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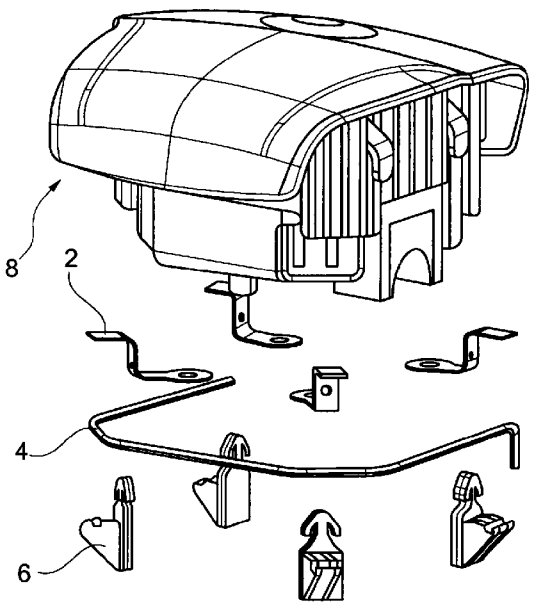

Fig. 1

(57) Abstract: The invention relates to a horn-activation device having a plurality of first horn contacts (2) and a second horn contact (4) for installation in a steering wheel (10), wherein in an installed state the first horn contacts (2) are held spaced apart from the second horn contact (4), and in order to activate the horn they form electrical contact with the second horn contact (4) in an activation state, in order to trigger an acoustic horn signal, wherein the first horn contacts (2) are embodied as leaf spring elements and are secured in electrically insulating mounts (6), and the second horn contact (4) is mounted spaced apart from the first horn contacts (2) in thet mounts (6).

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Horn-activation device

The invention relates to a horn-activation device having a plurality of first horn contacts and a second contact for installation in a steering wheel, wherein in an installed state the first horn contacts are held spaced apart from the second horn contact, and in order to activate the horn they form electrical contact with the second horn contact in an activation state, in order to trigger an acoustic horn signal.

WO 2006/076897 A1 discloses a generator carrier for a driver airbag module for installation in a steering wheel of a motor vehicle in which the two horn contacts which can be placed in electrical contact with one another are arranged on the generator carrier. One of the horn contacts is provided to be earthed electrically in an installation state of the generator carrier. In this context, an attachment region of the generator carrier is embodied and positioned relative to the earthed horn contact in such a way that when the generator carrier is properly attached to the attachment region electrical contact is formed between the earthed horn contact and the gas generator. The generator carrier is embodied as an electrical insulator. The horn contacts are embodied in a U shape and are attached both to a side of the generator carrier facing the driver and a side of the generator carrier facing away from the driver. The two horn contacts are electrically connected to one another by shaping of the horn contacts with the application of pressure, with the result that a horn signal is

triggered. Such an arrangement of the two horn contacts on opposite sides of the generator carrier is costly.

DE 10 2008 013 526 A1 discloses a safety device with a module carrier for an airbag unit and an airbag unit for installation in a steering wheel in a vehicle having two horn contacts. In their installation state, the horn contacts are electrically disconnected from one another, and in the activation state they can be placed in electrical contact with one another, in order to trigger an acoustic horn signal. At least one of the horn contacts is composed of a plurality of horn contact sections, wherein the airbag unit is connected in an electrically conductive fashion to the horn contact sections in order to complete the horn contact. Horn contact sections and the horn contact are electrically disconnected from one another by means of helical springs. For example electrical contact can be provided by pressing an airbag cover of the airbag module. Such a design is costly and difficult to mount.

The object of the present invention is to provide a horn-activation device which is of simple design and easy to mount.

According to the invention, this object is achieved by means of a horn-activation device having the features of the main claim. Advantageous refinements and developments of the invention are disclosed in the dependent claims, the description and the figures.

The horn-activation device having a plurality of first horn contacts and a second horn contact for

installation in a steering wheel, wherein in an installed state the first horn contacts are held spaced apart from the second horn contact, and in order to activate the horn they form electrical contact with the second horn contact in an activation state, in order to trigger an acoustic horn signal, provides that the first horn contacts are embodied as leaf spring elements and are secured in electrically insulating mounts, and the second horn contact is mounted spaced apart from the first horn contact in the mounts. As result of the configuration of the first horn contacts as leaf spring elements, the otherwise necessary cylindrical compression springs which hold the two contacts away from one another are dispensed with. The leaf spring elements serve at the same time as resetting elements in order to move an activation element back into the initial or installed state after activation of the horn and the elimination of the compressive force. As result of the joint mounting of the first horn contacts in the form of leaf spring elements with the second horn contact in corresponding mounts, wherein the mounts are embodied in an electrically insulating fashion, a contact-forming unit can be produced from the first horn contacts and second horn contacts as well as mounts, which contact-forming unit can be embodied as a module and can be mounted in such a way that it can be prefabricated.

The mounts are preferably embodied as separate components with attachment elements to be fixed to a steering wheel and/or an airbag module. By virtue of the configuration of the mounts with attachment elements it is possible to permit rapid mounting by

simply plugging or clipping the mounts into the respective corresponding components or devices on the steering wheel or on the airbag module. The attachment elements serve to secure the two horn contacts in a clamping or positively locking fashion to the respective other component and form the mechanical connection between the horn contacts and the steering wheel or an airbag module.

The mounts for the horn contacts have positively locking elements, in particular clips or hooks, by means of which, on the one hand, the horn contacts can be secured to the mounts and, on the other hand, the mounts themselves can be fixed to the steering wheel or to the airbag module by means of these positively locking elements.

The second horn contact is preferably embodied as a wire element or connecting wire between the mounts. As result it is possible for a plurality of first horn contacts to be assigned to one another. A first assignment of the first horn contacts to one another and to the second horn contact takes place by way of the wire element, and the mounts are also positioned with respect to the second horn contact, with the result that can be produced by means of the connecting wire which at the same time has electrical contact either with the negative pole or with the positive pole.

The leaf spring elements are preferably mounted in the mount in such a way that they can be shifted in the direction of the second horn contact, in order in this

way to close the electrical contact and to trigger a horn signal.

In the installed state the first horn contacts can be electrically connected to one another, for example by mounting the first horn contacts on a housing or a gas generator, as result of which, on the one hand, mechanical support of the first horn contacts and of the leaf spring elements which are embodied by the first horn contacts on the steering wheel or on the airbag module housing is implemented and, on the other hand, common electrical contact is formed and therefore only one electrical connection for, for example, earth or the phase is required.

The second horn contact is preferably clipped into the mounts in such a way that simple and fast mounting without additional tools is possible. The horn-activation device is preferably embodied as a module which can be attached to an airbag module or to a steering wheel. The mounts cause the horn contacts to be electrically insulated and mechanically fixed with respect to one another. In the non-installed state, the first horn contacts and leaf spring elements are not electrically connected to one another but instead electrical connection between the individual first horn contacts is only brought about by the mounting of the horn-activation device on the steering wheel or an airbag module, for example on a gas generator. The first horn contacts can also be clipped into the mounts in order also to produce a connection to the mounts there without a tool.

The first horn contacts can be coupled to a component which can move relative to a housing of an airbag module, while the second horn contact is mounted in a positionally fixed fashion on the housing by means of the mounts. Alternatively, the first horn contacts can be mounted on the steering wheel, and the second horn contact is mounted on a housing, for example an airbag module housing, which is mounted so as to be movable relative to the steering wheel, with the result that contact is formed either according to the floating-cover design or according to the floating-module design.

Exemplary embodiments of the invention are explained in more detail below with reference to the appended figures, in which:

Figure 1	shows an exploded illustration of an airbag module with a horn-activation device which is still not mounted;
Figures 2 to 6	show the individual mounting steps of the horn-activation device;
Figure 7	shows a view of a completely mounted horn-activation device on an airbag module from below;
Figure 8	shows an alternative embodiment of a horn-activation device, not yet mounted, in an exploded illustration;
Figures 9 to 12	show individual mounting steps;

Figure 13 shows an airbag module before the final mounting;

Figure 14 shows a variant of the invention with a single-part mount;

Figure 15 shows a view of a detail of the solution according to Figure 14;

Figure 16 shows a further variant of the invention with a single-part mount;

Figure 17 shows a variant of the embodiment according to Figure 14; and

Figure 18 shows a view of a detail of the solution according to Figure 17.

Figure 1 shows the components of a horn-activation device for an airbag module 8 in an exploded illustration. The horn-activation device has a plurality of first horn contacts 2, in the illustrated exemplary embodiment four first horn contacts 2 are provided, said horn contacts 2 interacting with a second horn contact 4 which is embodied as a continuous wire. Both the first horn contacts 2 and the second horn contact 4 are secured to a total of four mounts 6 and in an installed state they are oriented with respect to one another on the mounts 6 and are held with respect to one another such that they are spaced apart from one another. The closure of the horn circuit with the effect of triggering an acoustic horn signal

is not brought about until there is relative shifting of at least one of the first horn contacts 2 with respect to the second horn contact 4, with the result that the two horn contacts 2, 4 touch one another and produce an electrical contact.

The mounts 6 are equipped with a plurality of positively locking elements in order to fix the horn contacts 2, 4 and to be able to secure them in a positively locking fashion to the airbag module 8.

In the illustrated exemplary embodiment, the first horn contacts 2 are bent in a step shape and are embodied as leaf springs, wherein a spring tongue is positioned adjacent to or in the vicinity of the second horn contact 4, while the section which extends in the opposite direction serves to secure it to the airbag module.

Figure 2 shows the first mounting step for providing a horn-activation device. The second horn contact 4 which is essentially bent in a u shape is positioned on brackets 64 or projections which are integrally formed onto, or attached to, a carrier wall 61. The bracket 64 is embodied essentially in the form of a triangle and provides a bearing face for the second horn contact 4 in which a cutout 641, into which the second horn contact 4 is pressed, is formed. The mounting direction is indicated by the arrow. The mount 6 can be embodied in one piece, in particular as an injection moulded part and is preferably composed of a non-conducting material, in particular plastic. During the mounting process, the cutout 641 widens slightly and, after the

ending of the mounting movement, it moves slightly back, with the result that the second horn contact 4 is held in a positively locking and clamping fashion in the mount 6 by means of a restoring force. There is the possibility of the second horn contact 4 being shiftable in the longitudinal extent. The mobility of the respective mount 6 relative to the second horn contact is dependent on the holding force which is made available by the cutout 641.

After the mounting of the second horn contact 4 on the mounts 6, in the exemplary embodiment illustrated the four mounts 6 are held on the second horn contact 4 spaced apart virtually uniformly from one another. This state is illustrated in Figure 3. The four horn contacts 2 are subsequently fed through slots 62 in the carrier 61 of the mount 6. The slots 62 are located at a short distance above the bracket 64 and the cutout 641 for the second horn contact, with the result that in the mounted state a contact section 26 which joins a bearing section 27 at a right angle is positioned above and at a distance from the second horn contact 4, said bearing section 27 bearing on the carrier 61 and having a mounting section 28 which projects away from the carrier 61. For the purpose of mounting, the contact sections 26 are fitted in through the slots 62. A drilled hole or a mounting opening which can enter into engagement with a locking device 67, for example a pin or an element of sprung design, is formed in the bearing section 27. The locking element 67 on the carrier 61 penetrates the cutout in the bearing section 27 and brings about positively locking and fixing of the first horn contact 2 on the mount 6. Overall, after

the ending of the mounting four horn contact pairs are generated which are held spaced apart from one another in the mounted state.

Figure 4 shows the components in their completely mounted state. The first horn contact 4 is provided with six mounts 6, to which the first horn contacts 2 are also secured in a positively locking fashion. The spatial assignment of the mounts 6 and of the first horn contacts 2 to one another is carried out by means of the second horn contact 4. In the final-mounted position, the first horn contacts 2 are arranged spaced apart from the first horn contact 4. A module 20 is formed which can be secured to the airbag module 8. Positively locking elements 68 which permit a plug-type connection to a cover or an activation element are formed on the mounts 6. The positively locking elements 68 are embodied in the manner of arrows and are provided with spring clips, with the result that after the insertion of the mounts 6 with the positively locking elements 68 into the respective receptacle 86 in the airbag module 8 or a module cover inserted and positively locked. This step of mounting is illustrated in Figure 5.

Figure 6 shows the last mounting step after the module 8 composed of mounts 6, the second horn contact 4 and the first horn contacts 2 has been fixed or prefixed to the module housing cover with the positively locking elements 68 of the mounts 6. The airbag module 8 is turned round and the attachment sections 28 with the cutouts formed therein are positioned on an airbag module housing or a gas generator 11 by means of

threaded pins 82, and subsequently fixed with nuts 84. By means of the nuts 84, on the one hand the first horn contacts 2 which are embodied as leaf springs are mechanically secured and, on the other hand, electrical contact is formed with the gas generator 11 or an airbag module housing, with the result that all the first horn contacts 2 are electrically connected to one another via the respective housing.

In Figure 7, the completely mounted airbag module 8 is shown with the horn-activation device attached thereto. The mounts 6 are held in a positively locking fashion in the respective corresponding cutouts 86. The nuts 84 hold the attachment sections 28 of the first horn contacts 2 on the airbag module housing or the gas generator 11 and at the same time bring about electrical contact, for example with the earth of an electrical circuit. The cover 88 of the airbag module housing 8 can be shifted relative to the module housing 80, with the result that in the event of relative shifting of the cover 88, which is mounted as a movable component on the housing 80, the contact section 26 for the first horn contact 2 is moved in the direction of the second horn contact 4, and in this way the electrical circuit of the horn signal can be activated.

Figure 8 shows an exploded illustration of a variant of the invention with a steering wheel 10 on which the mounts 6 are mounted. The second horn contact 4 is again embodied as a continuous wire. The four first horn contacts 2 as leaf springs are embodied essentially in the shape of an e and have a lower support section 28, a horizontal contact section 26

running essentially parallel thereto, and a bearing section which is arranged between the latter and is essentially in the shape of a v. A spring effect can be achieved by means of the V shape of the bearing section 27. The airbag module 8 with a module housing 80 and a cover 88 attached thereto forms the driver-side terminating point.

Figure 9 shows the second horn contact 4 and the four mounts 6. The mount 6 is embodied essentially in the shape of an L and has a foot region 60 as well as a carrier 61 whose upper side, which lies opposite the foot region 60, has a cutout 641 for the positively locking, preferably clamping securement of the second horn contact 4. For the purpose of mounting, the second horn contact 4 is introduced into the respective cutouts 641, for latched connections or the like.

Figure 10 shows the mounting in which the first horn contacts 2, which are inserted with their contact sections 26 into slots 62 in the mounts 6. The contact sections 26 are located above the mounted second horn contact 4 and cover the second horn contact 4. The support section 28 is guided along on the underside of the foot section 60 and can be secured in a positively locking fashion thereto by means of a cutout and a projection. The bearing section 27 is embodied in the shape of a V and has a slot in order to increase the flexibility. When a compressive force is applied which acts in the direction of the support section 28, the contact section 26 is forced downward in the direction of the second horn contact 4, with the result that electrical contact arises after the activation.

For the purpose of final mounting of the module which is in the finished state in Figure 4, the module 20 is screwed to the steering wheel 10 by means of four screws 85. The screws 85 penetrate cutouts in the foot section 60 in the mounts 6 and thereby press the underside of the support section 28 against the base body of the steering wheel 10. An electrical connection is produced between the individual first horn contacts 2, for example to earth, via the base body of the steering wheel 10. In the illustrated state according to Figure 11, the first horn contact 2 is held spaced apart from the second horn contact 4.

The final-mounted state of the horn-activation device in the form of the module 20 is illustrated in Figure 12, from which the base body of the steering wheel 10 can be inferred. The mounts 6 are connected to the steering wheel 10 via the screws 85. The contact regions 26 are located above the second horn contact 4 within the slot 62 in the carrier 61 of the mount. For the purpose of activation, the contact regions 26 are shifted downward in the direction of the second horn contact 2, for example by shifting the entire airbag module 8 with the cover 88 and the housing 2 downward. The airbag module 8 is supported elastically with respect to the steering wheel 10 by means of the first horn contacts 2 which are embodied as leaf springs, with the result that in addition to the provision of a horn signal when contact is formed, at the same time elastic resetting and elastic bearing of the airbag module 8 on the steering wheel 10 are provided by means of the leaf springs.

For the purpose of the final mounting, as illustrated in Figure 13, the airbag module 8 is plugged onto the mounts 6, electrical contact is made with the gas generator 11 and the electrical contacts for the horn contacts 2, 4 are also applied and the activation of a horn signal can be carried out by shifting the airbag module 8 in the direction of the steering wheel 10.

Figure 14 shows a variant of the invention in an airbag module in which the mount 6 is embodied in one part. The mount 6 is embodied in one part and in the illustrated exemplary embodiment has four first horn contacts 2 which are embodied as leaf spring elements and are secured to the mount 6 via, in each case, a nut with a washer. The mount 6 has, on the side lying opposite the first horn contacts 2, a receptacle space for a gas generator 11 which is surrounded at least partially by the mount 6 and as a result becomes part of an airbag module. The mount 6 has positively locking elements 65 which protrude from the underside and in the illustrated exemplary embodiment are oriented counter to the deploying direction of an airbag and which serve to secure the mount 6, embodied in one part, for example to a steering wheel 10 or to another vehicle component. Furthermore, guides 68 are formed, in each of which a receiving groove or a positive locking element for receiving the second horn contact 4, embodied here as a circumferential wire, is arranged. Overall, four guides 68 are present which, together with further mounts, secure the second horn contact 4 to the mount 6.

A movable component 88 in the form of a housing cover or of a pressure pot is also attached to the mount 6, but to a cylindrical side wall 69 which projects from a base surface of the mount 6, wherein the movable component 88 is supported on the mount 6 in a rotationally fixed and longitudinally displaceable fashion by means of cutouts and projections. If the movable component 88 is moved downward in the direction of the horn contacts 2, 4, a lower edge 880 enters into contact with the first spring contact 2 and bends it in the direction of the second spring contact 4, which is supported at a distance therefrom in the home position.

The home position is shown enlarged in Figure 15, in which it can be seen that the first horn contact 2 in the form of a V-shaped leaf spring element and the second horn contact 4 in the form of a spring are secured spaced apart from one another to the mount 6. Guide clips 660 for the movable component 88 are formed on the mount 6, and also shown are the cutouts in the side wall of the movable component 88 as well as the upper edge 880. If the movable component 88 is moved in the direction of the second horn contact 4 counter to the spring force of the leaf spring elements 2, the circuit is closed and the horn signal is triggered. As soon as the user of the vehicle relieves the loading on the movable component 88, the restoring force of the leaf spring elements 2, which simultaneously form the first horn contact, moves back with the movable contact 88 into the home position again. The first horn contact 2 is electrically coupled to the horn circuit via a washer with a connecting contact 22, and an electrical connection of all four horn contacts 2 can be

implemented by means of the gas generator 11 which is arranged inside the mount 6.

A variant of the invention is shown in Figure 16 in which the mount 6 is embodied as a separate component in the form of a module. The second horn contact 4 is secured to the mount 6 with clip-type guides. The first horn contacts 2, in the illustrated exemplary embodiment three first spring contacts 2 with spring tongues oriented in opposing directions to one another, are attached by means of screws to the mount 6 which is embodied in one part. In order to activate a horn, a compressive force which is directed in the direction of the mount 6 is applied to the first horn contacts 2 which are located spaced apart from the second horn contact 4 in the illustrated home position. The moving force which is to be applied is applied, for example, via an airbag module or a steering wheel cover. The restoring force for the activation element (not illustrated) is applied via the first horn contacts 2.

A further variant of the invention is shown in Figures 17 and 18. The design corresponds essentially to that in Figures 14 and 15, but the movable component 88 is not illustrated. This illustration shows the guide clips 660 which protrude laterally from the wall 69 and extend from the base of the mount 6 in the deployment direction. The deployment direction is that direction in which the airbag which is not illustrated unfolds when the gas generator 11, which is also located in the mount 6 is activated. In the illustrated exemplary embodiment, three first horn contacts 2 in the form of leaf spring elements are shown. The second

horn contact 4 is partially embodied as a conductor track and leads into copper rivets as a contact region of the second horn contact 4. The home position with the horn contacts 2, 4 which are spaced apart from one another is shown in Figure 18. The first horn contact 2 which is embodied as a leaf spring protrudes radially outwardly beyond the mount 6 and therefore provides a possibility for entering into engagement with the movable contact 88. A contact clip 22 can be integrally formed onto one of the first horn contacts 2 in order to bring about contact with an electric circuit. The individual separate first horn contacts 2 can be coupled electrically to one another via the gas generator 11.

The restoring force which is applied to the movable component can be adjusted by means of the shape and dimensioning of the first horn contacts 2 and the material selected therefor. By this means, the activation force can be adjusted accordingly. It is also possible to adjust, by means of the shaping, the horn travel, that is to say the distance between the first horn contact 2 and the second horn contact 4 which has to be overcome in order to close the horn circuit.

Patent claims

1. Horn-activation device having a plurality of first horn contacts (2) and a second horn contact (4) for installation in a steering wheel (10), wherein in an installed state the first horn contacts (2) are held spaced apart from the second horn contact (4), and in order to activate the horn they form electrical contact with the second horn contact (4) in an activation state, in order to trigger an acoustic horn signal, **characterized in that** the first horn contacts (2) are embodied as leaf spring elements and are secured in electrically insulating mounts (6), and the second horn contact (4) is mounted spaced apart from the first horn contacts (2) in thet mounts (6).

2. Horn-activation device according to Claim 1, characterized in that the mounts (6) are embodied as separate components with attachment elements to be fixed to the steering wheel (10) and/or an airbag module (8).

3. Horn-activation device according to Claim 1 or 2, characterized in thatthe mounts (6) have positively locking elements, in particular clips or hooks.

4. Horn-activation device according to one of the preceding claims, characterized in that the second horn contact (4) is embodied as a wire element or connecting wire between the mounts (6).

5. Horn-activation device according to one of the preceding claims, characterized in that the leaf spring elements (2) are mounted in the mount (6) in such a way that they can be shifted in the direction of the second horn contact (4).

6. Horn-activation device according to one of the preceding claims, characterized in that in the installed state the first horn contacts (2) are electrically connected to one another.

7. Horn-activation device according to one of the preceding claims, characterized in that the second horn contact (4) is clipped into the mounts (6).

8. Horn-activation device according to one of the preceding claims, characterized in that the horn-activation device is embodied as a module (20).

9. Horn-activation device according to Claim 8, characterized in that the module (20) is attached to an airbag module (8) or the steering wheel (10).

10. Horn-activation device according to one of the preceding claims, characterized in that the first horn contacts (2) are coupled to a component (88) which can move relative to a housing (80) of an airbag module (8), and the second horn contact (4) is mounted in a positionally fixed fashion on the housing (80) by means of the mounts (6).

11. Horn-activation device according to one of Claims 1 to 9, characterized in that the first horn contacts (2) are mounted on the steering wheel (10), and the second horn contact (4) is mounted on a housing (12) which is mounted so as to be movable relative to the steering wheel (10).)

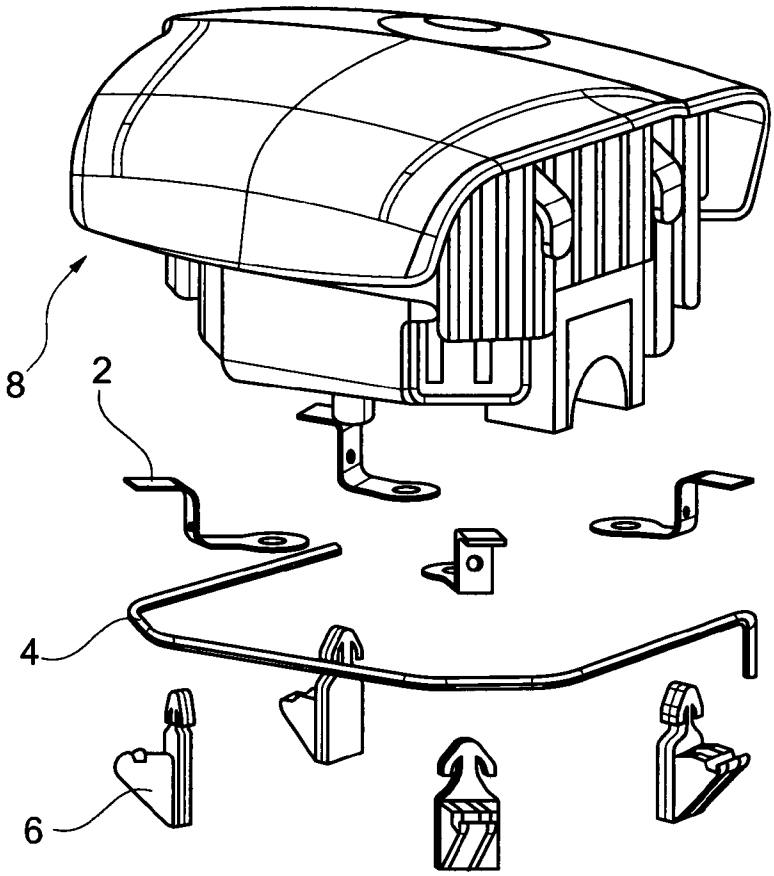

Fig. 1

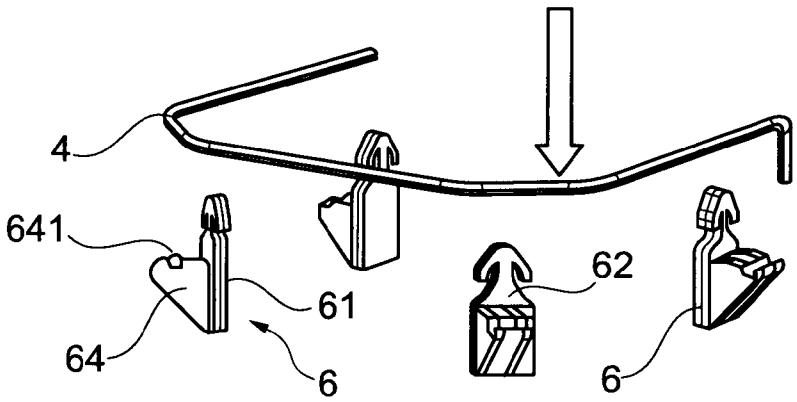

Fig. 2

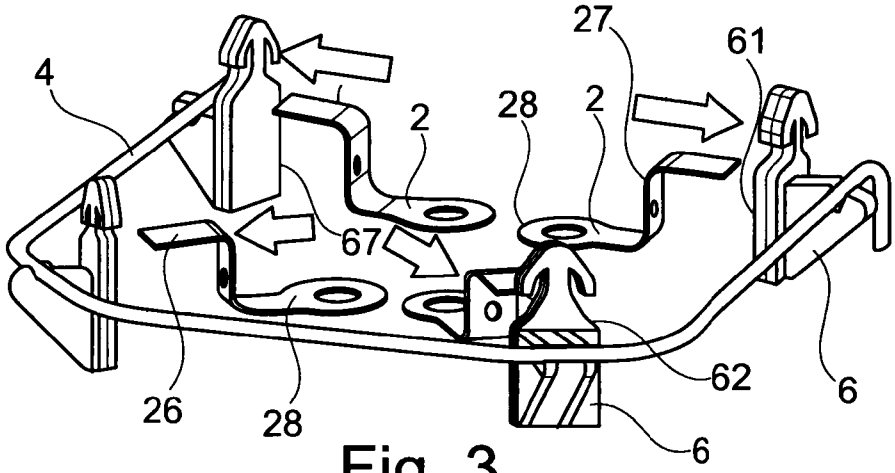

Fig. 3

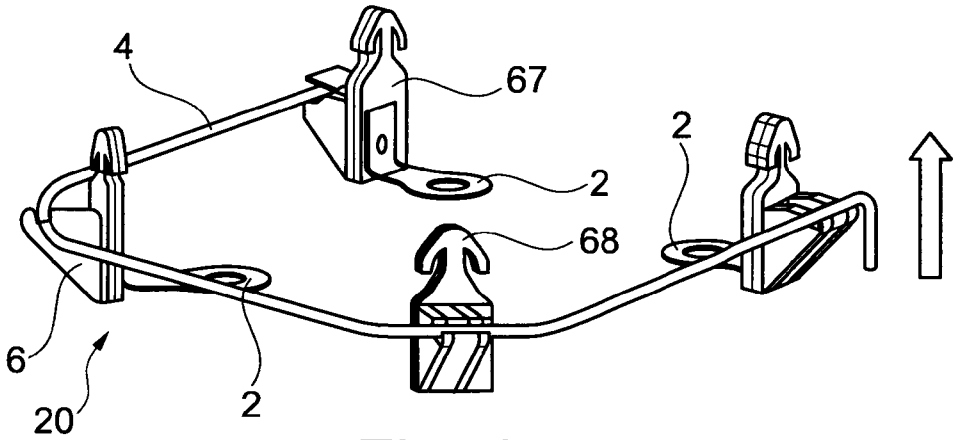

Fig. 4

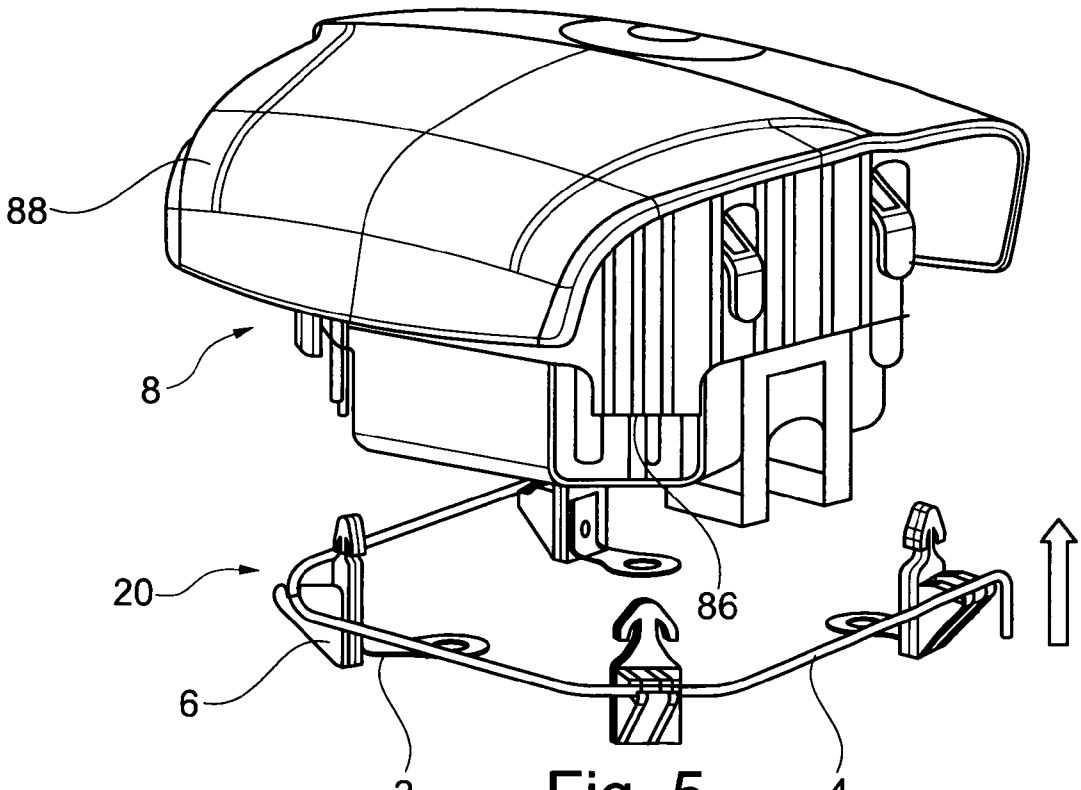

Fig. 5

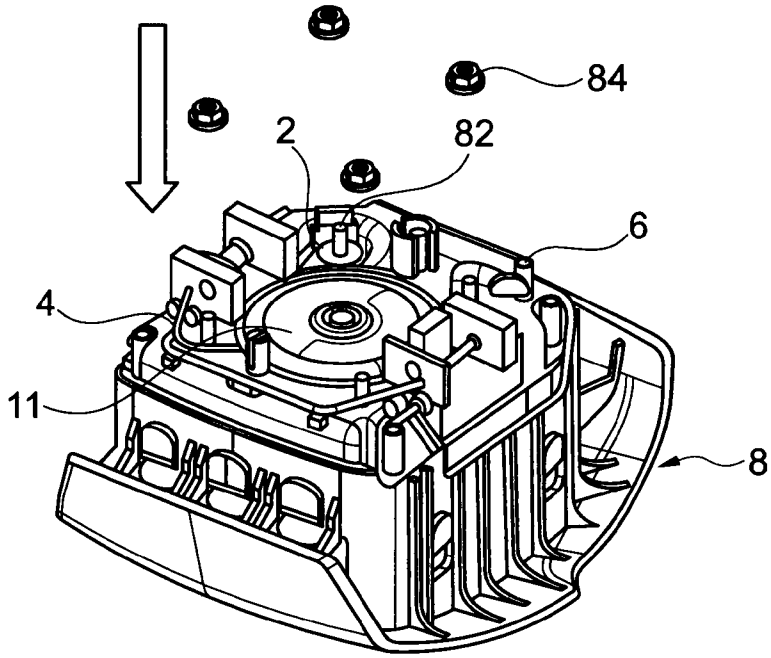

Fig. 6

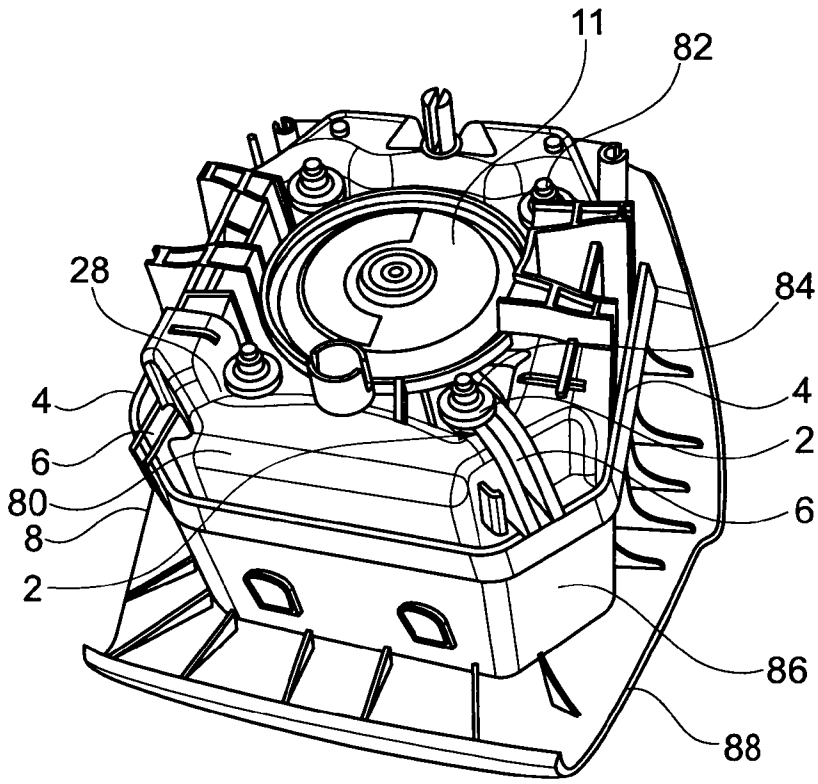

Fig. 7

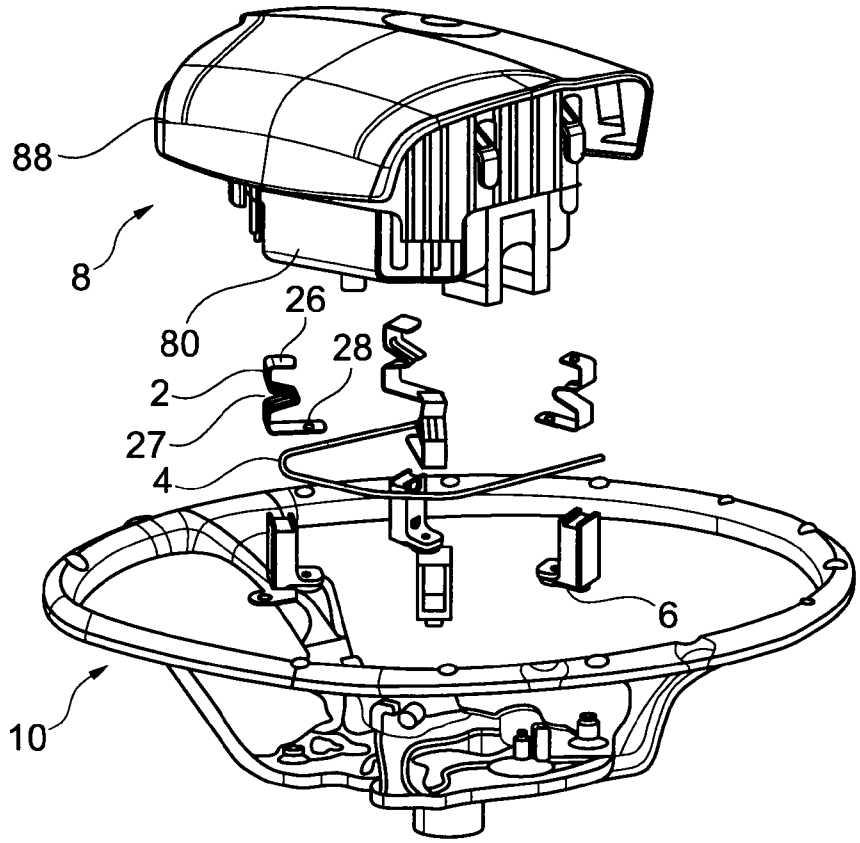

Fig. 8

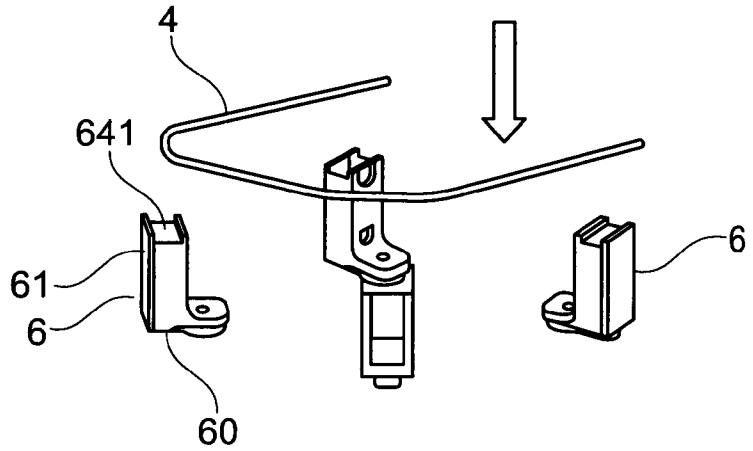

Fig. 9

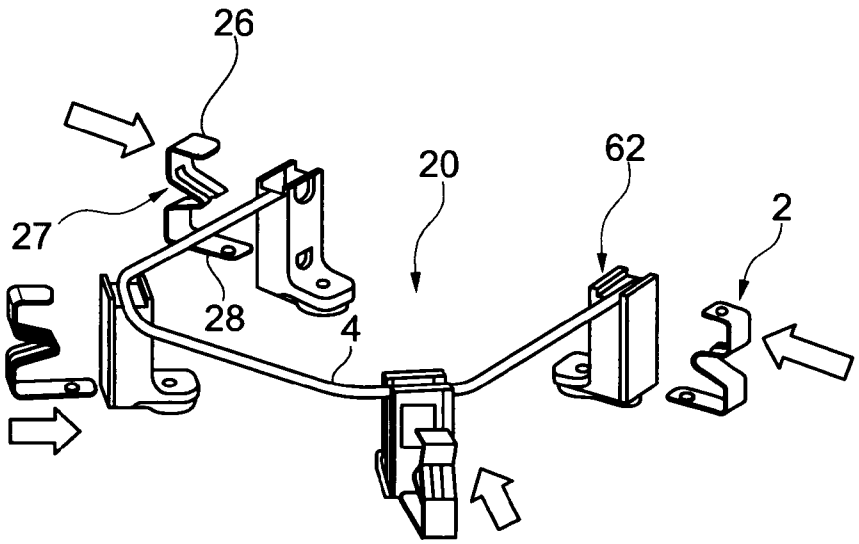

Fig. 10

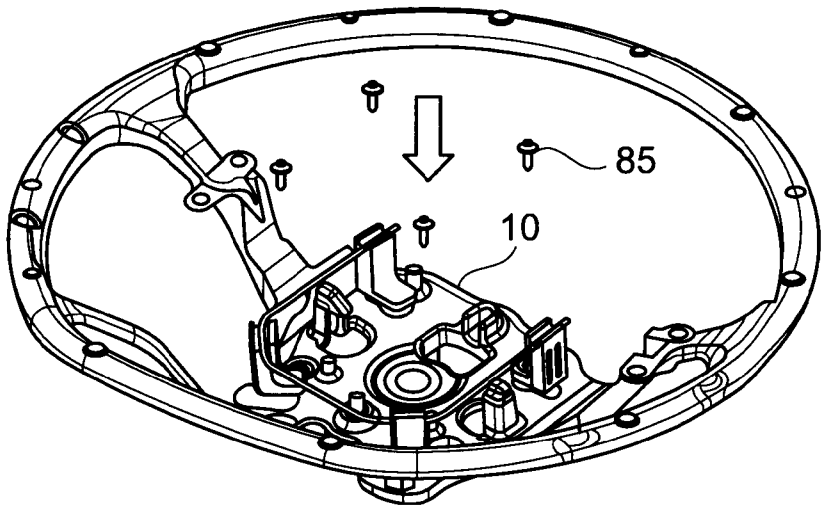

Fig. 11

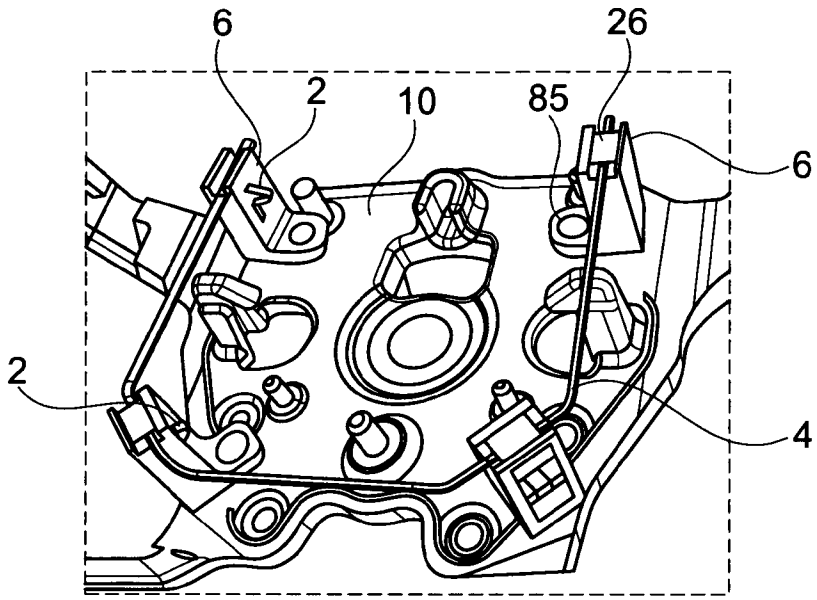

Fig. 12

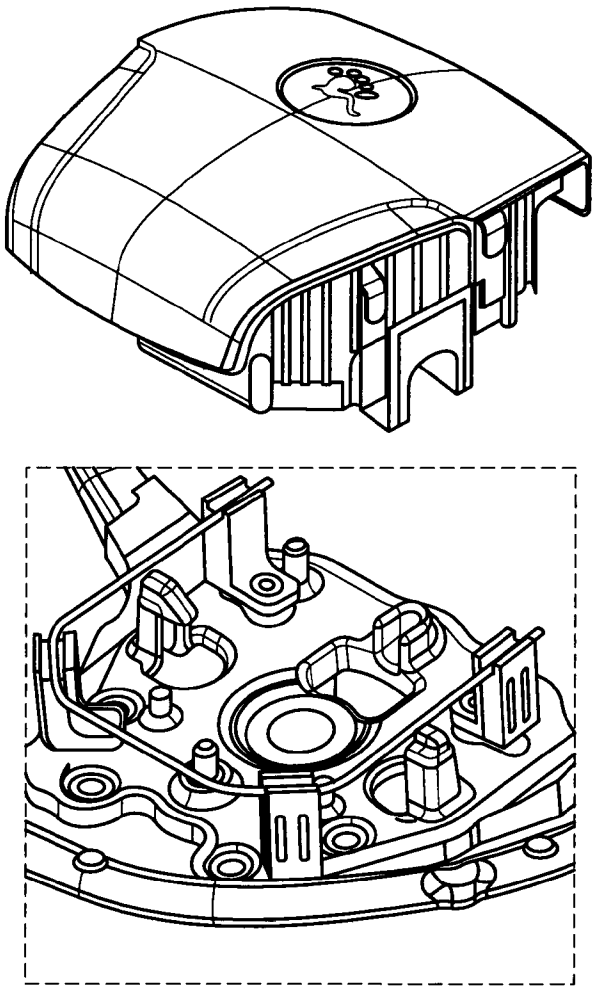

Fig. 13

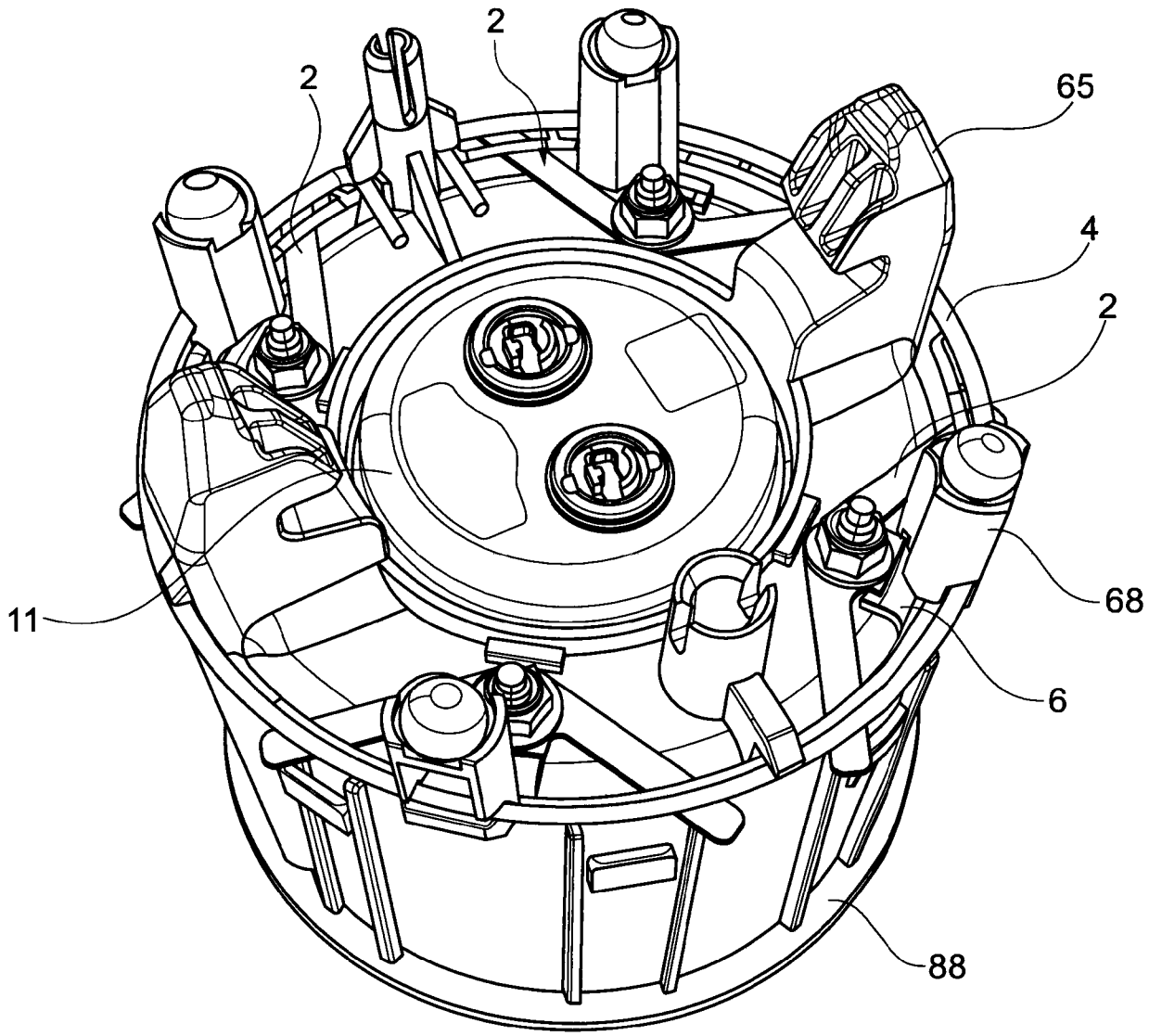

Fig. 14

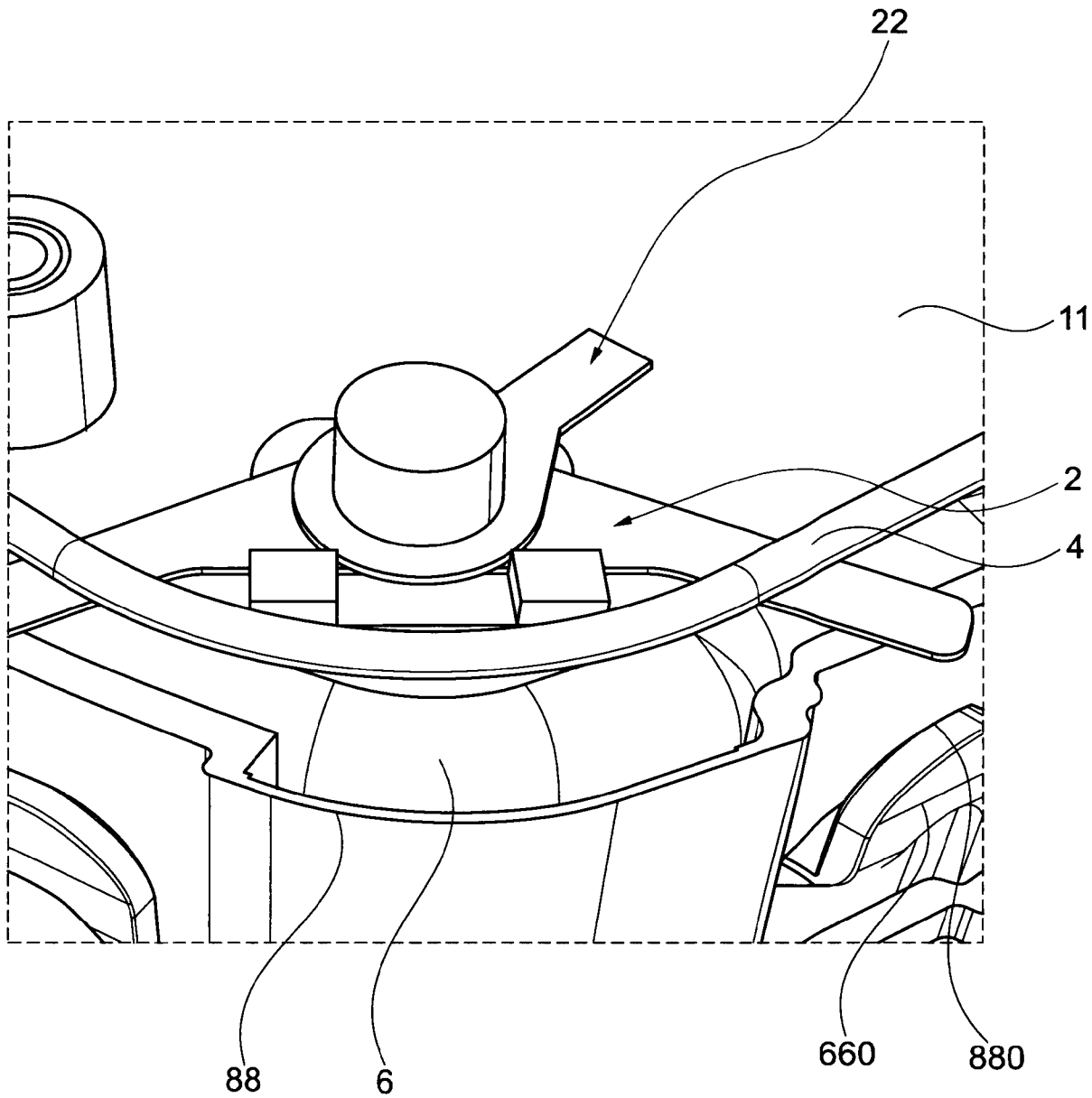

Fig. 15

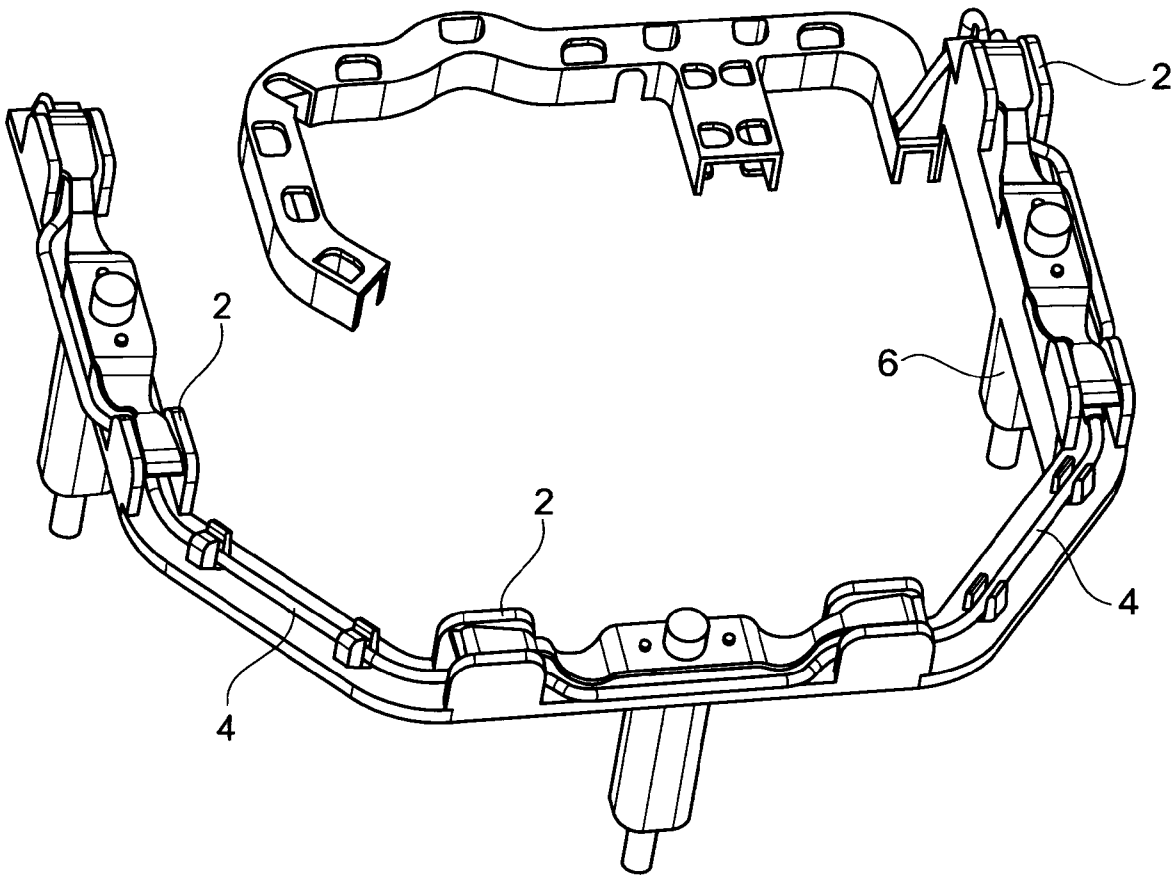

Fig. 16

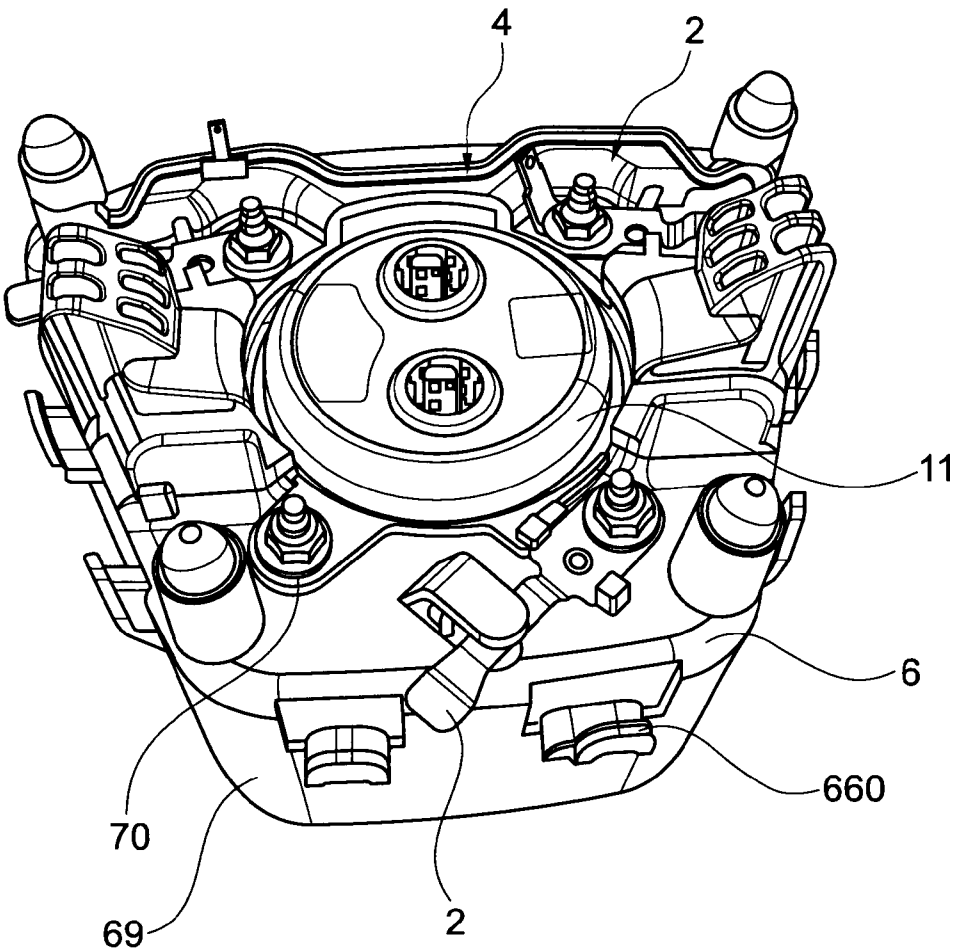

Fig. 17

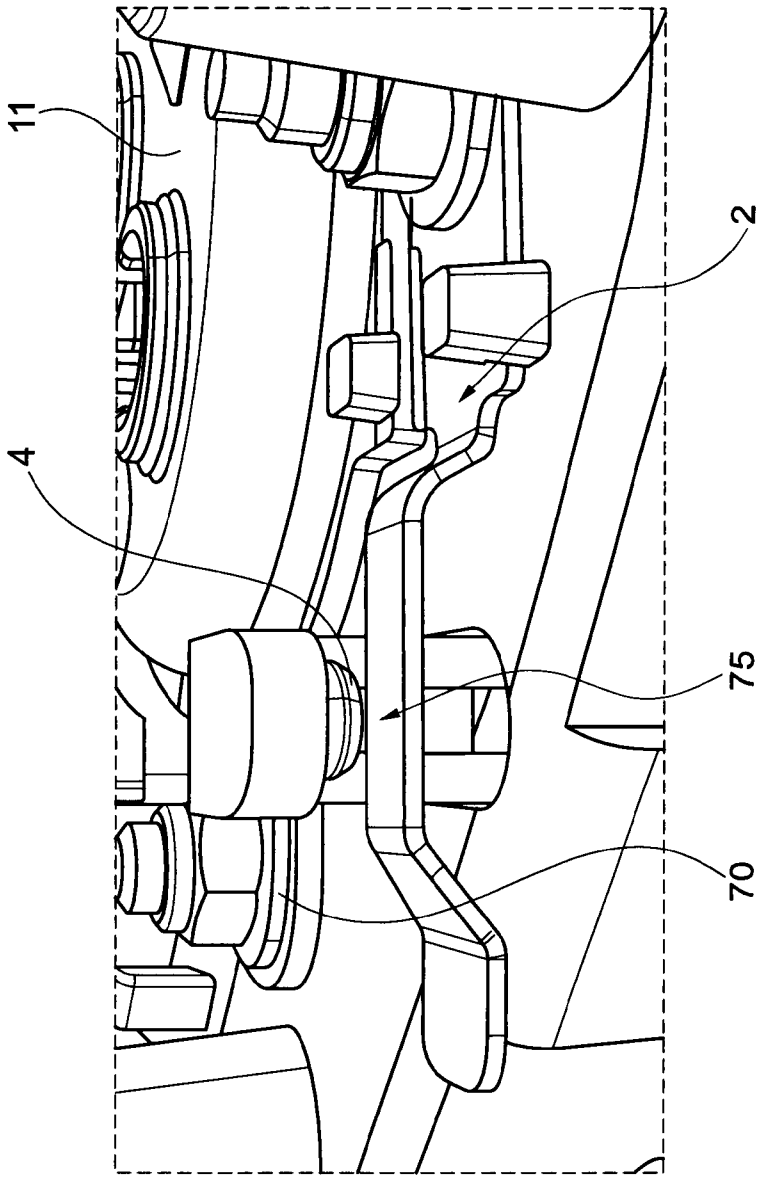

Fig. 18

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/071586

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60Q5/00
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)
B60Q B60R

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

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X	US 5 303 952 A (SHERMETARO MARK [US] ET AL) 19 April 1994 (1994-04-19) column 3, line 59 - column 6, line 57; figures 1-5	1,2,5, 7-10
X	US 2006/016613 A1 (MCLAUCHLAN RAYMOND B [US]) 26 January 2006 (2006-01-26) paragraphs [0021] - [0039]; figures 1-10	1-5,7-9, 11
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X	US 5 593 178 A (SHIGA ICHIZOU [JP] ET AL) 14 January 1997 (1997-01-14) column 4, line 14 - column 10, line 67; figures 1,3,4-7	1-9

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

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 October 2017	27/10/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Goltes, Matjaz

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/071586

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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X	DE 20 2015 009031 U1 (TAKATA AG [DE]) 14 July 2016 (2016-07-14) paragraphs [0028] - [0043]; figures 1-4	1,5,6,8, 9
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International application No
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