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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) Support and application rail in automatic window devices for cars

(57) The implementation of supports at the ends of rails for window opening mechanisms, made of materials different from the rails, has enabled the simplification of these rails. However, the application of these supports results in small gaps between the support and the end of the rail, something which is avoided with the support presented here, which is applied to the rail, also incorporating other functions such as cable guide, shaft for the pulley wheel, securing of the rail to the automobile door reinforcement panel and securing the reinforcement panel to the automobile door.

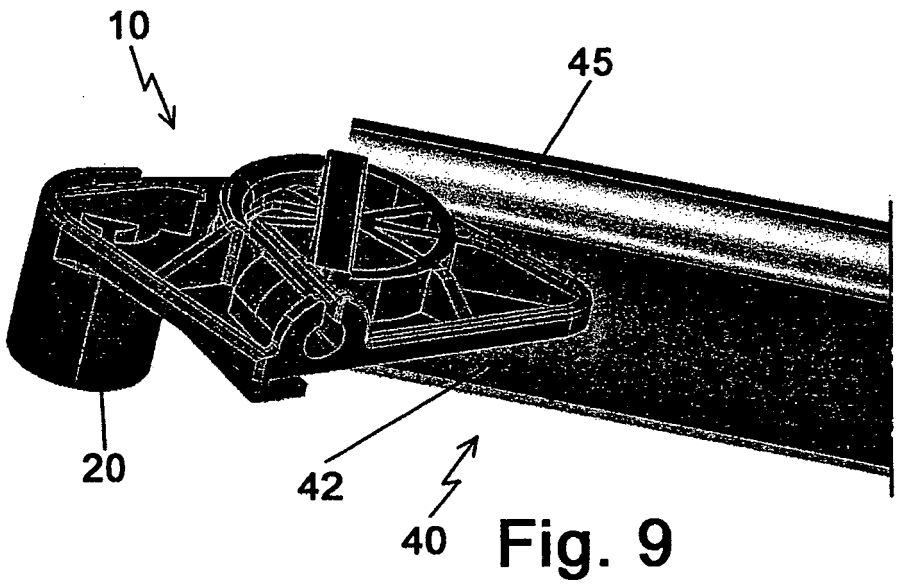

Fig. 9

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Description

Purpose of the Invention.

[0001] More specifically, the invention refers to a support especially designed to be fitted to the ends of a rail guide of the type used in window opening mechanisms in the automobile industry.

[0002] The support includes the means to secure it to the rail without needing operations such as riveting, screwing, welding or similar processes, thus eliminating these processes from the manufacturing process of the devices.

State of the art.

[0003] On the market there are and therefore can be considered as state of the art, the so-called window opening mechanisms, comprising a guide rail by which a slider moves up and down, which by suitable means supports and secures the automobile window, this slider is moved by an electric motor, the shaft of which is attached to a gearbox and a cable that pulls the slider, and the cable passes over pulley wheels fitted on the ends of the rail guide.

[0004] Alternatively, there are window opening mechanisms that use only one cable and others that use a Bowden cable (Bowden tube window opening), which do not need the motor to be secured onto the rail to keep the cable constantly tense.

[0005] In some instances, these pulley wheels are replaced by curved sliding surfaces to facilitate direction changing of the cable. All the aforementioned elements enable the window glass to be raised or lowered along the doorframe with the help of guide joints, fitted to the inner perimeter of the frame, and even for frameless doors.

[0006] There are different techniques to build the guide rail so that the rest of the elements of the window opening mechanism can be incorporated onto it. Basically, these techniques differ in the design of the ends of the rail, where one can find the means used as a cable guide fitted to any window opening mechanism and allow it to slide and change direction by means of pulley wheels or guide surfaces, without excessive friction, which would be harmful for the electric motor.

[0007] The ends of the guide rail enable another function in addition to facilitating the movement and guiding the cable, and this is securing the rail to the automobile door reinforcement module, and consequently of the entire window opening mechanism. To comply with all the functions entrusted to the rail, its ends are designed in different shapes, basically machining the ends of the rail, which can complicate its manufacturing process, this problem has been technically solved, but it does affect the time taken for manufacturing and consequently the price of the manufactured unit.

[0008] Another technique used is to manufacture the ends of the rail as separate parts and join them to the ends of the rail by screws, welding or riveting, which obliges the rail production line to incorporate the necessary machines for these operations to be carried out automatically, however, the more operations the greater the manufacturing time and the more expensive the completed rail.

[0009] Consequently, these parts should serve as a support of a shaft for the corresponding pulley wheel, they should include means for securing it to the door reinforcement module, and to the rail itself, by its ends. This securing of the parts of the aforementioned rail must be carried out with means that ensure that the force of the cable on the pulley wheels does not destabilise them, and that there are no noises or vibrations when the motor enters into action and moves the different moving parts of the window opening mechanism, that penetrate into the automobile cockpit, disturbing the passengers.

[0010] Examples of the aforementioned techniques can be seen in European Patent no. 1,630,341 in which a pulley wheel can be secured to the guide rail in different positions. German patent no. 385,167 also describes a pulley wheel support in which its shaft and the "Bowden" type support is secured to the rail.

Scope of the Invention.

[0011] To build the rails as simple means for moving the glass slider, so the manufacturing process does not need complex machining, and consequently its manufacture is competitive and does not consume time when fitting the window opening mechanism device it is integrated into. On the ends of said rail there are some parts that act as cable guides, and as means for securing the rail to the door reinforcement module and as a stop to the movement of the puller.

[0012] Additionally, these supports can serve as supports for the electric motor fitted to the window opening mechanisms, thus eliminating a third support on this device.

Description of the Invention.

[0013] The body of the support has a flat surface, which on the upper face incorporates a raised circular area acting as a shaft for the large diameter pulley wheel, and to which a hoop is fitted as a pulley wheel by simple pressure, on the opposite side of this flat surface, the lower face, emerges a small diameter cylindrical extension, like an appendix, whose aim is to hold the shaft of a bolt (or alternatively a nut and bolt or a clip) which passing through the automobile door reinforcement panel, secures the support, and with it the movement rail of this door and the movement rail to this door and to the window opening mechanism, as a support is fitted to each end of the rail, by suitable means.

[0014] The flat surface of the support body presents a low skirt on its perimeter, perpendicular to the same that

protects the cable when it moves round the pulley wheel, avoiding the cable becoming detached from the pulley wheel if it loses its tension and putting the window opening mechanism out of action.

[0015] The design of the support described here presents small variations with the aim of using the same rail to adapt to different window opening mechanisms that incorporate cables with a sheath (window opening mechanism with Bowden cable), or wires without sheath, (cable window opening mechanism) these variants are materialised in a cylindrical surface that projects from the flat surface and presents an opening on its upper part for inserting the sheath and with it the corresponding cable, and another circular opening on the front, so that the sheath will be detained by it.

[0016] The body of the support, to adapt to the guide rail, presents in the elevated area a diametrical groove, to enable the entry of a horizontal tab on the body of the rail, and on the opposite side of the support, a low ridge like a cylindrical lug, that enters into an orifice on the body of the rail, so that the supports are secured to the rail fitted to the same by their ends horizontally, by which, once fitted, any pitching is avoided when the cable slides along the pulley wheel pressing the support, as a result of supporting this cable to a slider, which in turn supports the glass by its bottom edge.

[0017] There are other with grooves that are not diametrical, but the mechanism is always the rail inserted into the support and clipped in such a manner that tools are not necessary to join the two parts, nor are any other elements such as screws or rivets needed.

[0018] According to the customer's needs, the pulley wheel will be a separate piece that is incorporated to its shaft in the raised area or this shaft, whose exterior side surface is configured in the shape of a pulley wheel.

[0019] The body of the support also presents on one of the sides of the flat surface, an extension in the shape of an appendix, from which emerges a small cylindrical lug on one of its edges, acting as a stop for the body of the slider when it moves vertically up and down, limiting its travel.

[0020] In all cases, the support has been designed with several functions, described below:

- Cable guide, whether it incorporates a pulley wheel separate from the support or not.
- Designed for cables/window opening mechanism with a sheath or cables/window opening mechanism without a sheath.
- Large diameter shaft for the pulley wheel if it is incorporated as a complementary part to the support, resisting heavy loads due to the diameter of the shaft.
- Enables the securing of the rail to the automobile door reinforcement panel.
- Incorporated to the ends of the rail laterally, thus avoiding the support pitching with regard to the rail.
- Acts as a stop for the glass when it reaches the end of travel along the rail.

Description of the drawings.

[0021]

Figure 1 is a perspective of the body of the support (10) that shows the different parts of the same, in an embodiment that uses a cable with sheath not represented in the illustrations, this sheath rests on the orifice (18).

Figure 2 is a perspective of the support body (10) showing the different parts of the same, in an embodiment working with un cable without sheath, and with the pulley wheel (23) before being incorporated to the body of the support (10), and the plateau (29) on the circular recess (28).

Figure 3 is a perspective view of the support body (10) in an alternative design without pulley wheel (23), in which the different parts can be seen, incorporating a cable without sheath, and the plateau (29) with ribs on its upper part (33).

Figure 4 is a perspective of the body of the support (10) displaying its different parts, in a design without pulley wheel (23) but with cable and cover with a plateau (29) of circular perimeter.

Figure 5 is a perspective view of the body of the support (10) seen from below (11.2), showing the groove (37) and the lug (38), to secure the rail (40) to the support (10), not represented (40) in this figure.

Figure 6 is a perspective view of the body of the support (10), in which all its parts can be seen, and specially the stop (47) to limit the travel of the slider that moves along the rail (40) the slider is not shown in this figure.

Figure 7 is a perspective view of the body of the support (10) seen from lower face (11.2), showing the groove (37) and the lug (38), to secure the rail (40) to the support (10), not represented (40) in this figure.

Figure 8 is a perspective view of the support (10) opposite a rail (40) with a flat body (42) and curved edge (45).

Figure 9 is a perspective view of the support (10) mounted on the rail (40).

[0022] Below is a list of the different parts of the support that appear in the plans identified by numbers; (10) support, (11) flat surface, (11.1) upper face, (11.2) lower face, (12) skirting, (13) opening, (14) tab, (15) open cavity, (16) wall, (17) Front of the support cover, (18) orifice on the front (17), (19) side surface of the support cover, (20) cylindrical extension, (21) cavities, (22) orifice, (23) pulley wheel, (24) concave surface, (25) circular skirting, (26) ribs, (27) base of the pulley wheel, (28) circular rebate, (29) plateau, (30) ribs, (31) tab, (32) slot, (33) ribs, (34) divider, (35) ridge, (36) circular contour, (37) slot, (38) lug, (39) base, (40) rail, (41) tab, (42) body of the rail, (43) drilled area, (44) orifice, (45) edge, (46) slot, (47) stop, (48) central part of the extension (20), (49) end part

of the rail (40).

Description of an embodiment of the invention.

[0023] In one of the preferred embodiments of the invention, a support (10) presents a body formed by a flat surface (11) on the upper face of which (11.1), there is a plateau (29) visibly circular and open with ribs to give added rigidity (30), and an elastic circular tab (31) that follows the contour of the plateau (29), as can be seen in figures 1 and 2, and that flexes (31) in the direction of the arrow.

[0024] On the lower face (11.2) of the surface (11) and as may be seen in figures 5 and 7, there is a groove that does not go completely through (37) and a cylindrical lug (38), which (37-38) enables it to fit to the rail (40) and stops it in collaboration with the tab (14) parallel to the front (11.2) of the flat surface (11).

[0025] On part of the contour of the flat surface (11) there is a low skirt (12) perpendicular to the upper face (11.1) with an opening (13), at one of whose ends of the skirt (12) a cylindrical surface side has been included (19) whose front (17) continuation of the skirt (12) has an orifice (18), and on the side (19) a groove (46) that extends to the top, as shown in figures 1, 4, 6, 8 and 9.

[0026] The support (10) has been designed with the same body but with small variations according to whether it is used only with cables, or with cables with a sheath, in the latter case, see for instance figures 1, 4, 6, 8 and 9, is when the cylindrical side surface is included (19), in which its front (17) the end of the sheath, not represented in the illustrations, rests on the orifice (18) the cable sliding down the groove (46), the cable, not represented in the illustrations, goes round the pulley wheel (23) and rests on the concave surface (24) that has a groove delimited on the right and a left by circular skirts (25), and leaving from an opening (13), in the skirt (12).

[0027] In all cases the support (10) incorporates, as a appendix, an extension, which in this case is cylindrical (20), but could also be rectangular forming a unit with (10) the aim of which is to enable the support (10) - one on each end of the rail (40)-to be secured to the door reinforcement panel, not represented in the illustrations. The appendix or cylindrical extension (20) as can be seen in figures 1 and 2 for instance, presents an orifice (22) for the shaft of a bolt passing through the door reinforcement panel and threading into this orifice (22), or inserting the bolt into the appendix (20) passing through the door reinforcement panel and secures the support to the panel with a conventional nut. Anther possibility is that the appendix incorporates a nut securing a bolt that goes through the reinforcement panel.

[0028] In other variants of the support (10) when the cables are used without sheath, the cylindrical side surface is not used (19), as shown in figures 2 and 3, where the cable passes through a circular recess (28), in all the variants, the support (10) incorporates an appendix (20).

[0029] In all cases the support (10) incorporates, as a appendix, an (cylindrical) extension (20) forming a unit with (10) the aim of which is to enable the support (10) - one on each end of the rail (40)- to be secured to the door reinforcement panel, not represented in the illustrations. The appendix or cylindrical extension (20) as can be seen in figures 1 and 2 for instance, presents an orifice (22) for the shaft of a bolt, clip or similar passing through the door reinforcement panel and threading into this orifice (22), or inserting the bolt into the appendix (20), or a nut with a bolt threaded onto it, passing through the door reinforcement panel and secures the support to the panel with a conventional nut.

[0030] In order to lighten the support body (10), (but this is not compulsory/strictly necessary) the extension or appendix (20) can have cavities (21) and ribs (26), that join the centre (48) of the appendix (20) to the outer part (20), as can be seen in figures 1 and 2.

[0031] The support (10) is incorporated to the rail (40), as can be seen in figures 8 and 9, because the rail (40) has a curved or rectangular edge (46) that emerges from the flat body (42) which is machined with an orifice (44) and a tab (41), the tab (41) for horizontal alignment, enters the groove (37) and the cylindrical lug (38) enters orifice (44) of the body (42) of the rail (40).

Claims

1. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** incorporated to the ends of a rail used for the vertical movement of a slider that incorporates a glass window, the slider and glass being moved up down by means of an electric motor and a cable pulled by the motor that moves the slider with the help of pulley wheels fitted to the ends of the rail, **characterised by** the fact that the support (10) is plastic injection moulded in one piece, designed from a flat surface (11), on the perimeter of which is a skirt (12) with an opening (13), the skirt extending (12) to the front: (17) of a cylindrical surface (19) and a wall (16) perpendicular to the skirt (12), from the lower end of which emerges a tab (14) parallel to the surface (11), emerging from the flat surface (11) and from its upper face (11.1), an elevated area or plateau (29), of circular open shape with ribs (30) with a tab, also circular (31), the plateau (29) and the tab (31) acting as a shaft for a pulley wheel (23) incorporated to (29) and (31), this tab flexes (31) inwards, for the press fitting of the pulley wheel (23), emerging from the flat surface in the direction and travel of the front (11.2) an extension (20), for securing the support (10) and the rail (40) to the car door reinforcement panel.

2. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 1 **characterised in**

that the pulley wheel (23) is a hoop formed by a concave surface (24) limited by skirts (25).

3. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 1 **characterised in that**, in an alternative version, the side surface of the plateau (29) presents a circular recess (28) acting as the pulley wheel.

4. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 1 **characterised in that** the cylindrical surface (19) presents on its upper part a groove that passes through the part (46).

5. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 1 **characterised in that** the rail (40) presents a flat body (42) on one of sides an curved edge emerges (45), presenting said body (42) a tab (41) perpendicular to the body (42) and an orifice (44).

6. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 1 **characterised in that** from the front (11.2) of the flat surface (11) a cylindrical lug projects (38) and a groove that does not go through (37).

7. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 1 **characterised in that** the extension (20) presents a cylindrical-shaped outer configuration, and in its central part a core (48), joined to (20) with ribs (26), with cavities (26) between the core (48) and the extension (20), the core (22) having an orifice (22).

8. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claims 1 and 7 **characterised in that** the orifice (22) of the extension (20) receive the shaft of a bolt which passing through the automobile door reinforcement panel, secures the window opening mechanism to said panel

9. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 8 **characterised in that**, alternatively, the extension (20) incorporates a bolt that goes through the door reinforcement panel, securing the window opening mechanism with a nut.

10. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 1 **characterised in that**, in an alternative version, the support (10) for cables without sheath, has on the side surface of the plateau (29), a circular groove (32) acting in the same manner as the pulley wheel and some ribs (33), emerging from the front 811.2) a cylindrical appendix (20) and a tab (149) parallel to the front (11.2) leaving between (11.2) and the tab (14) an open cavity (15) for fitting the end of the rail (40).

11. **"SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES"** according to claim 1 **characterised in that** the support (10) incorporates a wall (47) that is adapted to act as a stop for the end of travel of the slider.

Amended claims in accordance with Rule 137(2) EPC.

1. "SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES" incorporated to the ends of a rail used for the vertical movement of a slider that incorporates a glass window, the slider and glass being moved up down by means of an electric motor and a cable pulled by the motor that moves the slider with the help of pulley wheels fitted to the ends of the rail, **characterised by** the fact that the support (10) is plastic injection moulded in one piece, comprising a flat piece (11), which define a upper face (11.1) and a lower face (11.2); said upper face (11.1) provided with a plateau (29) visibly circular and open with ribs (30) and with an elastic tab (31) also circular that follows the contour of the plateau (29), and on the perimeter cf said flat piece (11) there is a skirt (12) perpendicular to the upper face (11.1) with an opening (13), said skirt (12) extending to forms the front part (17) of a cylindrical surface (19), wherein the plateau (29) and the tab (31) acting as a shaft for a pulley wheel (23) incorporated to (29) and (31), this tab (31) flexes inwards for the press fitting of the pulley wheel (23); said flat piece (11) further comprises a wall (16) perpendicular to the skirt (12) from the lower end of which emerges a tab (14) parallel to the lower face (11.2); and said lower face (11.2) incorporates an appendix (20) forming a unit with the support (10) which present an orifice (22) for the pass of the shaft of a bolt which passing through the automobile door reinforcement panel secures the window opening mechanism to said panel, and a groove (37) that does not go completely through and a cylindrical lug (38) which enables to fit the support (10) to the rail (40).

2. "SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES" according to claim1 **characterized in**

that the pulley wheel (23) is a hoop formed by a concave surface (24) limited by skirts (25).

3. "SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES" according to claim 1 **characterized in that**, in an alternative version, the side surface of the plateau (29) presents a circular recess (28) acting as the pulley wheel.

4. "SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES" according to claim1 **characterized in that** the cylindrical surface (19) presents on its upper part a groove that passes through the part (46).

5. "SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES" according to claim 1 **characterized in that** the rail (40) presents a flat body (42) on one of sides an curved edge emerges (45), presenting said body (42) a tab (41) perpendicular to the body (42) and an orifice (44).

6. "SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILE" according to claim1 **characterized in that** the extension (20) presents a cylindrical-shaped outer configuration, and in its central part a core (48), joined to (20) with ribs (26), with cavities (26) between the core (48) and the extension (20), the core (22) having an orifice (22).

7. "SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING MECHANISMS FOR AUTOMOBILES" according to claim 1 **characterized in that**, alternatively, the extension (20) incorporates a bolt that goes through the door reinforcement panel, securing the window opening mechanism with a nut.

8. "SUPPORT AND RAIL FOR APPLICATION IN WINDOW OPENING M CHANISMS FOR AUTOMOBILES" according to claim1 **characterized in that**, in an alternative version, the support (10) for cables without sheath, has on the side surface of the plateau (29), a circular groove (32) acting in the same manner as the pulley wheel and some ribs (33), emerging from the front (11.2) a cylindrical appendix (20) and a tab (14) parallel to the front (11.2) leaving between (11.2) and the tab (14) an open cavity (15) for fitting the end of the rail (40).

9. "SUPPORT AND RAIL FOR APPLICATION IN WINDOWOPENING MECHANISMS FOR AUTOMOBILES" according to claim 1 **characterized in that** the support (10) incorporates a wall (47) that is adapted to act as a stop for the end of travel of the slider.

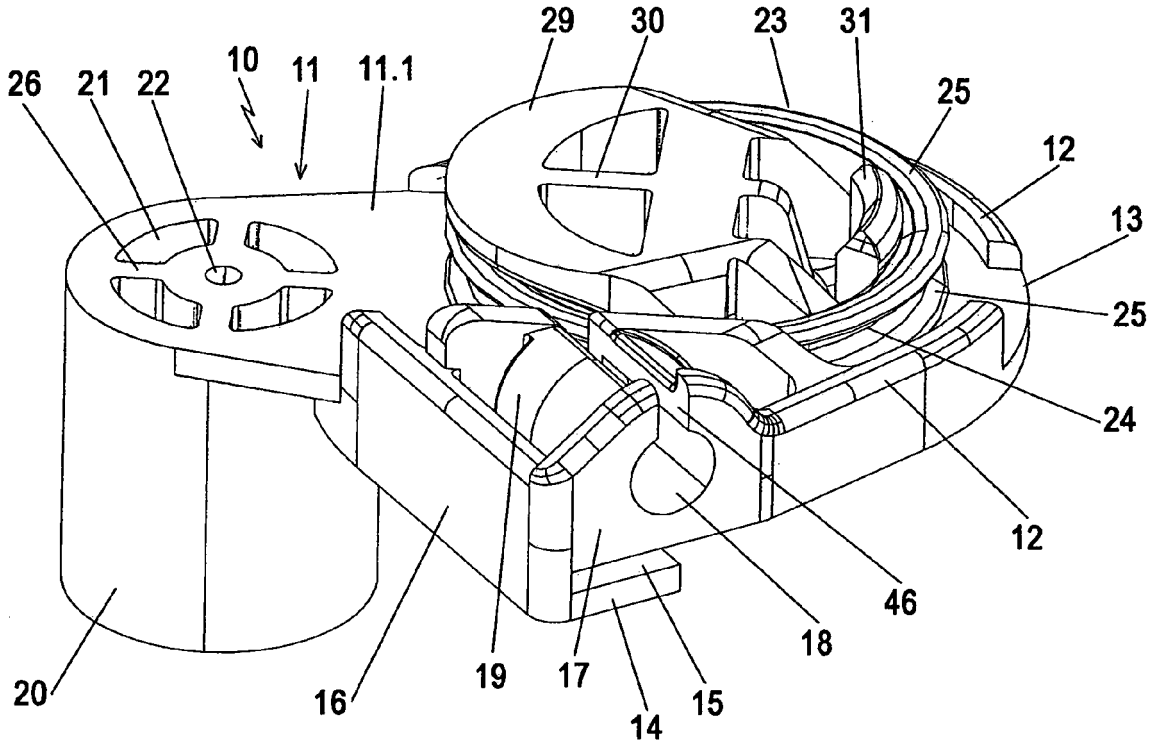

Fig. 1

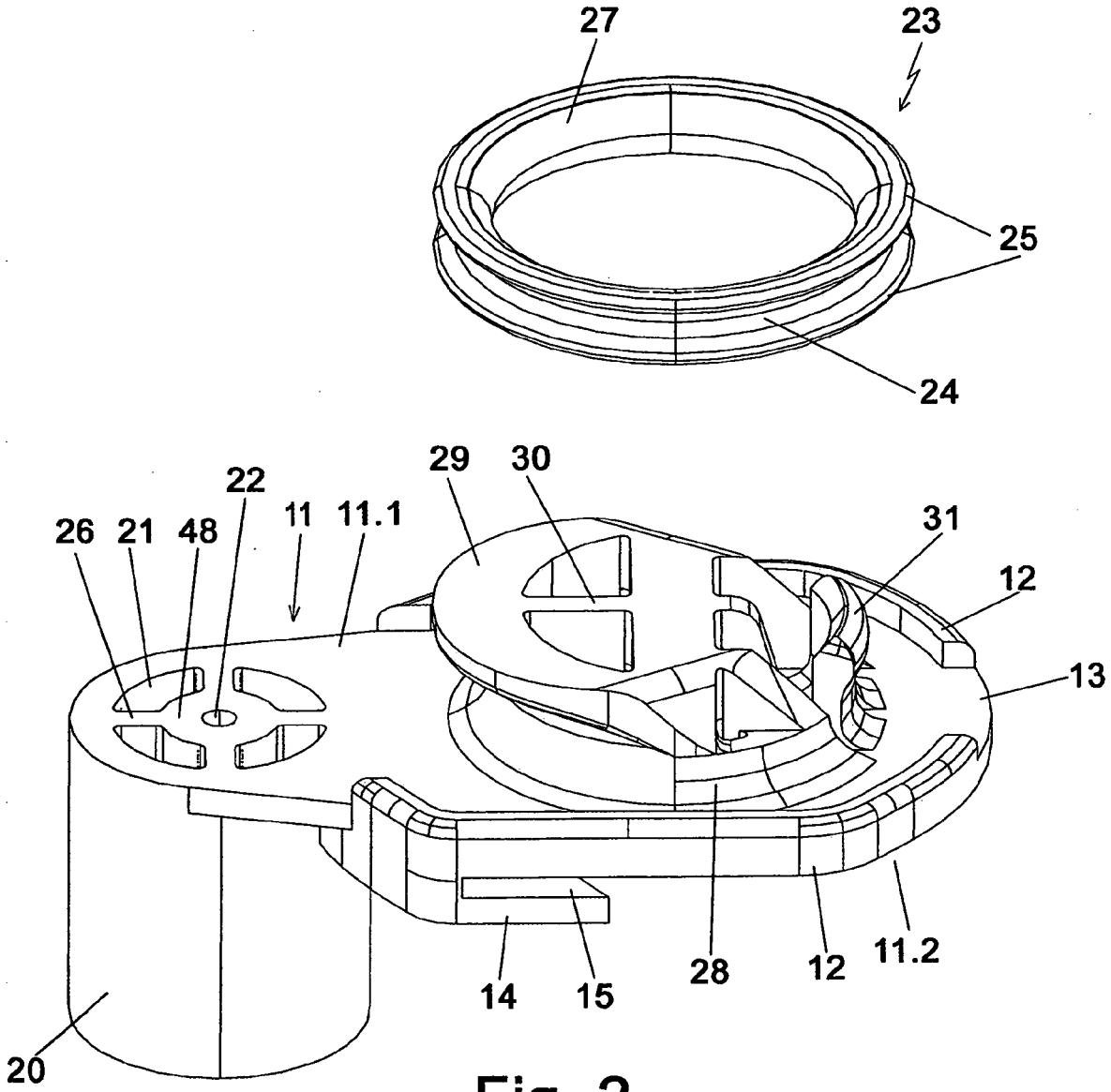

Fig. 2

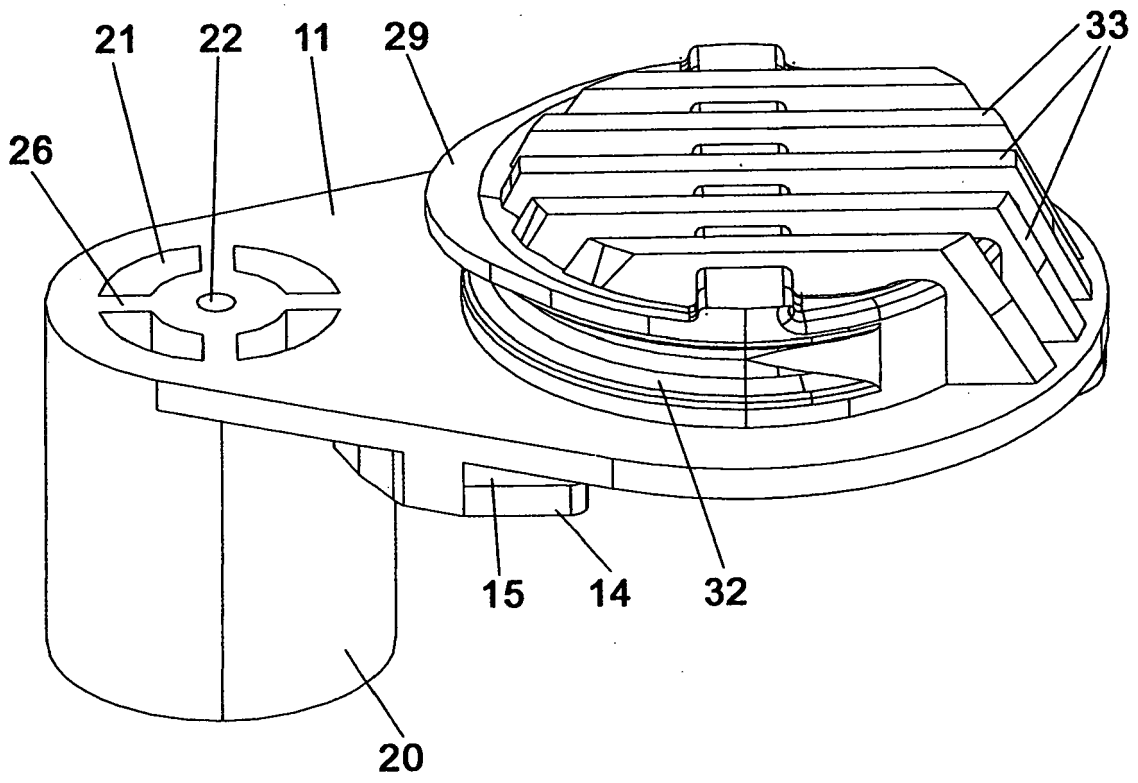

Fig. 3

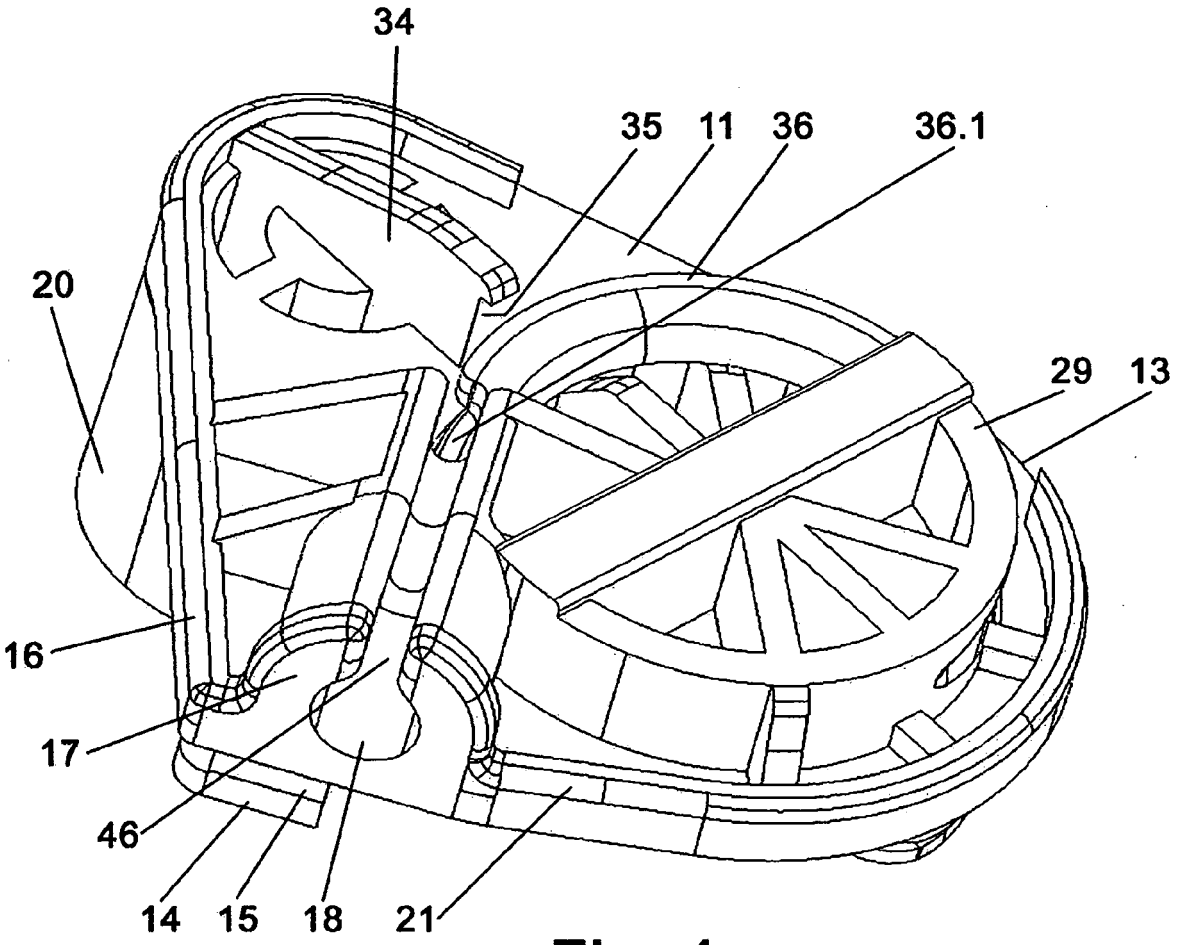

Fig. 4

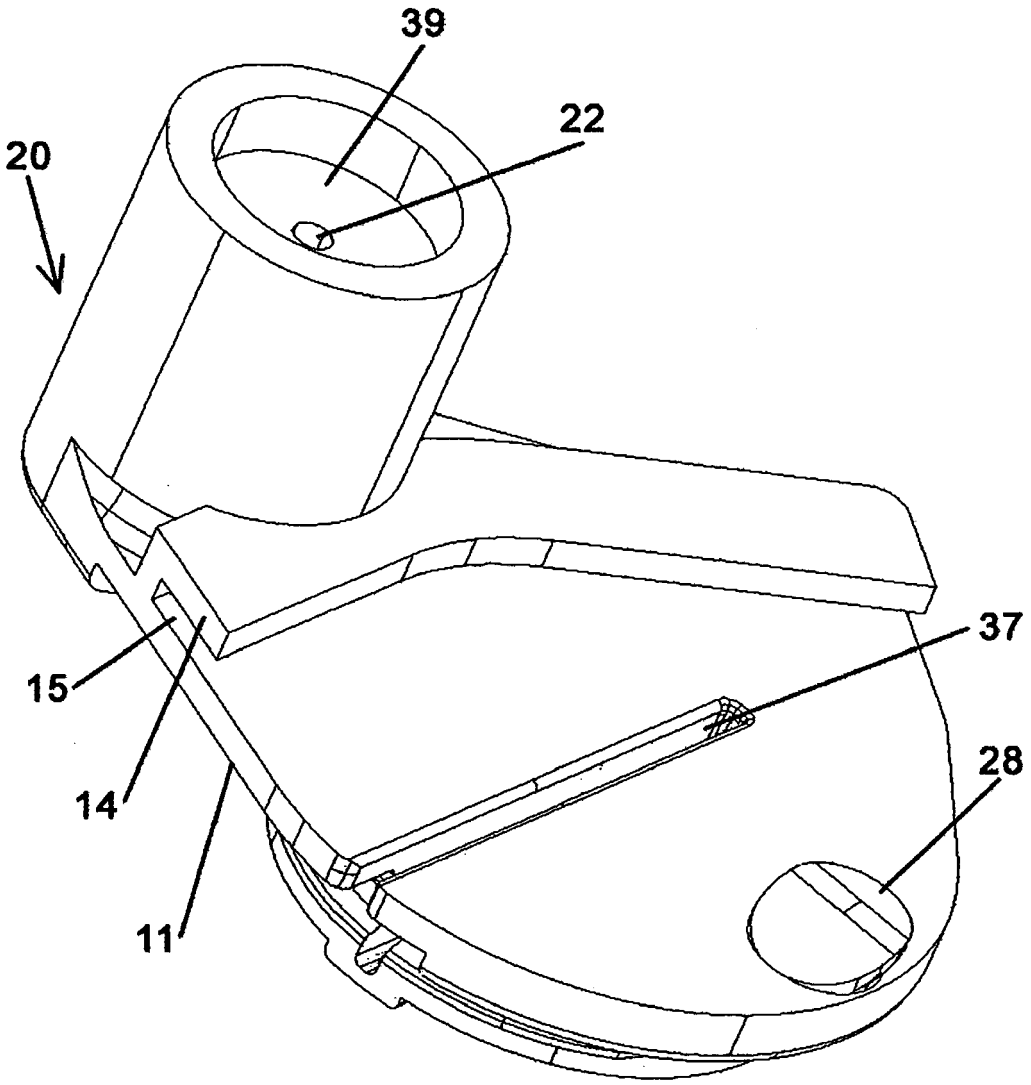

Fig. 5

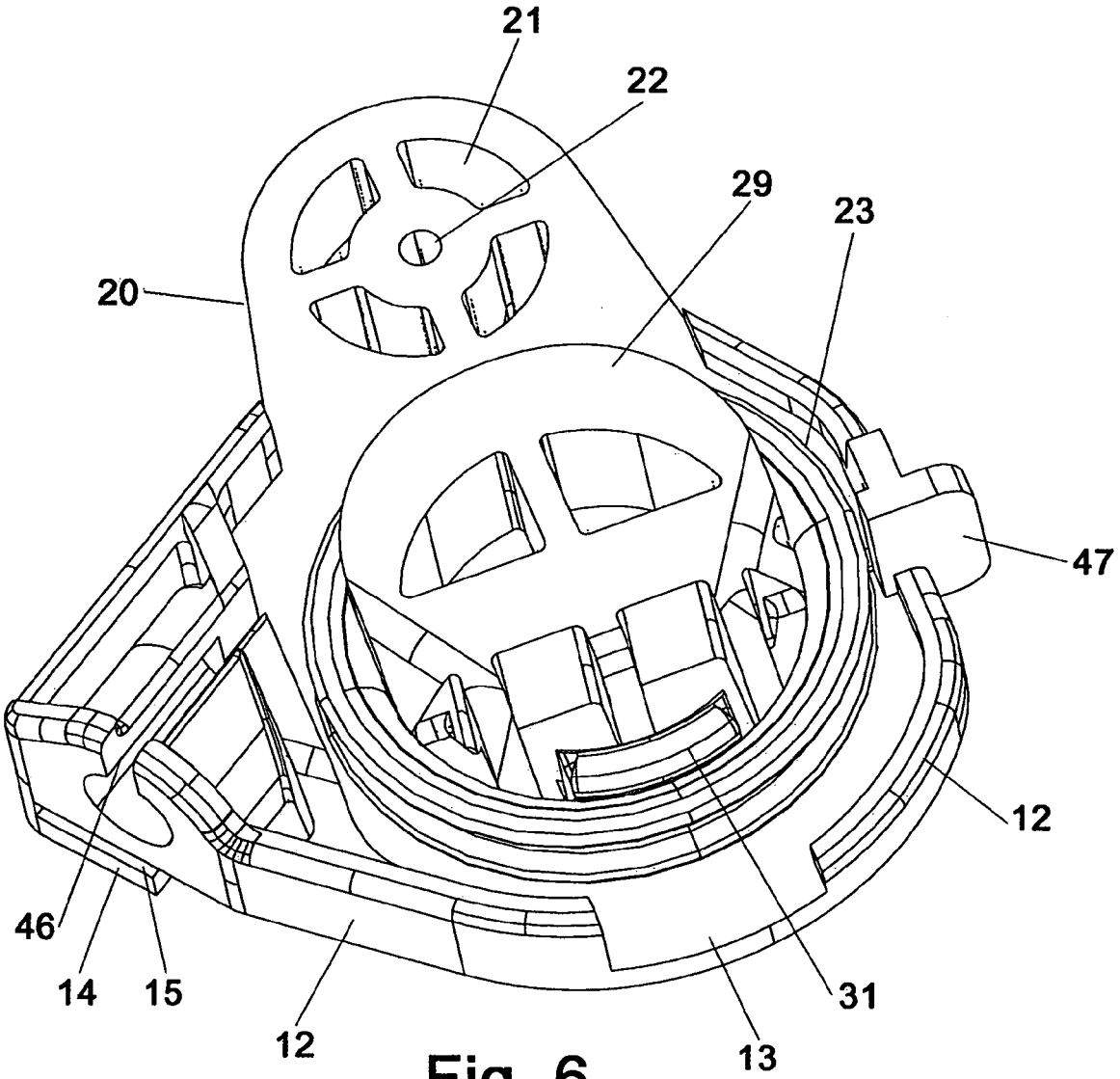

Fig. 6

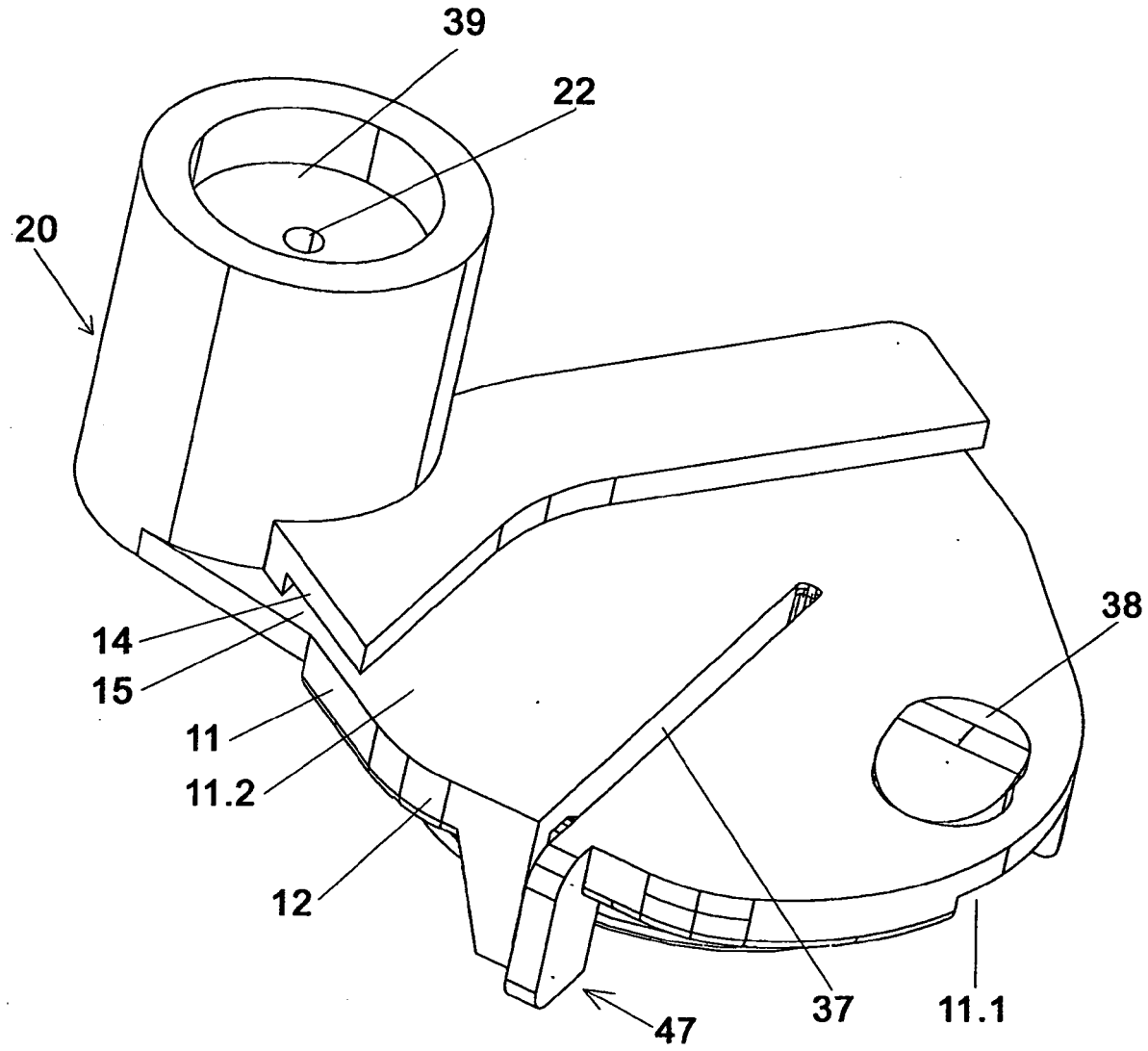

Fig. 7

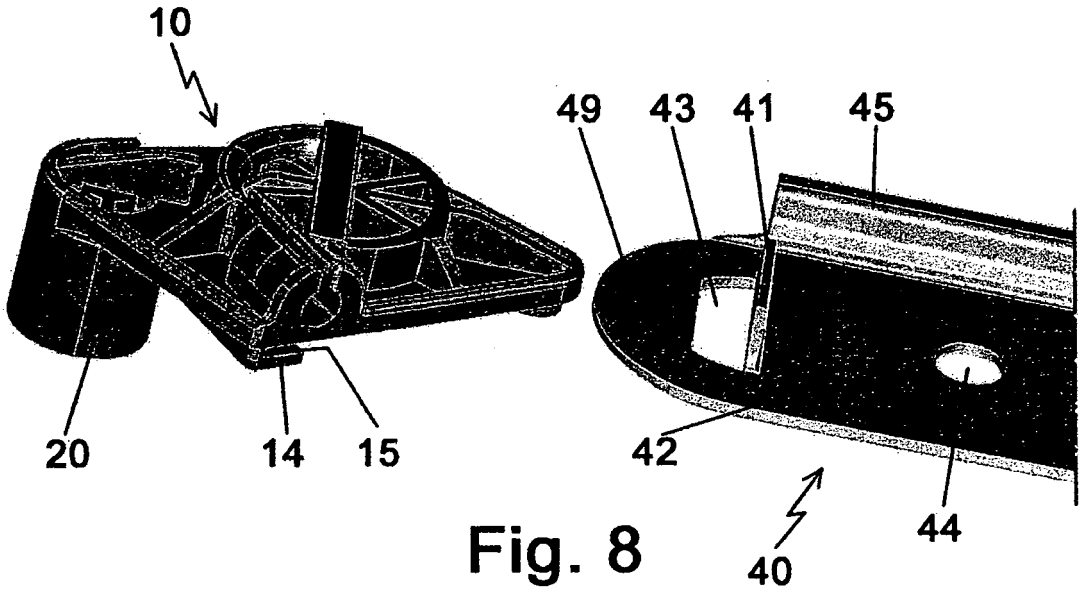

Fig. 8

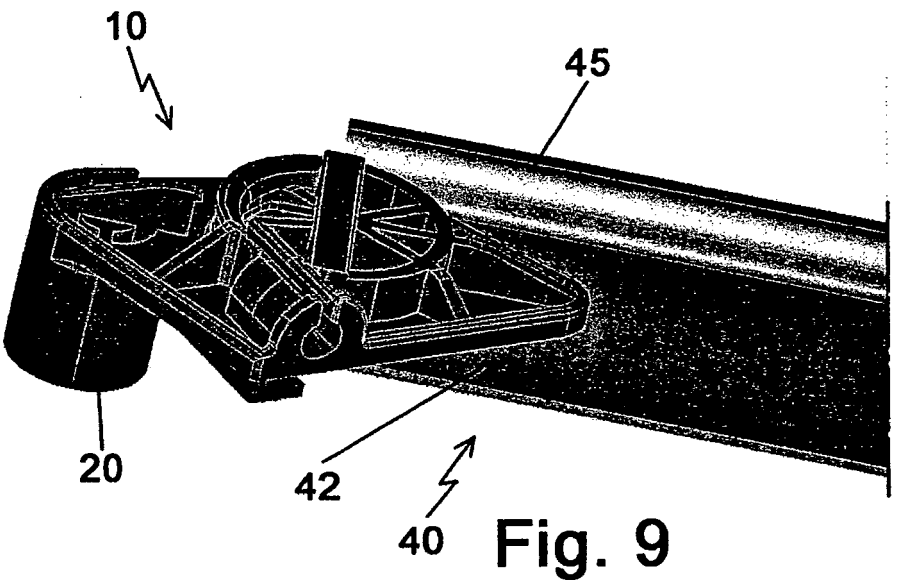

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 10 38 0151

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 02/094598 A1 (BROSE FAHRZEUGTEILE [DE]; FREYMUTH JAN [ES]; FREI MANFRED [ES]) 28 November 2002 (2002-11-28) * page 3, paragraph 3 * * page 7, paragraph 2-4 * * figures 2a, 3a *	1-11	INV. E05F11/48
A,D	EP 1 630 341 A1 (ARVINMERITOR GMBH [DE]) 1 March 2006 (2006-03-01) * paragraphs [0009], [0011], [0012], [0015] * * figure 2 *	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 May 2011	Klemke, Beate

CATEGORY OF CITED DOCUMENTS

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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 38 0151

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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24-05-2011

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