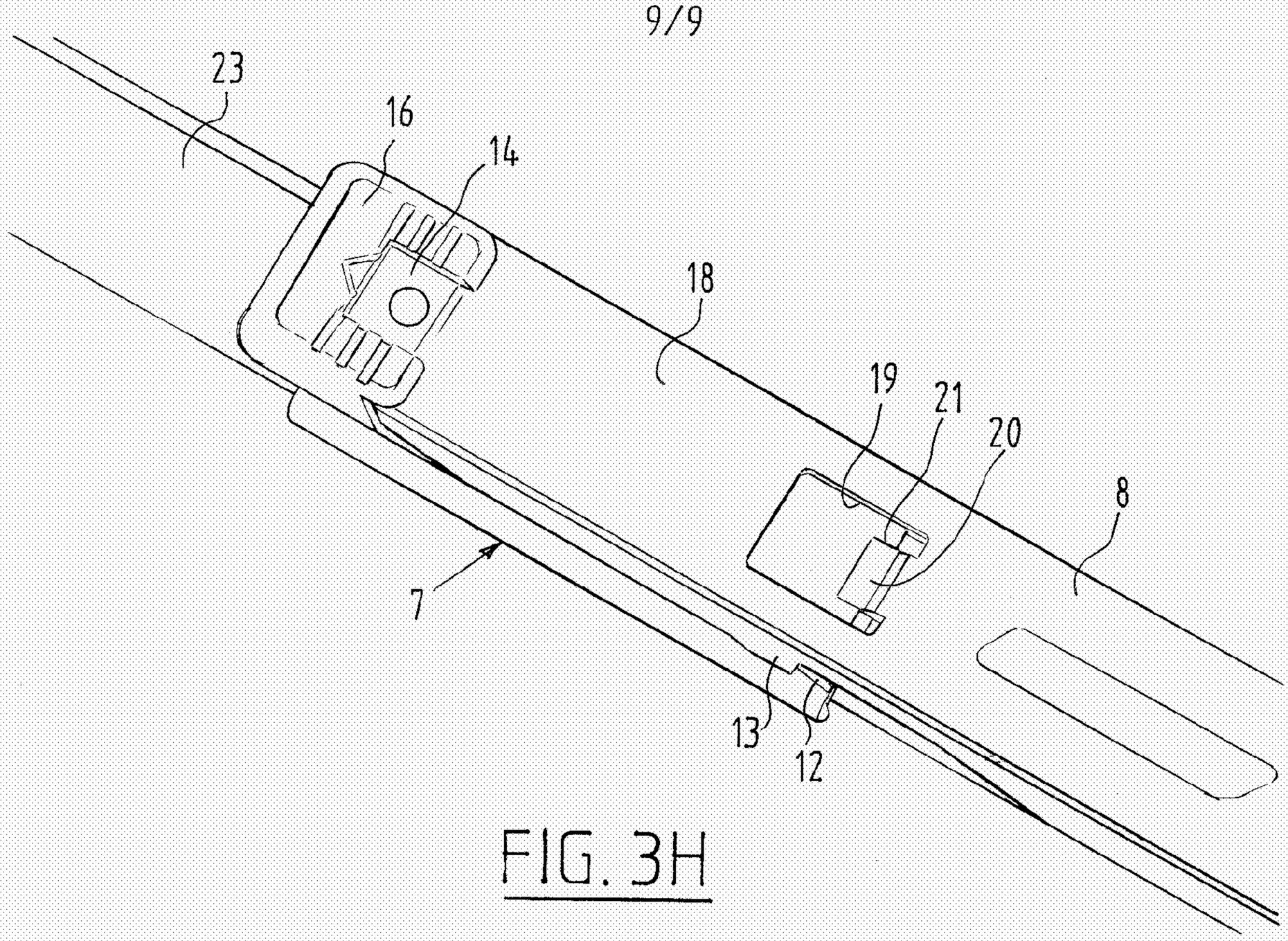
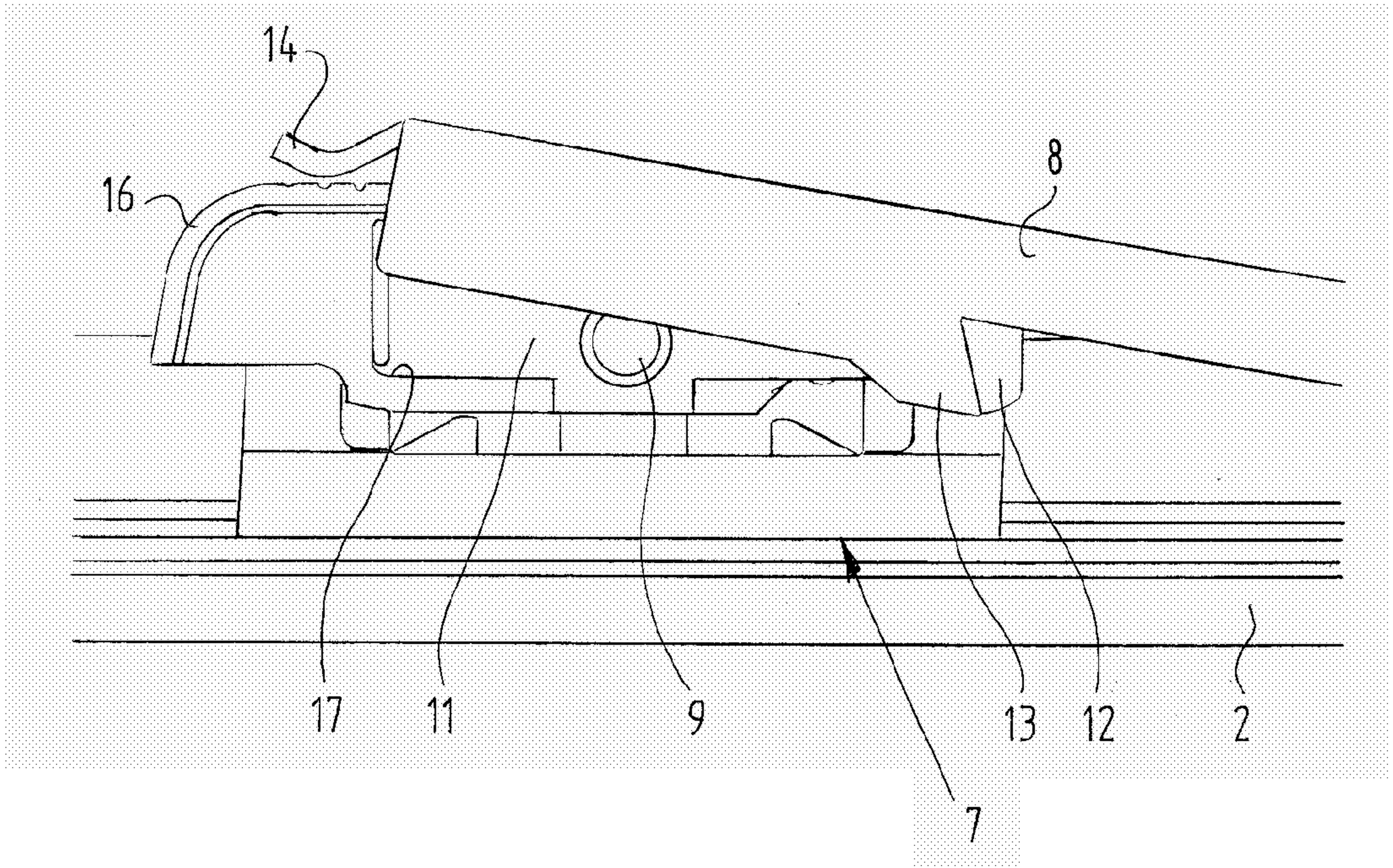


FIG. 3H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