HU000033273T2

(19) **HU**

(11) Lajstromszám: **E 033 273**

(13) **T2**

MAGYARORSZÁG
Szellemi Tulajdon Nemzeti Hivatala

EURÓPAI SZABADALOM
SZÖVEGÉNEK FORDÍTÁSA

(21) Magyar ügyszám: **E 11 006333**
(22) A bejelentés napja: **2011. 08. 02.**

(96) Az európai bejelentés bejelentési száma:
EP 20110006333
(97) Az európai bejelentés közzétételi adatai:
EP 2444646 A1 **2012. 04. 25.**
(97) Az európai szabadalom megadásának meghirdetési adatai:
EP 2444646 B1 **2017. 04. 19.**

(51) Int. Cl.: ***F02M 26/66*** *(2006.01)*
F16K 27/02 *(2006.01)*
F16K 27/10 *(2006.01)*
F02M 26/72 *(2006.01)*

(30) Elsőbbségi adatok:
102010048865 **2010. 10. 19.** **DE**

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(54) **Kipufogógáz-visszavezető szelep**

Exhaust gas recirculation valve

The invention relates to an exhaust gas recirculation valve having a valve housing and a valve member which is moveable into closure position or inversely away from it into an opening position via a drive device by means of a lift member guided in a shaft guide against a valve seat area of a valve seat ring and closes or opens the passage to a valve chamber, wherein the valve housing is assembled of a plurality of components, of which one component at least limits the tightly closed valve chamber, and another component has a housing part for at least parts of the drive device of the lift member, wherein the one component has securely and tightly connected body parts, which are adjacent to the housing part of the other component.

Such an exhaust gas recirculation valve is known from US 4,674,464 A. In this case, a separate valve seat area is provided in the housing for the valve, and the housing on the side of the actuating element is connected to a motor housing, which is fastened via an insulation.

A further exhaust gas recirculation valve is known from DE 11 2008 003 498 T5, in which a valve seat ring is also inserted in the valve housing. The valve housing is configured in two parts and is combined with a motor housing in which the actuating device is received.

The valve housing is usually designed as a cast housing in the above-mentioned exhaust gas recirculation valves. The valve seat ring designed for higher temperatures generally consists of a high-temperature-resistant material.

It has been shown that such valve housings, if they consist of cast aluminum, reach their strength limit at higher gas temperatures, e.g., above 500°C, and cannot be used at higher temperatures. A design made of a high-temperature cast material is not considered because of the high costs compared to aluminum castings.

Against this background, the invention is based on the object of improving an exhaust gas recirculation valve according the type mentioned at the outset in such a way that use is also possible without damage at high temperatures and ranges up to about 1000°C and cost-effective production is possible.

This object is achieved in an exhaust gas recirculation valve according to the type mentioned at the outset, in that a component is formed of an approximately pot-shaped body part having an approximately cylindrical wall part and thus an end-side valve seat ring of one piece and a housing section, which is united to the housing part of the other component into a housing unit of one piece, and the drive devices situated opposite, wherein the approximately pot-formed body part is connected to the housing section, and the housing section, together with the approximately pot-shaped body part, surrounds the valve chamber, wherein the housing unit is configured as a die casting part, in particular from aluminum, which housing unit contains in the inside at least one channel for transmitting cooling means, which channel is closely adjacent to the shaft guide.

The combination of the exhaust gas recirculation valve consisting of several components results in a simplified design. A simplified assembly results, since the valve seat ring is configured in one piece with the approximately cylindrical wall part.

Since the pot-shaped body part can be formed from a metallic deep drawn part made of steel sheet, e.g., of high-heat-resistant quality, a high temperature load-bearing capacity results with a simultaneously simple construction. As a result of the channel for transmitting cooling means, provided in the interior of the housing unit consisting of die casting, which can run as close as possible to the shaft guide, a good removal of heat is ensured, which is directed from the valve chamber via the lift member in a direction facing away from the valve member. This is of great importance because of the high temperatures of the controlled exhaust gas passing through the valve chamber. A housing unit designed, e.g., from die cast aluminum, promotes heat dissipation and favors cooling. In view of the high temperature-critical regions in the valve seat and the valve member, on the other hand, a deep drawn part can be produced cost-effectively based on the approximately top-shaped body part made of metal plates, wherein the material selection can therefore be adapted and optimized to the high temperatures in this lower region of the exhaust gas recirculation valve. Such an approximately pot-shaped body part at the lower end of the housing unit is thereby a simple, cost-effective component which can be positioned and attached with radial centering and axial bearing protection and coaxial alignment with respect to the housing unit.

The approximately pot-shaped body part can be fixedly connected to the housing unit. A radial and axial and coaxial aligned acceptance of the body part on the housing unit is thereby advantageous in such a way that the body part is reliably radially and axially oriented with respect to the housing unit and is held in coaxial alignment with the lift member. The body part can be placed axially between the lower end of the housing unit and a terminal housing receiving it and held radially and axially.

An advantageous embodiment provides that the one component has as individual elements a tubular part surrounding the valve chamber and/or the valve seat ring arranged at an axial end of the valve chamber, and/or a dividing wall or the like, which is arranged at an axial distance from the valve seat ring and axially delimits the valve chamber. The one component can also have the shaft guide as an individual element. Advantageously, the shaft guide is configured as a tubular element, which is inserted into the housing part of the other component and is preferably secured against this. This tubular element can be fixedly and tightly connected to the dividing wall by joining, e.g., by pressing in, or by screwing.

The one component is fixedly connected to a flange and is fixed, e.g., screwed on, by means of the flange to the housing part of the other component. In this case, the tubular part of the one component can be firmly connected to the flange by means of welding, in particular laser welding, or soldering, in particular brazing. The tubular part of the one component can be received with one end on the housing part of the other component so as to be rotationally secure and can be fastened as required.

It may be advantageous if at least some individual elements of the one component are formed from metallic turned parts produced by turning processing, in particular, e.g., the valve seat ring and/or the dividing wall and/or the tubular part and/or the tubular element. Such turned parts can be produced cost-effectively, even if the individual elements consist of different materials.

The tubular part can advantageously be formed from a metallic deep drawn part. In such a case, it may also be further advantageous if the tubular part is united with the valve seat ring and/or the dividing wall to form a component of one piece. It may also be advantageous if the tubular element is of one piece

with the dividing wall.

In a further advantageous embodiment, it is provided that the flange is formed from a punched part. Instead of rotating parts, at least some individual elements of the one component can also be formed from stamped parts e.g., the valve seat ring and/or the dividing wall, which are cost-effective.

It can be particularly advantageous if at least some individual elements of the one component are formed from steel, preferably from stainless steel. This makes use possible even at very high temperatures, without having to fear damage and loss of strength. In particular, e.g., the valve seat ring and/or the dividing wall and/or the tubular part and/or the tubular element can consist of steel, preferably stainless steel.

With regard to the connection, at least to some individual elements of the one component, it may be advantageous to connect them to one another by joining and crimping. This may apply, in particular, e.g., to the connection of the valve seat ring and/or the dividing wall to the tubular part. A flanging connection between the tubular element and the dividing wall can also be advantageous. The individual flangings are advantageously connected fixedly and tightly by soldering, in particular brazing, or welding, e.g., laser welding.

Instead, it can also be advantageous if, at least some individual elements of the one component are connected to one another by pressing on the stop, in particular, e.g., the valve seat ring and/or the dividing wall to the tubular part and/or the tubular element to the dividing wall. These press connections can be secured by soldering, in particular brazing, or welding, e.g., laser welding. Both the flanging connections and the press connections can be produced quickly and simply and thus cost-effectively, wherein a tightness can be achieved in the described manner by soldering or welding without having to fear a warping of the individual elements.

The housing part of the other component is expediently configured as a die casting part, in particular from aluminum, or instead as a stamped bent part.

The tubular element of the shaft guide can also consist of brass instead of steel, in particular stainless steel.

It can be advantageous if the approximately pot-shaped body part having an approximately cylindrical end part, which is situated opposite the valve seat ring, is pushed onto a suitably cylindrical neck of the housing section and is centered. In this case, the approximately cylindrical end part can advantageously have a radially protruding ring flange at the end, which is situated opposite the valve seat ring, which valve seat ring is received in a suitable ring fitting cavity of the housing section, e.g., by crimping and caulking.

It may be further advantageous if the approximately pot-shaped body part is fixed to the neck of the housing section, e.g., by means of a housing region of the wall part which is crimped or caulked into a, e.g., groove-shaped rest area on the neck of the housing section, or e.g., by means of clips, which are notched out of the wall part, which engage behind rest areas on the neck of the housing section.

A further advantageous embodiment provides that the valve seat ring of one piece of the approximately pot-shaped body part having the wall part is configured as an approximately U-shaped toroid ring in cross section and has an inner ring wall which is preferably directed towards the valve chamber and which surrounds a passage communicating with the valve chamber in the opening position of the valve member and forms the valve seat area at the free ring edge, which is machined to match the valve member.

It may be advantageous if the approximately pot-shaped body part is formed from a deep drawn part made of sheet metal.

A further advantageous embodiment provides that the valve member is a valve disk which is formed from a metallic deep drawn part and a fine stamped part.

The valve seat ring of the approximately pot-shaped body part can advantageously be designed in such a way that the valve member is pressed onto the valve seat area in the closure position from the valve chamber, in particular by means of the drive device and thereby held in the closure position. For opening, the valve member is inversely movable in the direction toward the valve chamber and into this in its opening position.

It may further be advantageous if the lower housing area of the housing section pointing toward the valve chamber and delimiting this is configured as a ceiling area which is curved for improving the flow. This curvature leads up to an outlet which is in communication with the valve chamber. Based on the design as a housing unit in the form of a die casting part, this shaping of the ceiling area of the valve chamber seat that improves the flow is possible in a more cost-effective and simple manner.

In the described design of the exhaust gas recirculation valve, the housing section is thus united with the housing part of the other component to form a housing unit of one piece, wherein this housing unit is configured as a die casting part, in particular of aluminum, and contains in the inside at least one channel for transmitting cooling means, which channel is closely adjacent to the shaft guide.

Further advantages and details of the invention will become apparent from the following description.

The invention is explained in more detail in the following with reference to exemplary embodiments shown in the drawings. They show:

Fig. 1 a schematic vertical section of a part of an exhaust gas recirculation valve of a conventional type,

Fig. 2 a schematic vertical section of a part of an exhaust gas recirculation valve according to the invention, according to a first exemplary embodiment,

Fig. 3 a schematic section of the detail III in Fig. 2 with a partial side view,

Fig. 4 a schematic section of a part of an exhaust gas recirculation valve according to the invention, according to a second exemplary embodiment,

Fig. 5 a schematic section of a part of an exhaust gas recirculation valve according to the

invention, according to a third exemplary embodiment,

Fig. 6 a schematic section of the exhaust gas recirculation valve along line VI-VI in Fig. 5.

Fig. 1 shows a part of a conventional exhaust gas recirculation valve 10. This has a valve housing 11 and a valve member 12 which, for example, is designed plate-shaped. The valve member 12 is seated at the lower end of a rising lift member 13 in the form of a valve stem which is guided in a shaft guide 14 which forms a sliding bearing for a vertical lifting movement in the drawing. In this configuration, the exhaust gas recirculation valve 10 represents a lift valve. The lift member 13 is extended upwards in Fig. 1, wherein a drive device for lifting operation engages on it, of which only parts are visible and which is indicated generally by 15. Such a drive device 15 is known and does not need any further detailed description here. The valve housing, generally designated with 11, is assembled here from two components 20 and 40, of which the first component 20 contains a tightly closed valve chamber 21, and the second component 40 is configured as a housing part 41 for at least parts of the drive device 15 of the lift member 13. The shaft guide 14, which forms a sliding bearing, is sealed at the upper end by means of a seal 16.

A valve seat ring 17 with an approximately ring-shaped valve seat area 18 is assigned to the valve member 12. In the closure position of the valve member 12 shown in Fig. 1, this is pressed with an ring area against the valve seat area 18 in Fig. 1 from below, whereby the passage to the valve chamber 21 is closed. The valve member 12 is inversely movable downwardly away from the valve seat area 18 in Fig. 1 into an opening position with the opening of the passage in the region of the valve seat ring 17 to the valve chamber 21. The valve housing 11 has integrated cooling channels 19 to provide cooling. The valve housing 11 is usually configured as a cast housing made of aluminum. The valve seat ring 17 with valve seat area 18 can be made of stainless steel. It has been shown that in operation, under the influence of very high gas temperatures of well above 500°C, the aluminum material of the valve housing 11, despite intensive cooling by means of the cooling channels 19, e.g., by cooling water, reaches its strength limit and is damaged. A different casting material for the valve housing 11, which is higher in temperature resistance, is not considered for this purpose because of the high cost.

Remedy is provided here by means of an exhaust gas recirculation valve 10 according to the invention according to the first exemplary embodiment in Figs. 2 and 3. For the parts which correspond to the first example in Fig. 1, the same reference symbols are used in Figs. 2 and 3, so that reference is made to the description of Fig. 1 to avoid repetitions.

In the example according to Fig. 2, the valve member 12 with lift member 13 is not shown. The special feature consists in the fact that the first component 20 is assembled from a plurality of individual elements which are fixedly and tightly connected to one another to form a whole in the form of a join part 6 which is joined to the housing part 41 of the second component 40 from below in Fig. 2, and is thus tightly connected via a flange 22, e.g., is screwed by means of screws 23. The screws 23 are only schematically indicated.

In detail, the first component 20 has, as individual elements, a tubular part 24 surrounding the valve chamber 21 and/or the valve seat ring 17 arranged on the axial lower end of the valve chamber 21, in

particular of the tubular part 24, in the drawing and/or a dividing wall 25, which is arranged at an axial distance from the valve seat ring 17 in the drawing above the valve chamber 21 and which axially delimits the valve chamber 21, wherein the dividing wall 25 separates the valve chamber 21 in Fig. 2 upwardly and seals it tightly. A further individual element of the first component 20 is the shaft guide 14. This is configured as a tubular element 26 with a smooth continuous inner bore 27, a first cylinder section 28 received in a bore 42 of the housing part 41, and a subsequent second cylinder section 29 of greater outer diameter protruding downwards from the housing part 41 in Fig. 2, which lies against with a ring shoulder 30 in Fig. 2 from below on a facing area 43 of the housing part 41. The second cylinder section 29 projects downwards in the entire length in Fig. 2.

The described tubular element 26 is inserted into the bore 42 of the housing part 41 of the second component 40 and is secured with respect to the housing part 41. The tubular element 26, which forms the shaft guide 14, can consist of brass or instead consists advantageously of stainless steel.

The second cylinder section 29 of the tubular element 26 has a stepped shoulder 31 on the lower end, on which the dividing wall 25 is seated, namely radially centered and axially abutted. The tubular element 26 is fixedly and tightly connected to the dividing wall 25 in this region by joining, e.g., pressing, or in a manner not shown, by means of screws.

In another exemplary embodiment, which is not shown, the tubular element 26 can be of one piece with the dividing wall 25 and, like the dividing wall 25, can also consist of steel, preferably of stainless steel.

The first component 20 is fixedly connected to the flange 22 and by means of the latter is fixed to the housing part 41, e.g., by means of the screws 23. The tubular part 24 of the first component 20 is connected to the flange 22, e.g., by means of welding, in particular laser welding, or soldering, in particular brazing. The upper end of the tubular part 24 in the drawing can protrude over the flange 22 and engage with a coil 32 in a corresponding groove 44 in the lower area 43 of the housing part 41 and, if required, also be secured at this position against rotation with respect to the housing part 41 and/or attached thereto.

At least some individual elements of the first component 20 are formed from metallic turned parts produced by turning operation. This applies, e.g., for the valve seat ring 17 and the dividing wall 25. The tubular part 24 and/or the tubular element 26 can also be formed from turned parts.

It may be advantageous if the tubular part 24 is formed from a metallic deep drawn part. In this case, it can also be advantageous if the tubular part 24 is united with the valve seat ring 17 and/or the dividing wall 25 into a component of one piece, in particular a deep drawn part. Also, the tubular member 26 may be of one piece with the dividing wall 25.

The flange 22 and/or at least some individual elements of the first component 20, e.g., the valve seat ring 17 and/or the dividing wall 25, can be formed from stamped parts.

Advantageously, at least some individual elements of the first component 20 are formed from steel, preferably from stainless steel. This applies in particular, e.g., for the valve seat ring 17 and/or the dividing wall 25 and/or the tubular part 24 and/or the tubular element 26. With regard to the connection,

a connection of at least to some of the individual elements of the first component 20 can be considered by means of joining and crimping to one another in the first exemplary embodiment according to Figs. 2 and 3. This applies in particular, e.g. to the valve seat ring 17 and/or the dividing wall 25, which can be connected to the tubular part 24 by flanging connection. Such a flanging connection is shown in particular as a detail III in Fig. 3. It can be seen that the outer edge of the dividing wall 25 engages with a positive fitting into a ring groove 33 on the inner side of the tubular part 24, and in this way the dividing wall 25 is crimped with the tubular part 24. A similar flanging connection can also be provided between the valve seat ring 17 and the tubular part 24. A flanging connection between the tubular element 26 and the dividing wall 25 is also necessary in the scope of the invention. The individual flangings are tightly connected by soldering, in particular brazing, or welding, e.g., laser welding, wherein in the last case there is the special advantage that no warping is to be feared.

The housing part 41 of the second component 40 is configured as a die casting part, in particular made of aluminum. Instead, the configuration as a stamped bent part is also possible.

Due to the described multi-part design, the respective most favorable material, which is highly temperature-resistant, can be used for the individual elements of the first component 20. This allows a modular assembly of the valve housing 11 in the form of the first component 20 and the second component 40. As a result of the described configuration, a temperature strength up to, e.g., about 1000°C is possible. With regard to the valve seat ring 17, the additional advantage that results is that either its lower area forms the valve seat area 18 or instead the opposite side forms the valve seat area. Both areas are similar and therefore suitable as valve seat areas. The design of the valve housing 11 in the described manner is particularly cost-effective. It thus makes possible an exhaust gas recirculation valve 10 of high temperature resistance at very high gas temperatures of approximately the order of 1000°C and enduring strength with favorable and low-cost use of the material and correspondingly favorable machining and production.

In the second exemplary embodiment shown in Fig. 4, the same reference symbols are used for the same parts for the aforementioned reasons. The second exemplary embodiment corresponds to the first exemplary embodiment with the exception of the connection of individual individual elements of the first component 20 to one another. Therefore, for the second exemplary embodiment, the above description also likewise applies to Fig. 2, but without a flanging connection.

In the exemplary embodiment according to Fig. 4, at least some individual elements of the first component 20 are connected to one another by pressing on the stop.

Thus, according to Fig. 4, e.g., the valve seat ring 17 and/or the dividing wall 25 with the tubular part 24 and/or the tubular element 26 are connected to the dividing wall 25 by pressing on the stop, wherein the regions of these press connections are indicated by IV in Fig. 4. Thus, e.g., a press connection can also take place between the tubular element 26 and the dividing wall 25 of the design such that the dividing wall 25, as in the first exemplary embodiment, rests against the shoulder 31 and is seated radially with press fit on the second cylindrical section 29. In the same way, in the case of the remaining individual elements of the first component 20, the connection can be realized by pressing on the stop. One shoulder

is respectively provided, e.g., on the inner side of the tubular part 24, against which, as an individual element, e.g., the separating wall 25 and/or the valve seat ring 17 press upon, wherein a pressing is realized through associated measurement of the radial dimensions. The individual press connections IV can be fixedly and tightly connected by soldering, in particular brazing, or by welding, e.g., laser welding.

In addition, the description of the first exemplary embodiment also likewise applies to the second exemplary embodiment according to Fig. 4, through which the described advantages are likewise achieved.

In the third exemplary embodiment shown in Figs. 5 and 6, around 100 major reference symbols are used for the parts which correspond to the first or the second exemplary embodiment according to Figs. 2 to 4, thereby referring to the foregoing description to avoid unnecessary repetitions.

The exhaust gas recirculation valve 110 according to Figs. 5 and 6 has a valve housing 111 and a valve member 112 which is moveable via a drive device 115 by means of a rod-shaped lift member 113 against a valve seat area 118 of a valve seat ring 117 in the closure position or inversely in the opposite direction into an opening position. The lift member 113 is guided in a sleeve-shaped shaft guide 114. In the closure position, the valve member 112 closes a passage 146 to a valve chamber 121, which is opened in an opening position, not shown. Then, exhaust gas supplied to the passage 146 can enter the valve chamber 121, in which it is deflected in a manner particularly for improved flow by means of a curved ceiling area 147 to an outlet 148.

Here, the valve housing 111 consists of a housing unit 149 of one piece which in Figs. 5 and 6 has a lower housing section 150 which carries the ceiling area 147 and delimits the valve chamber 121, and an upper housing part 141 of one piece with this, of the parts of the drive device 115 similarly contains the component 140 shown in Figs. 2 to 4. In the housing unit 149, the shaft guide 114 is held in the form of a tubular element 126, wherein a seal 116 is provided above this. A radial flange 122 is of one piece with the housing section 150 and serves to mount the valve on a terminal housing 151 and fixes thereto, wherein the housing section 150 with a lower end face 152 rests flat on the terminal housing 151.

The housing section 150 is obviously united with the housing part 141 of the upper component 140 into the housing unit 149 of one piece. The latter is configured as a die casting part, in particular made of aluminum, and contains at least one channel 119, which is closely adjacent to the shaft guide 114, for the coolant passage, and thus for cooling the housing section 150. Connected to the lower end face 152 of the lower housing section 150 is an approximately cylindrical neck 153, which is directed towards the valve member 112 as one piece and terminates in a narrow end face 154 above the valve member 112.

The lower component 120 shown in Figs. 5 and 6 has an approximately pot-shaped body part 160 interacting with the lower housing section 150, which adjoins the neck 153 and, together with the ceiling area 147, delimits the valve chamber 122 and carries the valve seat ring 117 at the lower end. The approximately pot-shaped body part 160 has an approximately cylindrical wall part 161, which at the end thus merges into a valve seat ring 117 of one piece. With an approximately cylindrical end part 162, which is situated opposite the valve seat ring 117, the body part 160 is slipped onto the appropriately

dimensioned neck 153 of the housing section 150 and is centered. The body part 160 may be held fixed on the neck 153, e.g., by means of clips 163, which are notched out of the wall part 161, which engage behind outer rest areas 164, e.g., a ring groove, on the neck 153. The clips 163 can be designed in such a way that when the body part 160 is pushed onto the neck 153, they spring outwards and spring in when the rest areas 164 are reached and rest on them with the end. Instead, the body part 160 can also be held on the neck 153 by crimping, caulking or the like, e.g., by crimping a housing region of the wall part 161 into a groove-shaped rest area 164.

This has the advantage that during the fastening of the body part 160, no relative movement takes place with respect to the neck 153 and thus its position is not changed.

The approximately cylindrical end part 162 has, at the end, which is situated opposite the valve seat ring 117, a radially projecting ring flange 165, which is received in a suitable ring fitting cavity 166 of the housing section 150. The ring flange 165 and the ring fitting cavity 166 are dimensioned in such a way that the ring flange 165 terminates on the underside approximately with the end face 152 of the housing section 150 and can lie flat on the terminal housing 151. The ring flange 165 is fixed within the ring fitting cavity between the housing section 150 and the terminal housing 151. The ring flange 165 can be fixed in the ring fitting cavity 166, e.g., by crimping or caulking the material of the housing section 150. The body part 160 is thus aligned in the axial direction and with the housing section 150, in particular with the lift member 113. The body part 160 with the valve seat ring 117 is aligned very precisely axially, radially and in alignment with the lift member 113 and its valve member 120 in this manner and thereby the cylindrical wall part 161 is seated precisely on the neck 153.

At its wall part 161, at the level of the end face 154 of the neck 153, the body part 160 may still have an approximately ring-formed lock beading as needed in order to avoid flow losses at the end face 154 and for better flow guidance there.

The valve seat ring 117 of the body part 160, which is of one piece with the wall part 161, is formed as a toroid ring 167 which is approximately U-shaped in cross section and has an inner ring wall 168 which is directed towards the valve chamber 121 in the embodiment shown, in another embodiment, however, may be inversely directed downwards in the opposite direction. The ring wall 168 surrounds the passage 146 and forms the valve seat area 118 at the free ring edge, e.g., may be approximately cut-shaped. The valve seat area 118 is machined to fit the valve member 112.

The approximately pot-shaped body part 160 is made of a metallic deep drawn part made of steel sheet, e.g., high-quality heat resistance.

The valve member 112 is a valve disk, which is formed from a metallic deep drawn part and a fine stamped part. This results in a simplification of the production with a reduction in the production costs and a weight reduction for the valve member 112. The design of the approximately pot-shaped body part 160 as a boundary of the valve chamber 121 with the realization of the valve seat area 118 also results in a reduction in costs and a special reduction in the production costs due to the design as a deep drawn part. The greatest temperature stress results from the high exhaust gas temperatures in the region of the valve chamber 121 and the valve seat ring 117. This can be countered in a simple, inexpensive manner

by the material selection of the approximately pot-shaped body part 160. Based on the lower housing section 150, which is of one piece with the valve housing 111, a design of the ceiling area 147 to improve the flow can be realized in a simple, cost-effective manner by corresponding shaping during the production as a die casting part. Furthermore, the fitting areas for receiving the approximately pot-shaped body part 160 can be realized in a simple manner and precisely in production. Overall, an exhaust gas recirculation valve 110 is thereby produced, which is cost-effective and can be used even at high temperatures and ranges, e.g., about 1000°C, without damage and can work continually.

Due to the inner ring wall 168, the valve member 112 is pressed downwards in the drawing from the valve chamber 121 onto the valve seat area 118 in the closure position and is held as leakage-free as possible in this position by means of the drive device 115 so that the valve member 112 can reliably withstand the exhaust gas pressure acting thereon from the passage 146 in the closure position. For the opening position, the valve member 112 is moved in the direction toward the valve chamber 121 by means of the drive device 115, wherein this opening movement is supported and facilitated by the pressure of the exhaust gas acting on the valve member 112. This has the advantage that the drive device 115 can be dimensioned smaller and lighter with regard to its individual elements, namely drive motor and transmission, and thus a cost reduction can also be achieved in this area.

Kipufogógáz-visszavezető szelep

Szabadalmi igénypontok

1. Kipufogógáz-visszavezető szelep, egy szelepházzal (111) és egy szeleptaggal (112), amely egy mozgató szerkezeten (115) keresztül egy szárvezetékben (114) megvezetett emelőtag (113) segítségével egy szelepülés-gyűrű (117) szelepülés-felületével (118) szemben záró helyzetbe vagy ellenkező irányban attól elfelé nyitott helyzetbe mozgatható és az áteresztő nyílást egy szelepkamra (121) felé lezárja, illetve szabaddá teszi, ahol a szelepház (111) több szerkezeti egységből (120, 140) van összeállítva, amelyek közül az egyik szerkezeti egység (120) legalább a tömören lezárt szelepkamrát (121) határolja, míg egy másik szerkezeti egység (140) egy házrésszel (141) rendelkezik az emelőtag (113) mozgató szerkezetének (115) legalább bizonyos részei számára, ahol az egyik szerkezeti egység (120) szilárdan és tömítetten összekötött alaptestrészekkel rendelkezik, amelyek a másik szerkezeti egység (140) házrészéhez (141) csatlakoznak,

azzal jellemezve,

hogy az egyik szerkezeti egység (120) egy lényegében hengeres fairésszel (161) és azzal egy darabot képező végoldali szelepülés-gyűrűvel (117) rendelkező, lényegében edény alakú alaptestrészből (160), valamint egy házszakaszból (150) van képezve, amely a másik szerkezeti egység (140) házrészével (141) egy egy darabból álló házegységgé (149) van egyesítve és a mozgató szerkezettel (115) szemben helyezkedik el, ahol a házszakaszhoz (150) a lényegében edény alakú alaptestrész (160) van csatlakoztatva és a házszakasz (150) a lényegében edény alakú alaptestrésszel (160) együtt a szelepkamrát (121) veszi körül, ahol a házegység (149) nyomásos öntésű alkatrészként, főként alumíniumból van kialakítva, amely házegység (149) a belsejében legalább egy, a szárvezetékkel (114) közel szomszédos csatornával (119) rendelkezik a hűtőközeg-átvezetéshez.

2. Az 1. igénypont szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a lényegében edény alakú alaptestrész (160) egy lényegében hengeres végrészével (162), amely a szelepülés-gyűrűvel (117) átellenben helyezkedik el, a házszakasz (150) egy hozzá igazodó hengeres nyakára (153) van rátolva és azon központosítva.

3. A 2. igénypont szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a lényegében hengeres végrész (162) azon a végen, amely a szelepülés-gyűrűvel (117) átellenben helyezkedik el, egy radiálisan kiálló gyűrűs karimával (165) rendelkezik, amely a házszakasz (150) egy hozzá igazodó gyűrűs bemélyedésében (166) oly módon van befogadva, hogy az alaptestrész (160) axiális irányban és a házszakasszal (150) egy vonalba eső módon van tájolva.

4. A 2. vagy 3. igénypont szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a gyűrűs karima (165) a gyűrűs bemélyedésben (166) a házszakasz (150) anyagának peremezésével vagy zömítésével van rögzítve.

5. A 2-4. igénypontok bármelyike szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a lényegében edény alakú alaptestrész (160) a házszakasz (150) nyakán (153) a falrésznek (161) egy a házszakasz (150) nyakán (153) egy horony alakú reteszelőfelületbe (164) beperemezett vagy bezömített háztartománya segítségével vagy a falrészből (161) kivágott, a reteszelőfelületeket (164) a házszakasz (150) nyakán (153) hátulról átfogó retesznyúlványok (163) vagy hasonlók segítségével van szilárdan megtartva.

6. Az 1-5. igénypontok bármelyike szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a lényegében edény alakú alaptestrésznek (160) a falrésszel (161) egy darabot képező szelepülés-gyűrűje (117) egy a keresztmetszetét tekintve lényegében U alakú toroid gyűrűként (167) van kialakítva és egy a szelepkamra (121) felé irányuló belső gyűrűs fallal (168) rendelkezik, amely egy, a szeleptag (112) nyitott helyzetében a szelepkamrával (121) összeköttetésben álló áteresztő nyílást (146) vesz körbe és a szabad gyűrűs peremén a szelepülés-felületet (118) képezi, amely a szeleptaghoz (112) hozzáigazítottan van megmunkálva.

7. Az 1-6. igénypontok bármelyike szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a lényegében edény alakú alaptestrész (160) egy fémlemezből levő mélyhúzott alkatrészből van kialakítva.

8. Az 1-7. igénypontok bármelyike szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a szeleptag (112) egy szeleptányér, amely egy fém anyagú mélyhúzott és finomkivágott alkatrészből van kiképezve.

9. Az 1-8. igénypontok bármelyike szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a szeleptag (112) záró helyzetben a szelepkamrától (121) távolodóan a szelepülés-felületre (118) van rászorítva és ellentétes irányban a szelepkamra (121) felé nyitott helyzetbe mozgatható.

10. Az 1-9. igénypontok bármelyike szerinti kipufogógáz-visszavezető szelep, ***azzal jellemezve***, hogy a házszakasznak (150) a szelepkamra (121) felé néző és azt lehatároló alsó házfelülete az áramlás szempontjából előnyös domborított fedőfelületként (147) van kialakítva.

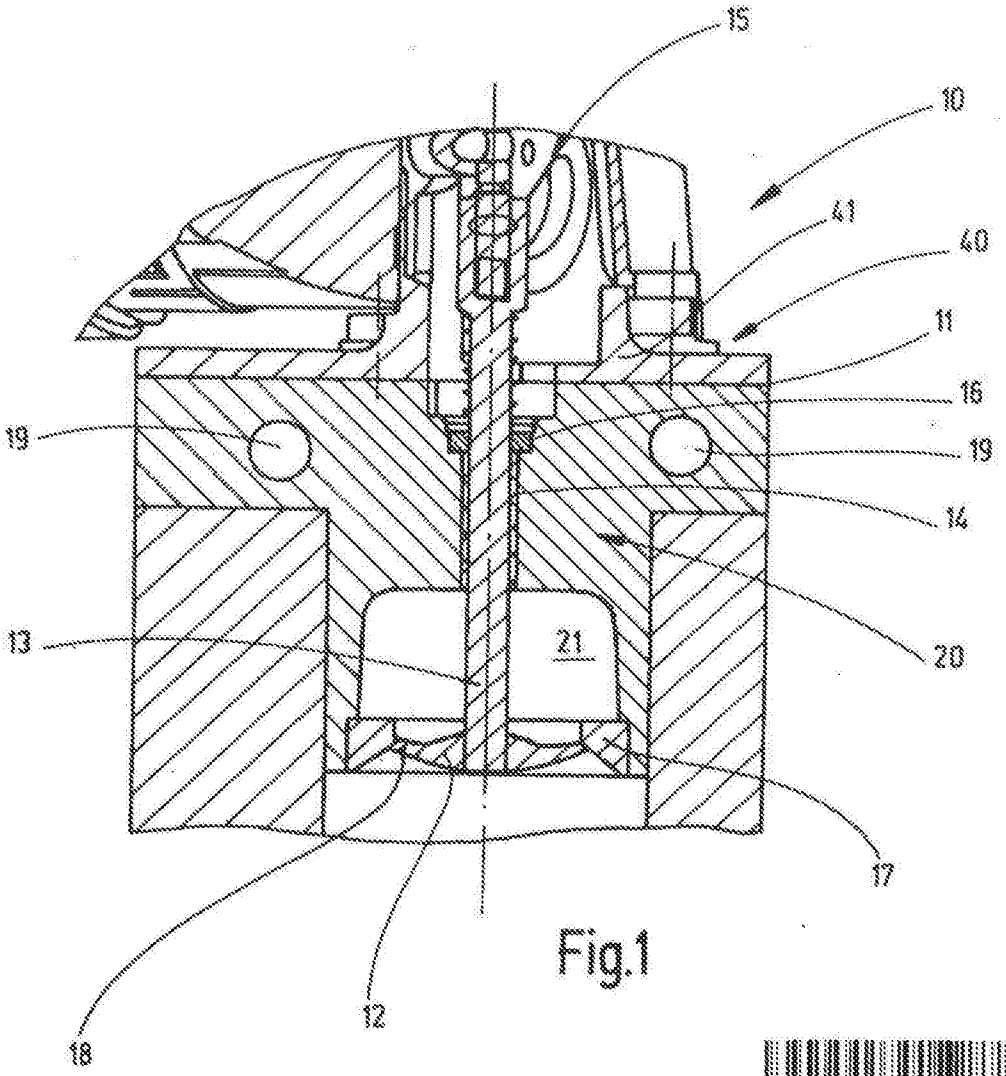

Fig.1

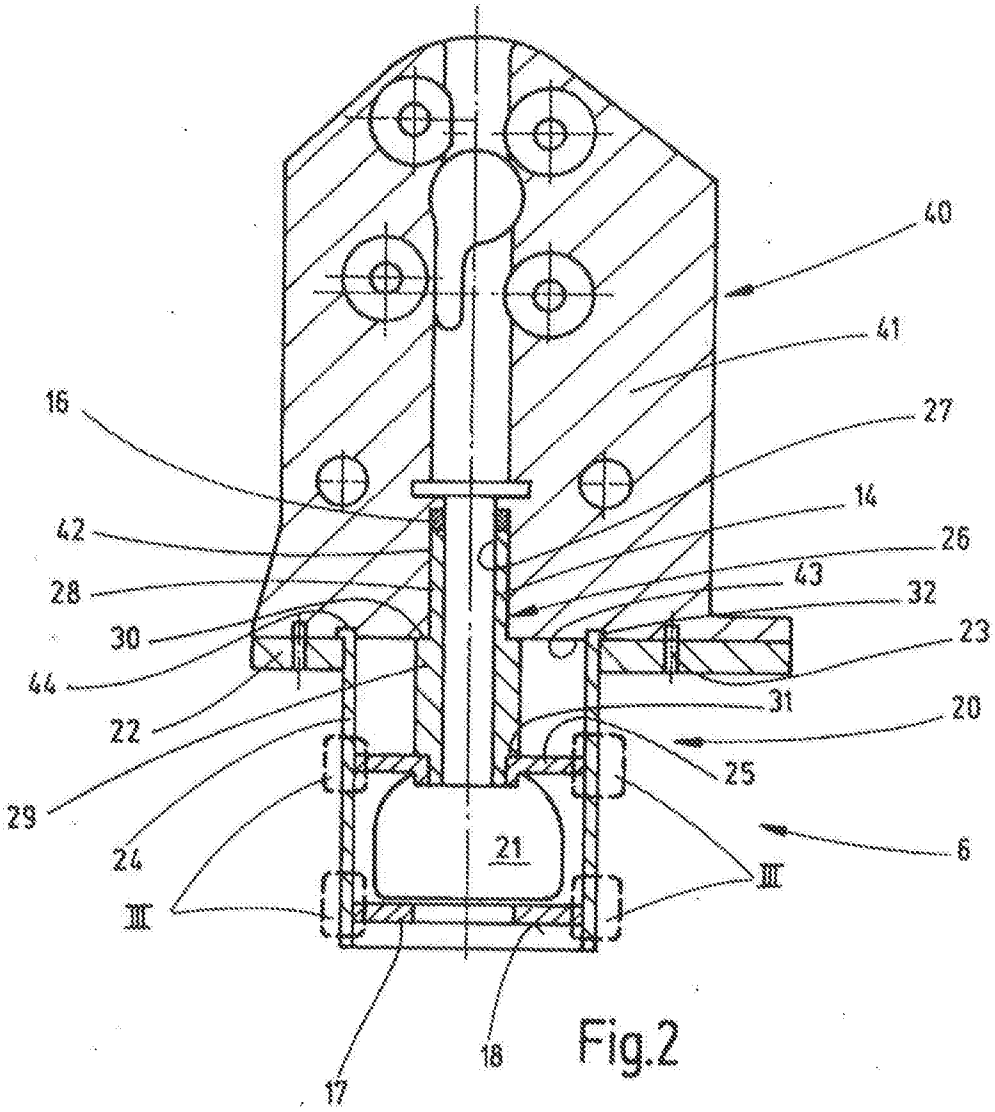
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Fig.2

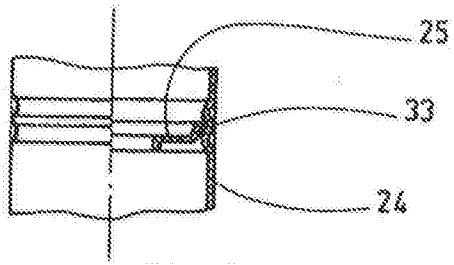
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Fig.3

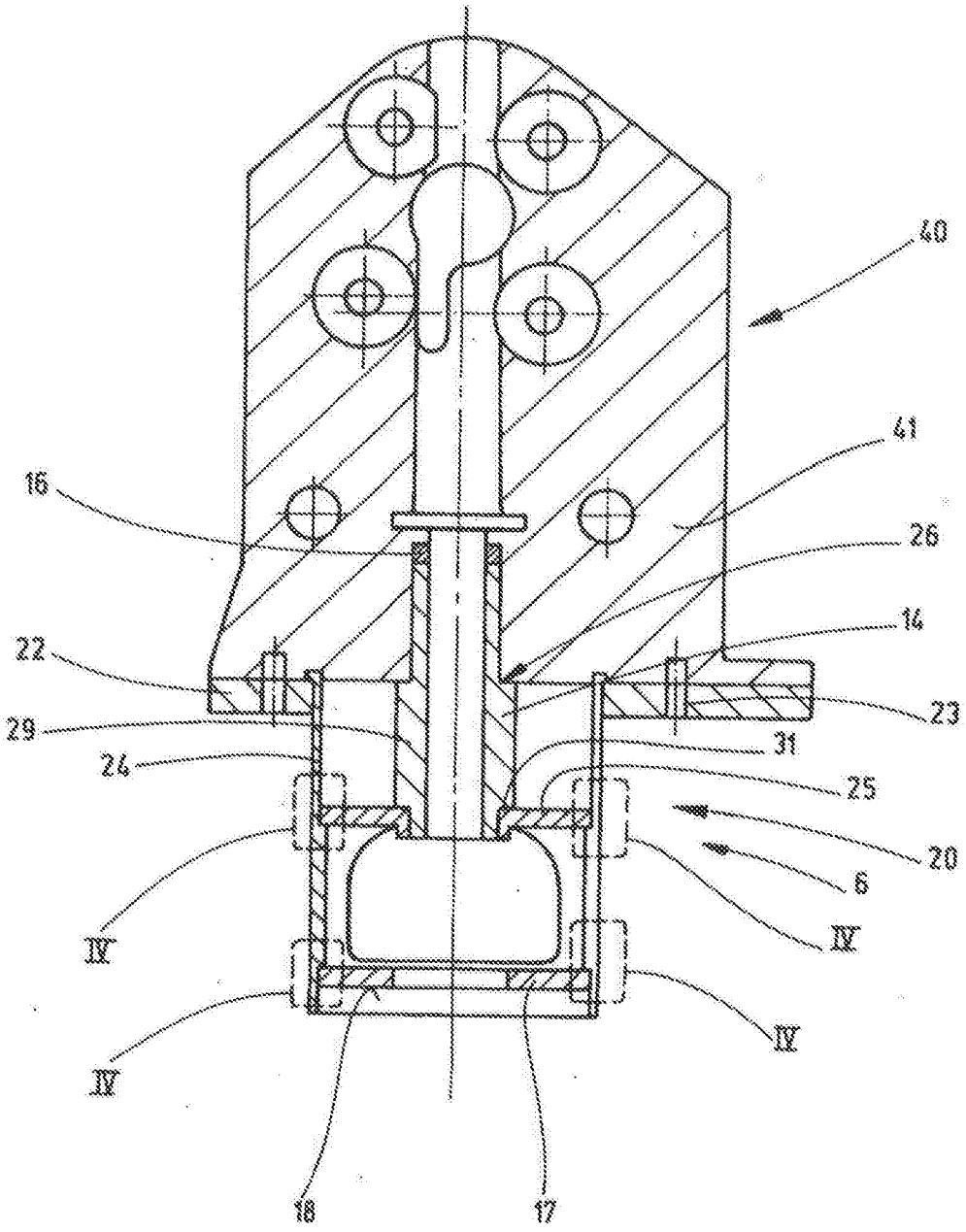

Fig.4

Fig. 5

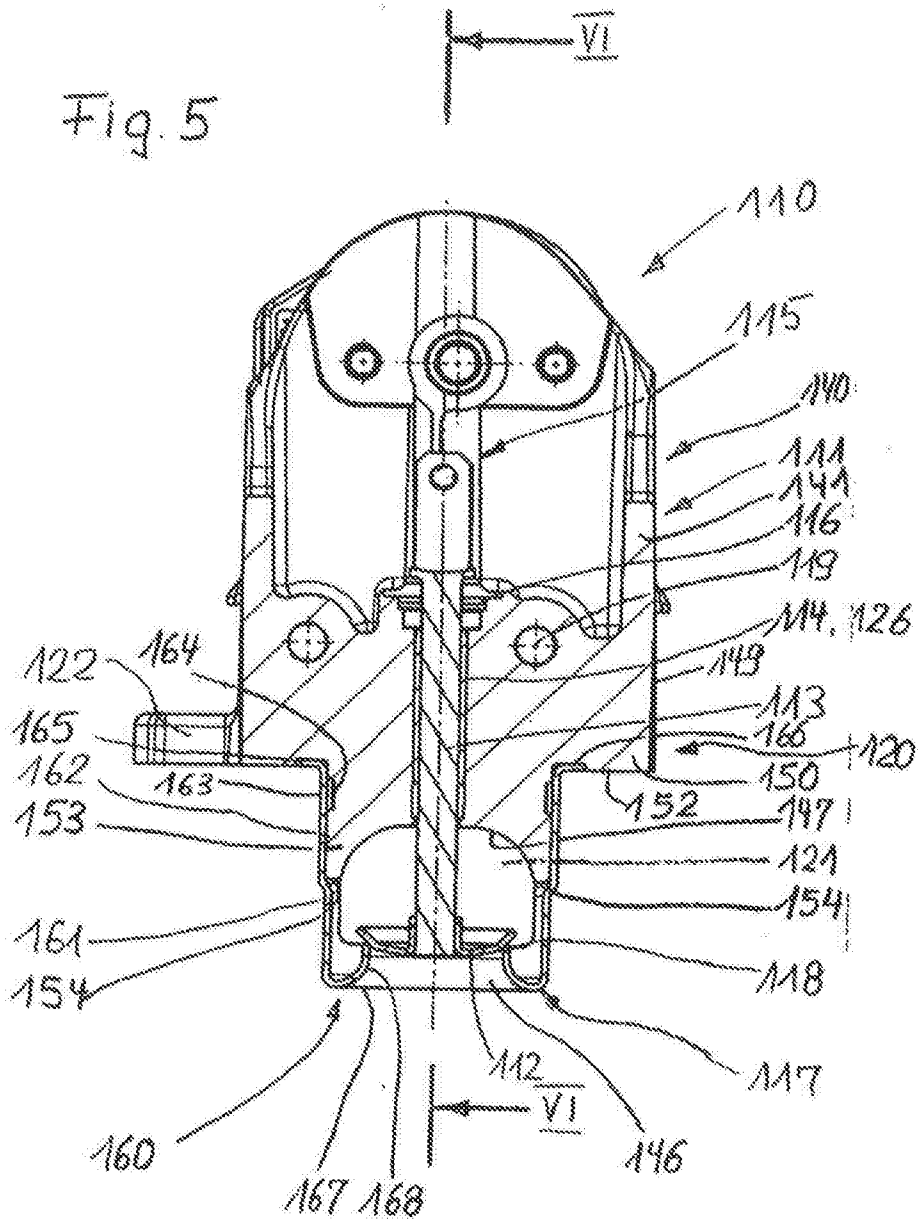
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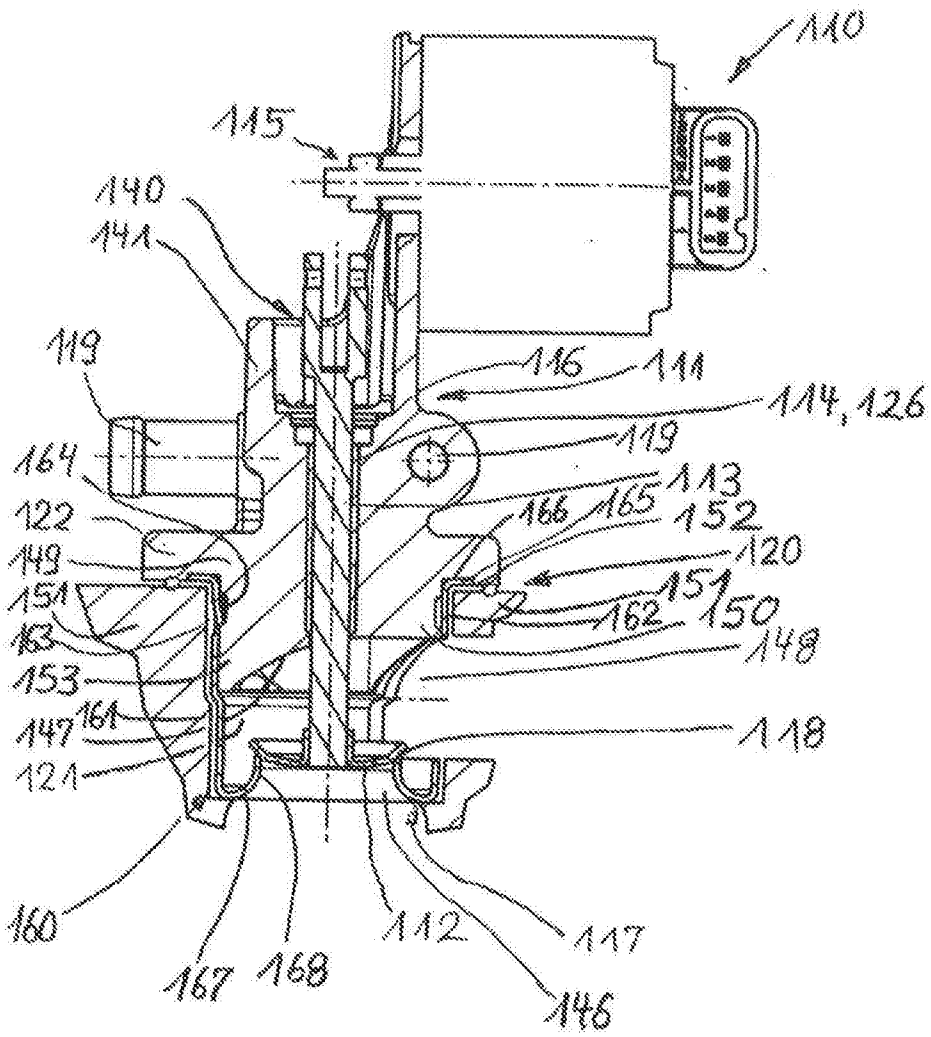
Fig.6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