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(54) **ROTOR AND PUMP COMPRISING SUCH ROTOR**

ROTOR UND PUMPE MIT SOLCH EINEM ROTOR

ROTOR ET POMPE COMPRENANT UN TEL ROTOR

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(73) Proprietor: **VHIT S.p.A. Societa Unipersonale 26010 Offanengo (IT)**

(72) Inventors:
• **PASQUALI, Stefania 26013 Crema (CR) (IT)**

• **BELA, Simona 20124 Milano (IT)**
• **RUFRANO, Vito 26013 Crema (CR) (IT)**
• **CADEDDU, Leonardo 26013 Crema (CR) (IT)**

(74) Representative: **Robba, Pierpaolo Interpatent S.R.L. Via Caboto, 35 10129 Torino (IT)**

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Description

Technical Field

[0001] The present invention relates to a rotor and a pump comprising such rotor. More particularly, the rotor is of the vane type comprising a vane carrier made of thermoplastic material and a transmission coupling made of a metal material, connected to the vane carrier and adapted to receive a drive torque from a drive member.

[0002] The pump which is the subject matter of the present invention finds particular application in the automotive industry, in particular as a vacuum pump capable of providing an air vacuum to brake assist devices or as a combined pump, used both as a vacuum pump and to supply fuel to an internal combustion engine.

Background Art

[0003] Among the known types of pumps, particularly vacuum pumps, there are vane pumps comprising a rotor capable of driving at least one vane and connected to a drive member, such as an engine camshaft. The rotor comprises a vane carrier, in which at least one vane is mounted in a movable manner, and a transmission coupling connected to the vane carrier and arranged to receive a drive torque provided by the camshaft and to transmit said torque to the vane carrier so as to create an air vacuum. More particularly, the transmission of the drive torque from the transmission coupling to the vane carrier takes place by means of thrust surfaces of the transmission coupling that are parallel to a longitudinal axis of rotation of the rotor and exert a thrust against corresponding abutment surfaces of the vane carrier, said support surfaces, too, being substantially parallel to the axis of rotation of the rotor.

[0004] Among the pumps like those described above, there are pumps in which, for the purpose of reducing the weight and cost thereof, the vane carrier is made of a thermoplastic material, whereas the transmission coupling, having to be capable of receiving the drive torque provided by the camshaft, is made of steel. In such cases, problems of reliability may arise, as the contact between the transmission coupling and the vane carrier can lead to wear of the vane carrier: this is due to the fact that the contact between the transmission coupling and the vane carrier always consists of a combination of compression and rubbing, or sliding friction, in a direction perpendicular to the axis of rotation of the rotor. Here below, for ease of discussion, this combination of compression and rubbing will simply be referred to as contact wear.

[0005] Furthermore, in the case of the most recent applications of vacuum pumps such as those described above, the camshaft, due to the use of an additional cam that drives a high-pressure fuel injection pump, or other auxiliary parts of the vehicle, can generate, under certain conditions, an important and impulsive reversal of the drive torque, with consequent radial and axial pulsation

of the transmission coupling. As a result of this, further transverse and/or axial wear of the vane carrier is generated, including, in particular, transverse wear on abutment surfaces of the vane carrier on which the drive coupling exerts a thrust at the time when a reversal of the drive torque occurs.

[0006] In order to limit the problem of the wear of the vane carrier, the rotor described in document CN207777183U includes a support element with a base consisting of two radial portions from each of which a first and a second wing extends. The first wing is arranged between a thrust surface of the transmission coupling, which surface exerts a thrust onto a corresponding abutment surface of the vane carrier during normal operation of the pump, and said corresponding abutment surface; the second wing is instead arranged between a corresponding thrust surface of the transmission coupling, which surface exerts a thrust onto a corresponding abutment surface of the vane carrier at the time a reversal of the drive torque occurs, and said corresponding abutment surface.

[0007] The Applicant has noticed that the known rotor described above does not adequately solve the problem of transverse wear of the vane carrier due to the radial clearances between the vane carrier and the transmission coupling, caused for example by the different thermal expansion of vane carrier and transmission coupling, and by the dimensional drift after shrinkage of the vane carrier, which determine the wear of the vane carrier by the support element (said wear being due, in particular, to the removal of material from the abutment surfaces of the vane carrier by the relative sliding between these abutment surfaces and the wings of the support element) and/or the breakage of the support element itself.

[0008] An object of the present invention is to overcome the problems and limitations of prior art by providing a rotor less susceptible to wear and therefore having a longer service life. A further object of the present invention is to provide a pump that comprises said rotor and is reliable, with reduced weight and reduced cost.

[0009] These and other objects are achieved with the rotor and the pump comprising such rotor as claimed in the appended claims.

Summary of the Invention

[0010] The rotor according to the present invention comprises a vane carrier, a transmission coupling configured for transmitting a drive torque to the vane carrier, and at least one vane movably inserted in a suitable slot of the vane carrier. The vane carrier comprises a seat and the transmission coupling comprises an engaging end configured for being inserted into the seat of the vane carrier. The engaging end of the transmission coupling comprises, in particular, a first face oriented towards the seat of the vane carrier, and a second face oriented in a direction opposite to that of the first face.

[0011] According to the present invention, the vane

holder is preferably made of a thermoplastic material and the transmission coupling is preferably made of metal.

[0012] According to the present invention, the rotor further comprises a first support element. Said first support element comprises a base resting on the second face of the engaging end of the transmission coupling, two first wings and two second wings, which preferably extend substantially perpendicular to the base of the first support element. The two first wings are arranged between respective first thrust surfaces of the engaging end and corresponding first abutment surfaces of the seat, said first abutment surfaces facing the first thrust surfaces, whereas the two second wings are arranged between respective second thrust surfaces of the engaging end and corresponding second abutment surfaces of the seat, said second abutment surfaces facing the second thrust surfaces.

[0013] According to the invention, the base of the first support element comprises two radial portions, in which a corresponding radial slot is provided dividing said two radial portions into a first sub-branch, from which a respective wing of said two first wings extends, and a second sub-branch, from which a respective wing of said two second wings extends.

[0014] Advantageously, the radial slot allows to make the first and second sub-branches, defined by the slot itself, elastic. This allows the first support element to adapt to the different dimensional variations of the vane carrier and transmission coupling, due to thermal expansions, or, in the case of the vane carrier, to dimensional drift after shrinkage. In particular, the first sub-branch is configured to bend elastically in a transverse direction relative to the corresponding first wing, and the second sub-branch is configured to bend elastically in a transverse direction relative to the corresponding second wing.

[0015] In addition, advantageously, said first and second sub-branch are pre-loaded transversely in diverging directions, so that the two first wings and the two second wings remain adhering against the corresponding first and second abutment surfaces of the vane carrier.

[0016] According to the invention, the first thrust surfaces are rotational thrust surfaces, configured to exert a thrust onto the corresponding first abutment surface, so as to transmit the drive torque to the vane carrier during normal operation of the pump. The second thrust surfaces are instead counter-rotational thrust surfaces configured for exerting a thrust onto said second abutment surfaces at the time when a reversal of the drive torque occurs.

[0017] Advantageously, each of the two first wings of the first support element allows limiting the wear of the vane carrier due to the contact between the respective first thrust surfaces of the engaging end of the transmission coupling and the corresponding first abutment surfaces of the vane carrier. In addition, advantageously, each of the second wings of the first support element allows limiting the wear due to the contact between the

respective second thrust surfaces of the engaging end of the transmission coupling and the corresponding second abutment surfaces of the vane carrier. In this case, indeed, the contact takes place between two metal elements (namely, the first support element and the transmission coupling), preventing occurrence of the sliding friction component on the vane carrier.

[0018] According to the present invention, the rotor further comprises a second support element. Said second support element comprises a base arranged between a blind bottom of the seat of the vane carrier and the first face of the engaging end of the transmission coupling, said first face being oriented towards said blind bottom and proximal thereto.

[0019] Advantageously, the base of the second support element allows limiting the wear of the bottom of the seat of the vane carrier due to the first face of the engaging end of the transmission coupling because of axial pulsations of the transmission coupling.

[0020] According to another aspect of the present invention, the seat of the vane carrier and the engaging end of the transmission coupling each have a four-arm cross-shaped cross-section.

[0021] According to a further aspect of the present invention, the first and second support elements are made as thin metal plates.

[0022] According to a further aspect of the present invention, the first and the second support elements are made of spring-steel.

[0023] A further object of the present invention is a pump comprising a rotor according to any of the features mentioned above.

Brief Description of the Drawings

[0024] These and other features and advantages of the present invention will become more apparent from the ensuing description of some preferred embodiments given by way of non-limiting examples with reference to the annexed figures, in which elements designated by the same or similar reference numerals indicate elements having the same or similar function and construction, and in which:

- Figure 1 is a perspective view of a pump according to the present invention;
- Figure 2 is an exploded perspective view of a rotor according to the present invention;
- Figure 3 is a top view of the rotor of Figure 2;
- Figure 4 is a cross-sectional view of the rotor of Figure 3, taken along the line AA;
- Figure 5 is a perspective view of a vane carrier of the rotor of Figure 2;
- Figure 6 is a perspective view of a transmission coupling of the rotor of Figure 2;
- Figure 7 is a perspective view of a first support element of the rotor of Figure 2;
- Figure 8 is a perspective view of a second support

element of the rotor of Figure 2.

Description of Some Preferred Embodiments of the Invention

[0025] Referring to Figure 1, a pump according to the present invention is a vane pump 10 comprising a rotor 20 mounted within the pump 10 and configured for being driven by a drive member (not shown), such as a camshaft of a vehicle engine.

[0026] The rotor 20, shown in Figures 2, 3 e 4, comprises a vane carrier 21, a transmission coupling 40, intended to transmit a driving torque provided by the drive member to the vane carrier 21, a vane (not shown), a first support element 170 and, preferably, a second support element 160.

[0027] Referring in particular to Figures 2 and 5, the vane carrier 21, preferably made of a thermoplastic material, comprises a first cylindrical end 22 oriented towards the transmission coupling 40 and having a longitudinal axis Y, i.e. the axis of rotation of the rotor 20, and a second cylindrical end 23, coaxial to the first end 22 and preferably having an outer diameter larger than the outer diameter of the first end 22.

[0028] The second end 23 of the vane carrier 21 is radially crossed by a slot 24 in which the vane is movably mounted.

[0029] In the first end 22 of the vane carrier 21 there is provided a seat 25 having a blind bottom 26 and an open end 27 opposite to the blind bottom 26. The seat 25 has a cross-section shaped like a four-arm cross comprising a first, a second, a third and a fourth radial portion 29a-d. In particular, said radial portions 29a-d, diametrically opposed two by two, develop along two directions preferably orthogonal to each other. In addition, each of the above four radial portions 29a-d is preferably connected to two neighboring radial portions by means of arc-shaped portions 30. The blind bottom 26 of the seat 25 is substantially perpendicular to the longitudinal axis Y, whereas a plurality of walls of the seat 25 extend in a direction substantially parallel to the longitudinal axis Y. In particular, the first and the second radial portion 29a and 29b, diametrically opposite to each other, of the seat 25, have respective first walls 32 and second walls 33 extending from corresponding arc-shaped portions 30 to a respective peripheral wall 31 of said radial portions; these walls 32, 33 act as first abutment surfaces 32 and second abutment surfaces 33, respectively, against which the transmission coupling 40 exerts a thrust, as will be better illustrated below, so as to rotate the vane carrier 21.

[0030] The second end 23 of the vane carrier 21 further comprises a pin 34 arranged at the center of the seat 25 and extending from the bottom 26 of the seat 25 along the longitudinal axis Y. The pin 34 preferably has two portion with different diameters, i.e. a first portion 34a, proximal to the bottom 26 of the seat 25 and having a larger diameter, and a second portion 34b, distal to the

bottom 26 of the seat 25 and having a smaller diameter.

[0031] Referring in particular to Figures 2 and 6, the transmission coupling 40, preferably made of steel or other material harder than that of the vane carrier, comprises an engaging end 41 configured for being inserted into the seat 25 of the vane carrier 21, and a coupling end 42, comprising coupling means 52 between the transmission coupling 40 and a camshaft end (not shown).

[0032] The engaging end 41 of the transmission coupling 40 has a four-arm cross-shaped cross-section, substantially equal to the cross-section of the seat 25 of the second end 23 of the vane carrier 21 and thus comprising a first, a second, a third and a fourth radial portion 44a-d. Similarly to what is provided for the radial portions 29a-d of the seat 25 of the vane carrier 21, the radial portions 44a-d of the transmission coupling 40 are arranged diametrically opposed two by two, develop along two directions preferably orthogonal to each other and each radial portion 44a-d is connected to two neighboring radial portions by means of arc-shaped portions 45.

[0033] The engaging end 41 further comprises a first face 46, substantially perpendicular to the longitudinal axis Y and oriented towards the bottom 26 of the seat 25 of the vane carrier 21 and proximal thereto, and a second face 47, also perpendicular to the longitudinal axis Y, said second face being opposite to the first face 46 and distal to the bottom 26 of the seat 25 of the vane carrier 21. The engaging end 41 further comprises walls extending between the first face 46 and the second face 47, substantially perpendicularly to said faces. In particular, the first and the second radial portion 44a and 44b, diametrically opposed to each other, have respective first walls 49 and second walls 50, extending from corresponding arc-shaped portions 45 to a respective peripheral wall 48 of said radial portions. The first walls 49, abutting against said first abutment surfaces 32 facing said first walls, exert, onto said first abutment surfaces, thrusts that cause rotation of the vane carrier 21; similarly, the second walls 50, abutting against said second abutment surfaces 33 facing said second walls exert, onto said second abutment surfaces, thrusts that cause rotation of the vane carrier 21 in a direction opposite to the that of the rotation caused by the first thrust walls 49. In the following description, the first walls 49 will be referred to as first thrust surfaces 49 and the second walls 50 will be referred to as second thrust surfaces 50.

[0034] In particular, the first thrust surfaces 49 are rotation thrust surfaces configured for exerting a thrust onto the respective first abutment surfaces 32, so as to transmit the drive torque to the vane carrier 21 during normal operation of the pump; the second thrust surfaces 50 are, instead, counter-rotational thrust surfaces configured for exerting a thrust onto the respective second abutment surfaces 33 at the time when a reversal of the drive torque occurs.

[0035] The engaging end 41 of the transmission coupling 40 further comprises a central opening 51 extending from the first face 46 to the second face 47 of the engag-

ing end 41, along the longitudinal axis Y. The pin 34 of the vane carrier 21 is inserted through said opening 51. Preferably, said opening 51 is non-circular and it rather has an elongated shape. In particular, the opening 51 has a greater extension along a direction of development of the first radial portion 44a and the second radial portion 44b, diametrically opposed to each other, of the engaging end 41 of the transmission coupling 40. Advantageously, said elongated shape of the opening 51 allows some clearance between the transmission coupling 40 and the vane carrier 21, such as to compensate for any non-coaxiality between them.

[0036] In the coupling end 42 of the transmission coupling 40, the coupling means preferably have the shape of two teeth 52. Said teeth extend parallel to the longitudinal axis Y, from the second end 47 of the engaging end 41 of the transmission coupling 40, at the third radial portion 44c and the fourth radial portion 44d of the engaging end 41. In particular, said third and fourth radial portions 44c, 44d are diametrically opposite radial portions of the engaging end 41 that are arranged transversely relative to the direction along which the opening 51 with elongated shape of the transmission coupling 40 has a greater extension. In a known manner, the teeth 52 are preferably configured for sliding in a corresponding slot (not shown) located at the end of the camshaft, thus forming an Oldham joint.

[0037] Referring in particular to Figures 2 and 7, the first support element 170, made of a metal material, preferably spring-steel, and made as a thin metal plate, comprises a base 171 having a central bore 174 configured for being fitted with interference onto the second portion 34b of the pin 34 of the seat 25 of the vane carrier 21. The base 171 has a first radial portion 173a and a second radial portion 173b which are diametrically opposite to each other relative to the central bore 174 and rest on the second face 47 of the transmission coupling 40, in particular on the first radial portion 44a and on the second radial portion 44b of the engaging end 41, respectively.

[0038] Advantageously, the central bore 174, being made by deep drawing, has a longitudinal extension greater than the thickness of the first support element 170: such extension allows to obtain a large area of interference with the pin 34 in order to withstand axial and radial stresses transmitted by the transmission coupling 40.

[0039] Advantageously, the interference fitting between the first support element 170 and the second portion 34b of the pin 34 of the vane carrier 21 allows to prevent the transmission coupling 40 from slipping out of the vane carrier 21.

[0040] The first support element 170 further comprises four wings 175, 176, 177, 178, made as a single piece with the base 171. In particular, a first wing 175 and a third wing 177 extend from the first radial portion 173a and a second wing 176 and a fourth wing 178 extend from the second radial portion 173b of the base 171. All the wings 175, 176, 177, 178 extend in a direction substantially

perpendicular to the base 171 and on the same side relative to a plane on which the base itself lies. The first and the second wing 175, 176 are arranged between the first thrust surfaces 49 of the first radial portion 44a and of the second radial portion 44b, respectively, of the engaging portion 41 of the transmission coupling 40 and the corresponding first abutment surfaces 32 of the seat 25 of the vane carrier 21, which first abutment surfaces face said first thrust surfaces, and thus lie in diametrically opposite directions relative to the longitudinal axis Y. The third and fourth wing 177, 178 are arranged between the second thrust surfaces 50 of the first radial portion 44a and of the second radial portion 44b, respectively, of the engaging portion 41 of the transmission coupling 40 and the corresponding second abutment surfaces 33 of the seat 25 of the vane carrier 21, which second abutment surfaces face said second thrust surfaces, and thus lie in diametrically opposite directions relative to the longitudinal axis Y.

[0041] Advantageously, the first and the second wing 175, 176 of the first support element 170 allow limiting the wear of the vane carrier 21 due to the contact between the first thrust surfaces 49 of the transmission coupling 40 and the corresponding first abutment surfaces 32 of the vane carrier 21, which first abutment surfaces face said first thrust surfaces. In addition, advantageously, the third and fourth wing 177, 178 of the first support element 170 allow limiting the wear due to the contact between the second thrust surfaces 50 of the transmission coupling 40 and the corresponding second abutment surfaces 33 of the vane carrier 21, which second abutment surfaces face said second thrust surfaces.

[0042] In each of the two radial portions 173a, 173b of the first support element 170 there is further provided a radial slot 179 extending from a first closed end 184 proximal to the central bore 174 to an end 180 of the radial portion 173a, 173b distal to the central bore 174. Each slot 179 divides the respective radial portion 173a, 173b into a first sub-branch 181 and a second sub-branch 182, whereby each of the four wings 175, 176, 177, 178 extends from a respective sub-branch 181, 182. Preferably, each slot 179 has, at its closed end 184, a widened portion 185.

[0043] Owing to the slots 179, the sub-branches 181, 182 are elastic along the plane on which the base 171 lies, in a direction transverse to the corresponding wings (i.e. in the direction indicated by the arrow in Figure 7 for one of the sub-branches) and, furthermore, they are advantageously pre-loaded along said plane outwards, i.e. in divergent directions, so that the respective wings 175, 176, 177, 178 remain adhering against the corresponding first and second abutment surfaces 32, 33 of the vane carrier 21 rather than against the first and second thrust surfaces 49, 50 of the transmission coupling 40. In other words, the elastic radial slots 179, combined with a width, under rest conditions, of the radial portions 173a, 173b of the support element 170 greater than the width of the corresponding radial portions 29a, 29b of the seat 25 of

the vane carrier 21, allow inserting the first support element 170 and the transmission coupling 40 into the seat 25 of the vane carrier 21, ensuring that the wings 175, 176, 177, 178 of the first support element 170 are always in contact with the respective abutment surfaces 32, 33 of the vane carrier 21.

[0044] Referring in particular to Figures 2 and 8, the second support element 160, made of a metal material, preferably spring-steel, and being in the form of a thin metal plate, comprises a base 161 having the shape of a four-arm cross substantially equal to the shape of the cross-section of the seat 25 of the vane carrier 21. This base 161 therefore comprises a first, a second, a third and a fourth radial portion 163a-d, diametrically opposite two by two. The base 161 further has a central bore 164 configured for being fitted with interference onto the first portion 34a of the pin 34 of the vane carrier 21. Thanks to the fact that the second portion 34b of the pin 34 has a diameter smaller than that of the first portion, the insertion of the second support element 160 into the pin 34 is made easier.

[0045] Advantageously, the central bore 164, being made by deep drawing, has a longitudinal extension greater than the thickness of the second support element 160: such extension allows obtaining a large area of interference with the pin 34 in order to withstand the axial and radial stresses transmitted by the transmission coupling 40.

[0046] Advantageously, the base 161 of the second support element 160 allows to limit the wear of the bottom 26 of the seat 25 of the vane carrier 21 due to the first face 46 of the engaging end 41 of the transmission coupling 40 because of axial pulsations of the transmission coupling 40.

[0047] The rotor as described and illustrated is susceptible to further variants and modifications falling within the scope of the claims.

Claims

1. Rotor comprising a vane carrier (21), a transmission coupling (40), configured for transmitting a drive torque to the vane carrier (21), and at least one vane; wherein the vane carrier (21) comprises a seat (25), and wherein the transmission coupling (40) comprises an engaging end (41) configured for being inserted into the seat (25) of the vane carrier (21) and having a first face (46) oriented towards the seat (25) of the vane carrier (21), and a second face (47) oriented in a direction opposite to that of the first face (46),

the rotor further comprising a first support element (170) comprising a base (171) resting on the second face (47) of said engaging end (41), two first wings (175, 176) arranged between respective first thrust surfaces (49) of the engaging

end (41) and corresponding first abutment surfaces (32) of the seat (25), said first abutment surfaces (32) facing the first thrust surfaces (49), and two second wings (177, 178) arranged between respective second thrust surfaces (50) of the engaging end (41) and corresponding second abutment surfaces (33) of the seat (25), said second abutment surfaces (33) facing the second thrust surfaces (50),

the rotor being **characterized in that** the base (171) of the first support element (170) comprises two radial portions (173a, 173b) in which a corresponding radial slot (179) is provided dividing said two radial portions (173a, 173b) into a first sub-branch (181), from which a respective wing of said two first wings (175, 176) extends, and a second sub-branch (182), from which a respective wing of said two second wings (177, 178) extends.

2. Rotor according to claim 1, wherein the first sub-branch (181) is configured for elastically bending in a transverse direction relative to the respective first wing (175, 176) and the second sub-branch (182) is configured for elastically bending in a transverse direction relative to the respective second wing (177, 178), said first sub-branch (181) and second sub-branch (182) being transversely pre-loaded in diverging directions, so that said two first wings (175, 176) and said two second wings (177, 178) remain adherent to the corresponding first abutment surfaces (32) and second abutment surfaces (33) of the vane carrier (21), respectively.
3. Rotor according to claim 1 or 2, wherein the radial slot (179) comprises a closed end (184) having a widened portion (185).
4. Rotor according to any of the preceding claims, further comprising a second support element (160) comprising a base (161) arranged between a blind bottom (26) of the seat (25) of the vane carrier (21) and the first face (46) of the engaging end (41) of the transmission coupling (40), said first face (46) being oriented towards said blind bottom (26) and proximal thereto.
5. Rotor according to any of the preceding claims, wherein:
said first thrust surfaces (49) are rotational thrust surfaces configured for exerting a thrust onto said first abutment surfaces (32), so as to transmit the drive torque to the vane carrier (21), and said second thrust surfaces (50) are counter-rotational thrust surfaces configured for exerting a thrust onto said second abutment surfaces (33) at the moment when an inversion of the drive torque occurs.

6. Rotor according to any of the preceding claims, wherein the seat (25) of the vane carrier (21) and the engaging end (41) of the transmission coupling (40) have each a four-arm cross-shaped cross-section.
7. Rotor according to any of the preceding claims, wherein said first and second support elements (170, 160) are made as thin metal plates.
8. Rotor according to any of the preceding claims, wherein said first and second support elements (170, 160) are made of spring-steel.
9. Rotor according to any of the preceding claims, wherein the vane carrier (21) is made of thermoplastic material and the transmission coupling (40) is made of metal.
10. Pump comprising a rotor according to any of the preceding claims.

Patentansprüche

1. Rotor umfassend einen Schaufelträger (21), eine Übertragungskupplung (40), die zur Übertragung eines Antriebsmoments auf den Schaufelträger (21) ausgebildet ist, und mindestens einer Schaufel; wobei der Schaufelträger (21) einen Sitz (25) aufweist, und wobei die Übertragungskupplung (40) ein Eingriffsende (41) aufweist, das so ausgebildet ist, dass es in den Sitz (25) des Schaufelträgers (21) eingeführt wird, und eine erste Fläche (46), die zum Sitz (25) des Schaufelträgers (21) hin ausgerichtet ist, und eine zweite Fläche (47) aufweist, die in einer Richtung entgegengesetzt zu der der ersten Fläche (46) ausgerichtet ist,

wobei der Rotor ferner ein erstes Trägerelement (170) umfasst, das eine Basis (171), die auf der zweiten Fläche (47) des Eingriffsendes (41) ruht, zwei erste Flügel (175, 176), die zwischen jeweiligen ersten Druckflächen (49) des Eingriffsendes (41) und entsprechenden ersten Anlageflächen (32) des Sitzes (25) angeordnet sind, wobei die ersten Anlageflächen (32) den ersten Druckflächen (49) zugewandt sind, und zwei zweite Flügel (177, 178), die zwischen entsprechenden zweiten Druckflächen (50) des Eingriffsendes (41) und entsprechenden zweiten Anlageflächen (33) des Sitzes (25) angeordnet sind, wobei die zweiten Anlageflächen (33) den zweiten Druckflächen (50) zugewandt sind, der Rotor **dadurch gekennzeichnet** wird, dass die Basis (171) des ersten Trägerelements (170) zwei radiale Abschnitte (173a, 173b) umfasst, in denen ein entsprechender radialer

Schlitz (179) vorgesehen ist, der die beiden radialen Abschnitte (173a, 173b) in einen ersten Nebenzweig (181), von dem sich ein entsprechender Flügel der beiden ersten Flügel (175, 176) erstreckt, und einen zweiten Nebenzweig (182), von dem sich ein entsprechender Flügel der beiden zweiten Flügel (177, 178) erstreckt, unterteilt.

2. Rotor nach Anspruch 1, wobei der erste Nebenzweig (18) so ausgebildet ist, dass er sich in einer Querrichtung relativ zu dem jeweiligen ersten Flügel (175, 176) elastisch biegt, und der zweite Nebenzweig (182) so ausgebildet ist, dass er sich in einer Querrichtung relativ zu dem jeweiligen zweiten Flügel (177, 178) elastisch biegt, wobei der erste Nebenzweig (181) und der zweite Nebenzweig (182) in divergierenden Richtungen quer vorgespannt sind, so dass die beiden ersten Flügel (175, 176) und die beiden zweiten Flügel (177, 178) an den entsprechenden ersten Anlageflächen (32) bzw. zweiten Anlageflächen (33) des Schaufelträgers (21) anliegend bleiben.
3. Rotor nach Anspruch 1 oder 2, wobei der radiale Schlitz (179) ein geschlossenes Ende (184) mit einem verbreiterten Abschnitt (185) aufweist.
4. Rotor nach einem der vorhergehenden Ansprüche, ferner umfassend ein zweites Trägerelement (160), das eine Basis (161) umfasst, die zwischen einem Zwischenboden (26) des Sitzes (25) des Schaufelträgers (21) und der ersten Fläche (46) des Eingriffsendes (41) der Übertragungskupplung (40) angeordnet ist, wobei die erste Fläche (46) zum Zwischenboden (26) hin und in der Nähe desselben ausgerichtet ist.
5. Rotor nach einem der vorhergehenden Ansprüche, wobei: die ersten Druckflächen (49) Rotationsdruckflächen sind, die so ausgebildet sind, dass sie einen Druck auf die ersten Anlageflächen (32) ausüben, um das Antriebsdrehmoment auf den Schaufelträger (21) zu übertragen, und die zweiten Druckflächen (40) gegenläufige Druckflächen sind, die so ausgebildet sind, dass sie einen Druck auf die zweiten Anlageflächen (33) in dem Moment ausüben, in dem eine Umkehrung des Antriebsdrehmoments auftritt.
6. Rotor nach einem der vorhergehenden Ansprüche, wobei der Sitz (25) des Schaufelträgers (21) und das Eingriffsende (41) der Übertragungskupplung (40) jeweils einen vierarmigen kreuzförmigen Querschnitt aufweisen.

7. Rotor nach einem der vorhergehenden Ansprüche, wobei die ersten und zweiten Trägerelemente (170, 160) als dünne Metallplatten ausgeführt sind.
8. Rotor nach einem der vorhergehenden Ansprüche, wobei die ersten und zweiten Stützelemente (170, 160) aus Federstahl bestehen.
9. Rotor nach einem der vorhergehenden Ansprüche, wobei der Schaufelträger (21) aus thermoplastischem Kunststoff und die Übertragungskupplung (40) aus Metall besteht.
10. Pumpe mit einem Rotor nach einem der vorhergehenden Ansprüche.

Revendications

1. Rotor comprenant un support de palette (21), un couplage de transmission (40), configuré pour transmettre un couple d'entraînement au support de palette (21), et au moins une palette ; dans lequel le support de palette (21) comprend un siège (25), et dans lequel le couplage de transmission (40) comprend une extrémité d'engagement (41) configurée pour être insérée dans le siège (25) du support de palette (21) et ayant une première face (46) orientée vers le siège (25) du support de palette (21), et une seconde face (47) orientée dans une direction opposée à celle de la première face (46),

le rotor comprenant en outre un premier élément de support (170) comprenant une base (171) reposant sur la seconde face (47) de ladite extrémité d'engagement (41), deux premières ailes (175, 176) agencées entre des premières surfaces de poussée (49) respectives de l'extrémité d'engagement (41) et des premières surfaces de butée (32) correspondantes du siège (25), lesdites premières surfaces de butée (32) faisant face aux premières surfaces de poussée (49), et deux secondes ailes (177, 178) agencées entre des secondes surfaces de poussée (50) respectives de l'extrémité d'engagement (41) et des secondes surfaces de butée (33) correspondantes du siège (25), lesdites secondes surfaces de butée (33) faisant face aux secondes surfaces de poussée (50),
le rotor étant **caractérisé en ce que** la base (171) du premier élément de support (170) comprend deux portions radiales (173a, 173b) dans lesquelles une fente radiale (179) correspondante est prévue divisant lesdites deux portions radiales (173a, 173b) en une première section

auxiliaire (181), d'où s'étend une aile respective desdites deux ailes (175, 176), et une seconde section auxiliaire (182), d'où s'étend une aile respective desdites deux secondes ailes (177, 178).

2. Rotor selon la revendication 1, dans lequel la première section auxiliaire (181) est configurée pour se courber élastiquement dans une direction transversale par rapport à la première aile (175, 176) respective et la seconde section auxiliaire (182) est configurée pour se courber élastiquement dans une direction transversale par rapport à la seconde aile (177, 178) respective, lesdites première section auxiliaire (181) et seconde section auxiliaire (182) étant préchargées transversalement dans des directions divergentes, de sorte que lesdites deux premières ailes (175, 176) et lesdites deux secondes ailes (177, 178) restent respectivement adhérentes aux premières surfaces de butée (32) et aux secondes surfaces de butée (33) correspondantes du support de palette (21).
3. Rotor selon la revendication 1 ou 2, dans lequel la fente radiale (179) comprend une extrémité fermée (184) ayant une portion élargie (185).
4. Rotor selon l'une quelconque des revendications précédentes, comprenant en outre un second élément de support (160) comprenant une base (161) agencée entre un fond aveugle (26) du siège (25) du support de palette (21) et la première face (46) de l'extrémité d'engagement (41) du couplage de transmission (40), ladite première face (46) étant orientée vers ledit fond aveugle (26) et proximale à celui-ci.
5. Rotor selon l'une quelconque des revendications précédentes, dans lequel :
lesdites premières surfaces de poussée (49) sont des surfaces de poussée rotatives configurées pour exercer une poussée sur lesdites premières surfaces de butée (32), de façon à transmettre le couple d'entraînement au support de palette (21), et lesdites secondes surfaces de poussée (50) sont des surfaces de poussée contrarotatives configurées pour exercer une poussée sur lesdites secondes surfaces de butée (33) au moment où une inversion du couple d'entraînement se produit.
6. Rotor selon l'une quelconque des revendications précédentes, dans lequel le siège (25) du support de palette (21) et l'extrémité d'engagement (41) du couplage de transmission (40) ont chacun une section en forme de croix à quatre branches.
7. Rotor selon l'une quelconque des revendications précédentes, dans lequel lesdits premier et second

éléments de support (170, 160) sont réalisés sous forme de plaques de métal minces.

8. Rotor selon l'une quelconque des revendications précédentes, dans lequel lesdits premier et second éléments de support (170, 160) sont réalisés en acier à ressort. 5
9. Rotor selon l'une quelconque des revendications précédentes, dans lequel le support de palette (21) est réalisé en matériau thermoplastique et le couplage de transmission (40) est réalisé en métal. 10
10. Pompe comprenant un rotor selon l'une quelconque des revendications précédentes. 15

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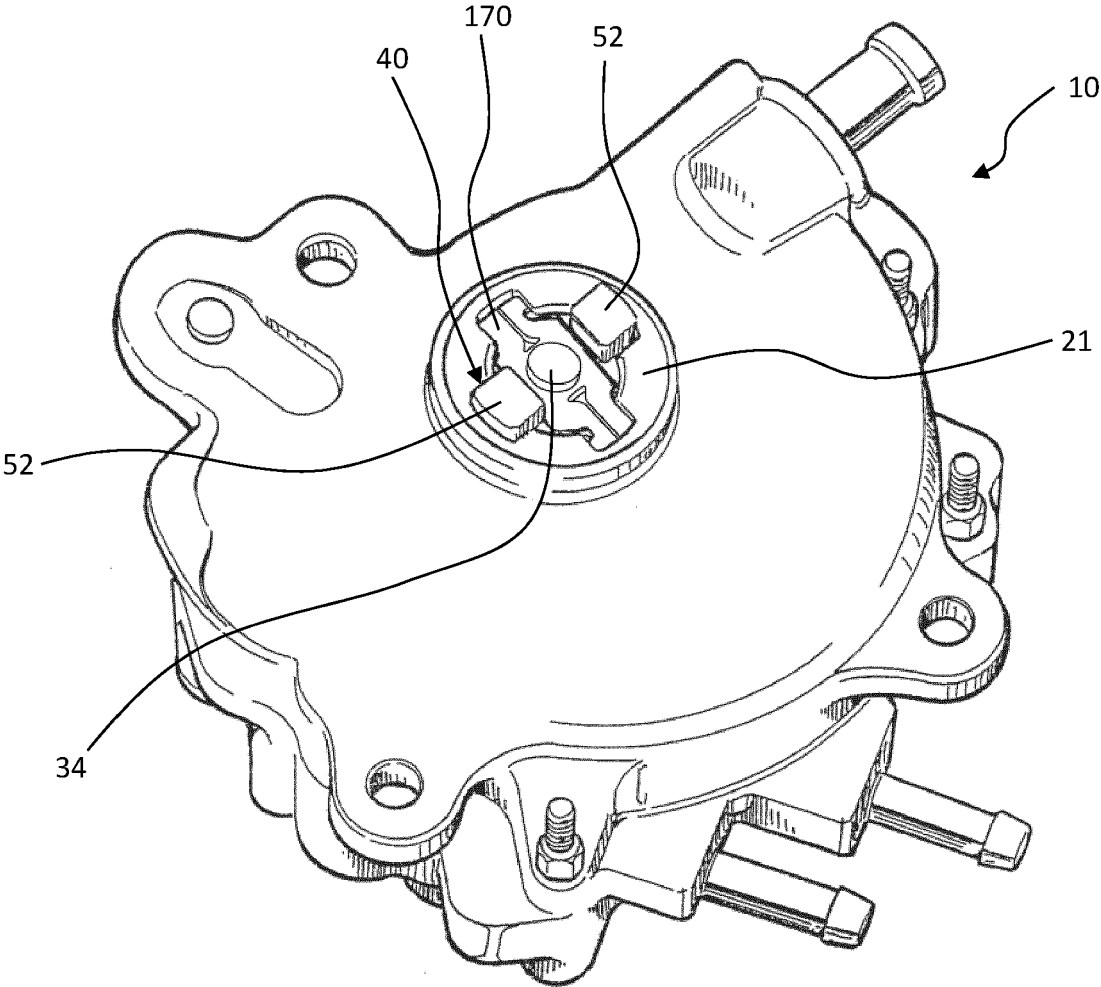


Fig. 1

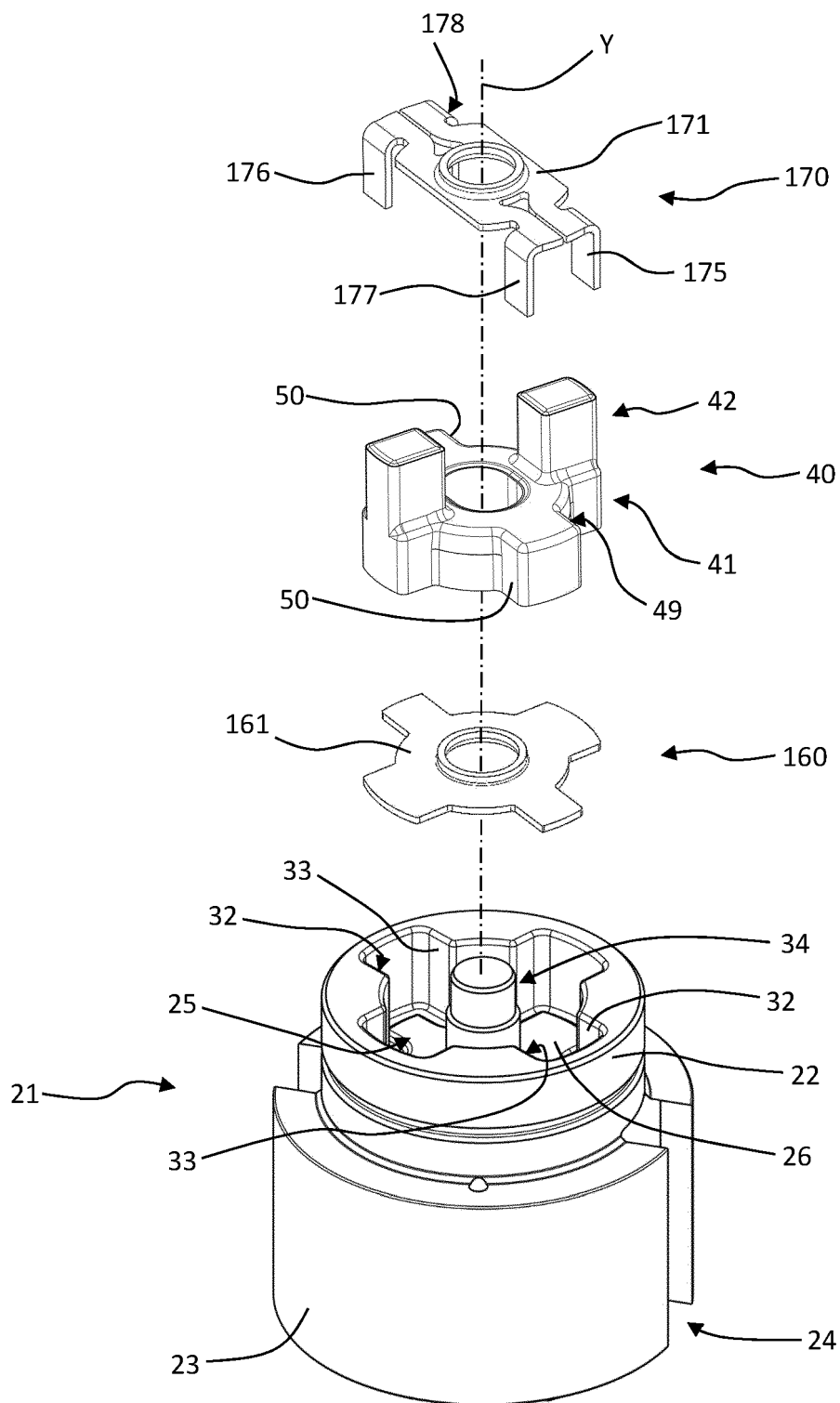


Fig. 2

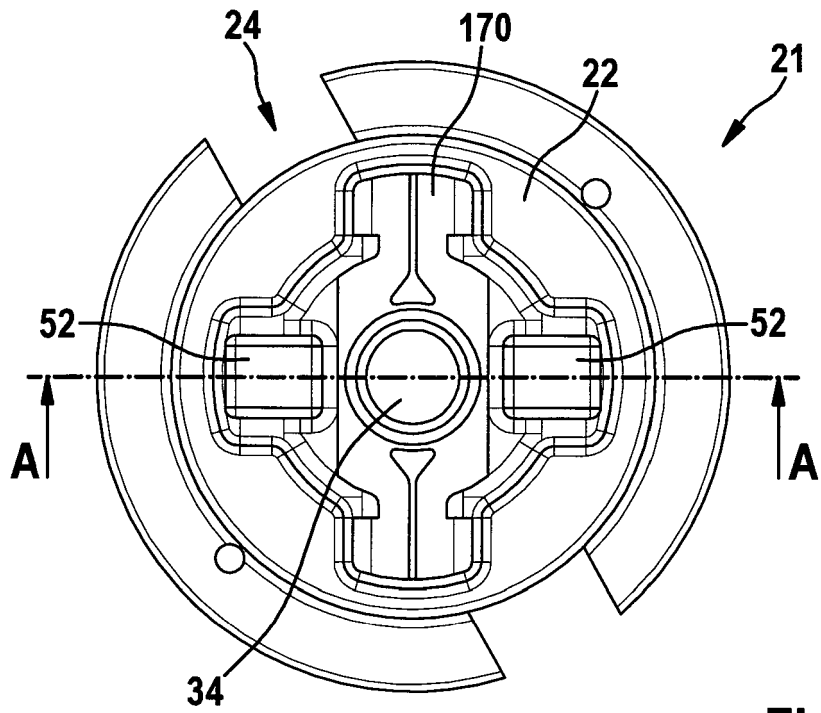


Fig. 3

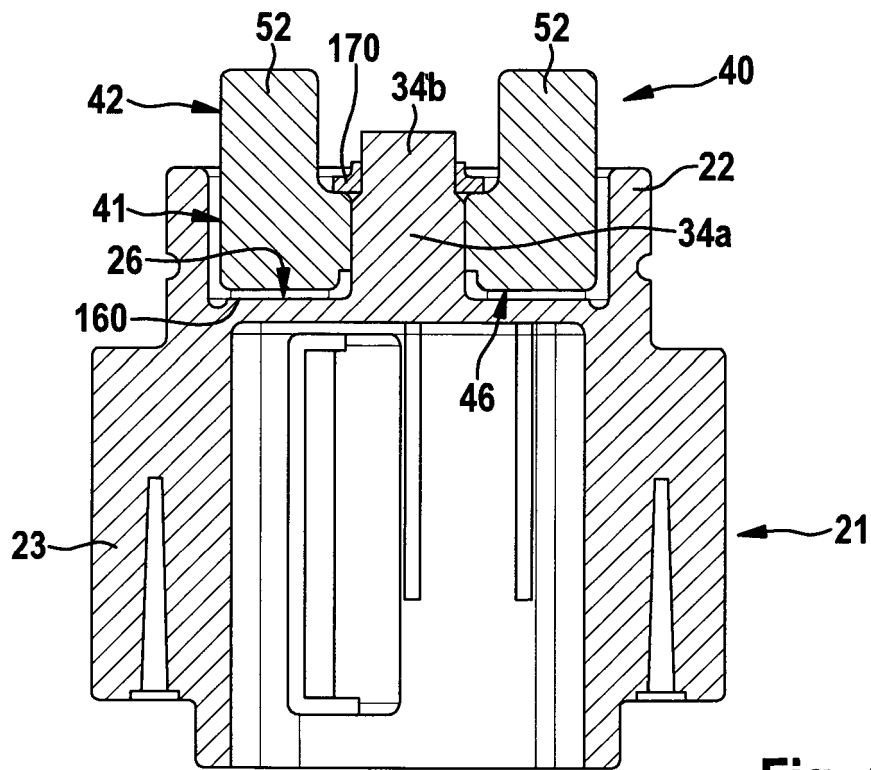


Fig. 4

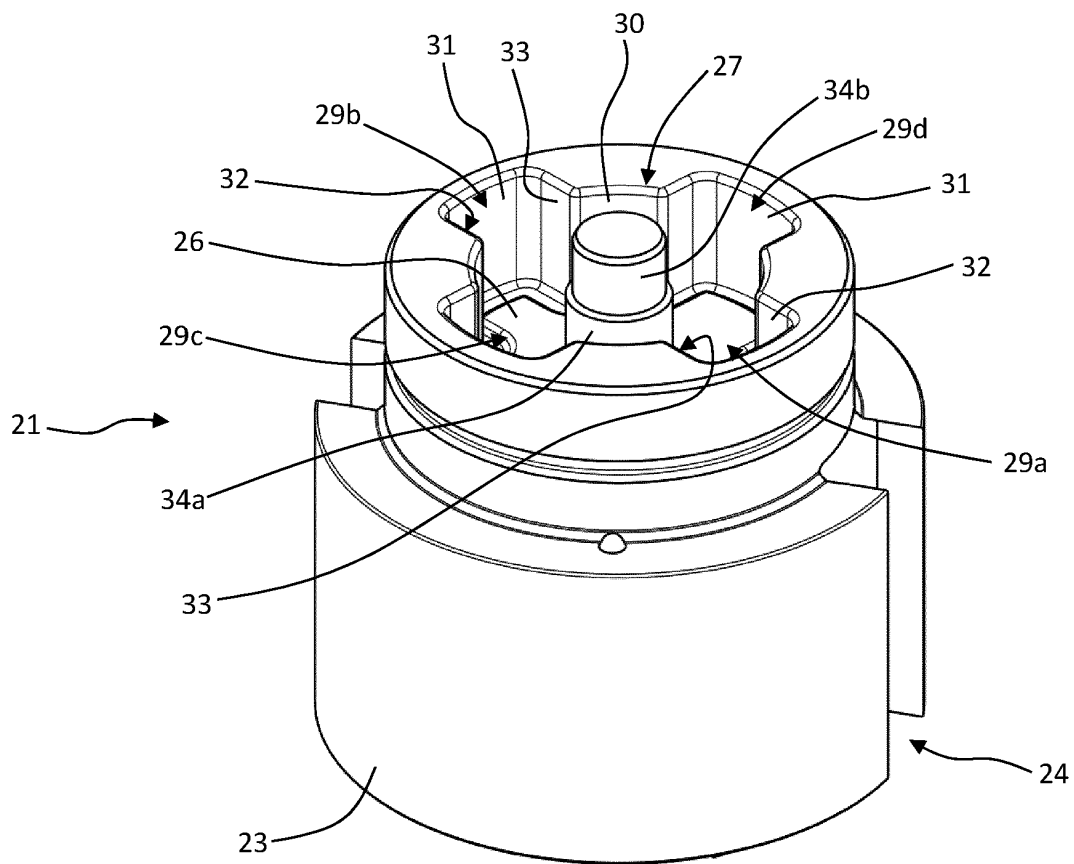


Fig. 5

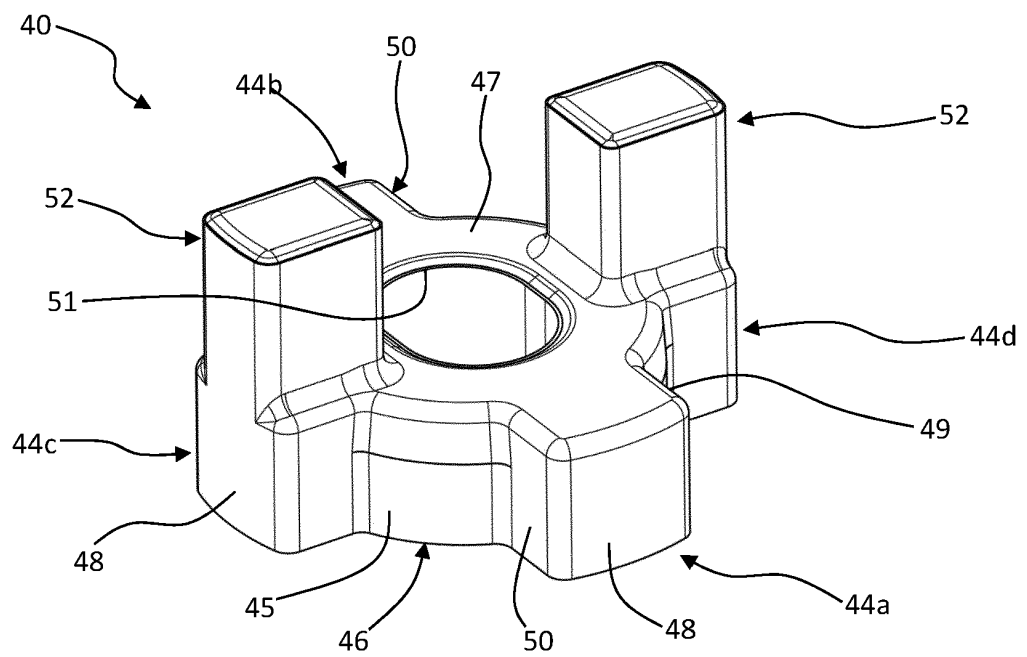
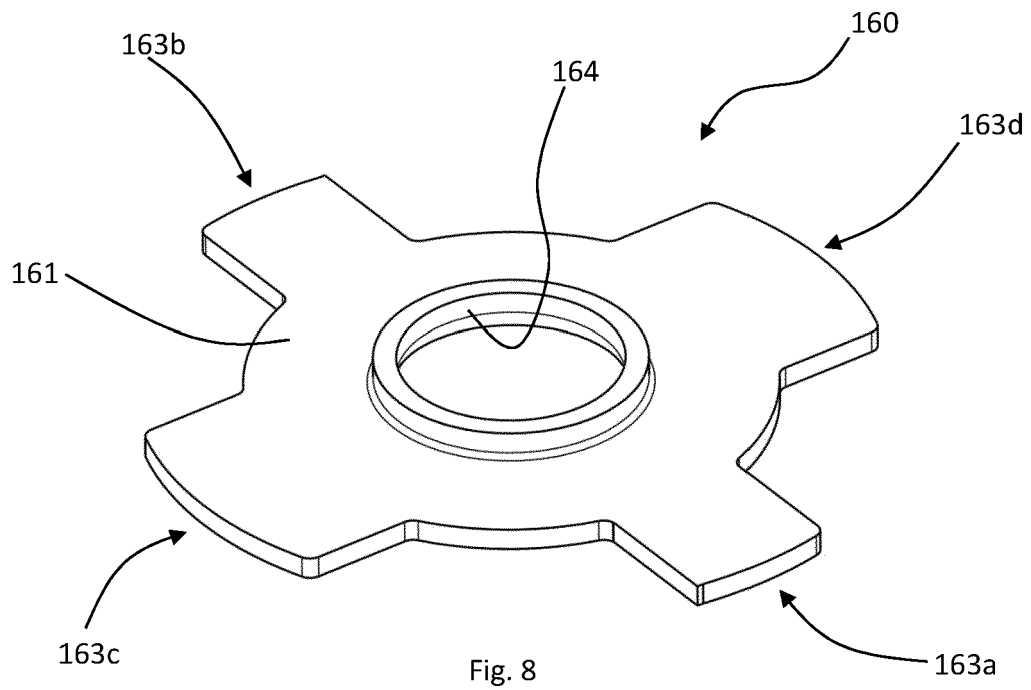
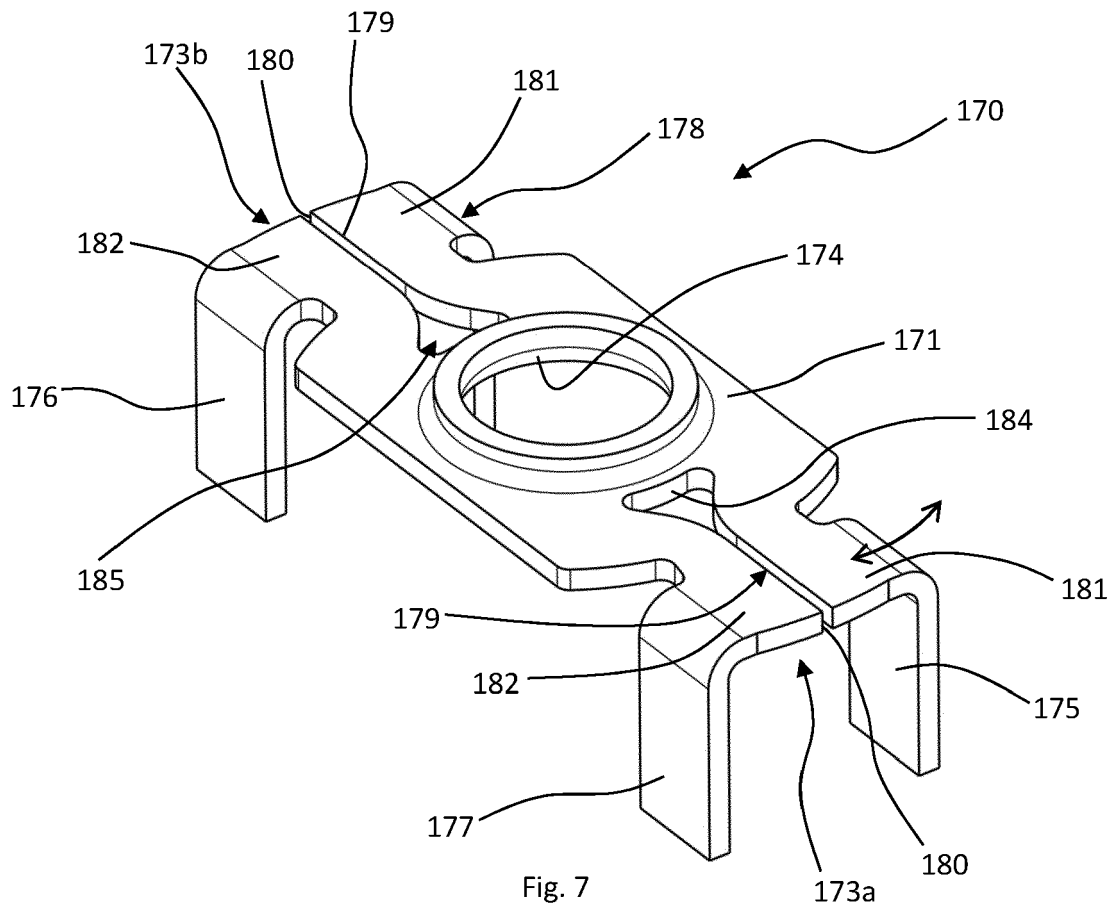


Fig. 6



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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