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(54) **DRAG PUMPING MECHANISM FOR A TURBOMOLECULAR PUMP**

REIBUNGSPUMPMECHANISMUS FÜR EINE TURBOMOLEKULARPUMPE

MÉCANISME DE POMPAGE DE TRAÎNÉE POUR POMPE TURBOMOLÉCULAIRE

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to turbomolecular pumps (TMPs).

BACKGROUND

[0002] A turbomolecular pump is a type of vacuum pump which operates by pushing gas molecules in a desired pumping direction using rotating blades in one or more bladed pumping stages.

[0003] One type of turbomolecular pump includes, in addition to one or more bladed turbomolecular pumping stages, a drag pumping mechanism (e.g. one or more Holweck and/or Siegbahn drag pumping stages). This type of turbomolecular pump is sometimes referred to as a compound turbomolecular pump. In this type of turbomolecular pump, it is generally desirable to increase the drag generated by the drag pumping mechanism in order to improve pumping efficiency.

[0004] EP3670924 A1 is an example of such a compound turbomolecular pump.

SUMMARY OF INVENTION

[0005] According to a first aspect of the invention, there is provided a drag pumping mechanism for a turbomolecular pump according to claim 1.

[0006] The drag generation structure may be formed from the same type of material as the part of the motor with which it is integrally formed. The type of material may be epoxy.

[0007] The plurality of walls may all extend by substantially the same distance from the frustoconical surface.

[0008] The drag pumping mechanism may further comprise a stator, one or more Holweck and/or Siegbahn drag pumping stages formed by the impeller and the stator.

[0009] The drag generation structure may be located downstream of the one or more Holweck and/or Siegbahn drag pumping stages.

[0010] The drag pumping mechanism may further comprise one or more Holweck and/or Siegbahn drag pumping stages located downstream of the drag generation structure.

[0011] The annular body of the drag generation structure may have a generally triangular cross-section.

[0012] The plurality of channels of the drag generation structure may be curved.

[0013] The plurality of walls of the drag generation structure may be integrally formed with the annular body of the drag generation structure.

[0014] The bottoms of the plurality channels may be flat.

[0015] The bottoms of the plurality of channels may be curved.

[0016] According to a second aspect of the invention, there is provided a turbomolecular pump comprising the drag pumping mechanism of the first aspect.

BRIEF DESCRIPTION OF DRAWINGS

[0017]

Figure 1 is a schematic illustration (not to scale) showing a turbomolecular pump;

Figure 2 is a schematic illustration (not to scale) showing a more detailed cross-sectional view of the turbomolecular pump of Figure 1;

Figure 3 is a schematic illustration (not to scale) showing the flow path of gas being pumped through the turbomolecular pump of Figure 2; and

Figure 4 is a schematic illustration (not to scale) showing a perspective view of a section of a drag generation structure of the turbomolecular pump of Figure 2.

25 DETAILED DESCRIPTION

[0018] Figure 1 is a schematic illustration (not to scale) showing a turbomolecular pump 10.

[0019] The turbomolecular pump 10 comprises a bladed turbomolecular pumping stage 100 and a drag pumping mechanism 200. The bladed turbomolecular pumping stage 100 is configured to receive gas from a location external to the turbomolecular pump 10 (e.g. a chamber from which it is desired to pump gas), pump the received gas therethrough, and output the pumped gas to the drag pumping mechanism 200. The drag pumping mechanism 200 is configured to receive the pumped gas from the bladed turbomolecular pumping stage 100, pump the received gas therethrough and output the pumped gas out of the turbomolecular pump 10 (e.g. for disposal or for conveyance to another location).

[0020] The operation of the bladed turbomolecular pumping stage 100 of the turbomolecular pump 10 is well understood and will not be described here in detail. However, briefly, the bladed turbomolecular pumping stage 100 comprises a plurality of rotor blades and a plurality of stator blades intermeshed with the rotor blades. The rotor blades are angled relative to the stator blades such that rotation of the rotor blades pushes gas through the spaces between the rotor and stator blades in a desired pumping direction to pump gas through the bladed turbomolecular pumping stage 100.

[0021] The turbomolecular pump 10 will now be described in more detail with reference to Figure 2.

[0022] Figure 2 is a schematic illustration (not to scale) showing a cross-sectional view of the turbomolecular pump 10.

[0023] The turbomolecular pump 10 comprises an im-

peller 210, a stator 220, a motor 230, a drag generation structure 240, an inlet 250 and an outlet (not depicted). The impeller 210 is configured to rotate relative to the stator 220 and the drag generation structure 240 to pump gas from the inlet 250 to the outlet. To achieve this, the impeller 210, stator 220 and drag generation structure 240 together form the turbomolecular pumping stage 100 and a plurality of drag pumping stages, which will be described below in more detail. The motor 230 is configured to drive the rotation of the impeller 210. The inlet 250 is configured to receive gas from an entity from which gas is to be pumped (e.g. a chamber connected to the turbomolecular pump 10). The inlet 250 comprises one or more openings at the top of the turbomolecular pump 10 which are fluidly connected to the bladed turbomolecular pumping stage 100. The outlet is configured to output gas which has been pumped through the turbomolecular pump 10 out of the turbomolecular pump 10 entirely. The direction to the location of the outlet is depicted by arrow 260.

[0024] In more detail, the impeller 210 comprises an impeller shaft 212, a plurality of turbomolecular rotor elements 214, a plurality of Holweck rotor elements 216 and a connecting member 218. In this embodiment, the plurality of turbomolecular rotor elements 214 comprises a first turbomolecular rotor element 214a and a second turbomolecular rotor element 214b. In this embodiment, the plurality of Holweck rotor elements 216 comprises a first Holweck rotor element 216a and a second Holweck rotor element 216b. The plurality of turbomolecular rotor elements 214 and the plurality of Holweck rotor elements 216 are attached to the impeller shaft 212 via the connecting member 218. The impeller shaft 212 is generally cylindrical and defines a longitudinal direction, a radial direction and a circumferential direction. The impeller shaft 212 also defines a rotation axis of the impeller 210 about which the impeller 210 is configured to rotate when driven by the motor 230. The rotation axis of the impeller 200 extends in the longitudinal direction. Each of the plurality of turbomolecular rotor elements 214 is an annular blade extending in the radial direction outwards from the connecting member 218. Each of the plurality of Holweck rotor elements is a cylindrical wall (also known as a "skirt") extending circumferentially around the impeller shaft 212 and extending in the longitudinal direction from the connecting member 218.

[0025] The stator 220 comprises a plurality of turbomolecular stator elements 222 and a plurality of Holweck stator elements 224. In this embodiment, the plurality of turbomolecular stator elements 222 comprises a first turbomolecular stator element 222a and a second turbomolecular stator element 222b. In this embodiment, the plurality of Holweck stator elements 222 comprises a first Holweck stator element 224a, a second Holweck stator element 224b and a third Holweck stator element 224c. Each of the plurality of turbomolecular stator elements 222 is an annular blade extending in the radial direction inwards towards a centre line of the impeller shaft 212.

Each of the plurality of Holweck stator elements 224 is a cylindrical wall comprising helical channels (or grooves) in its surface for generating drag for drag pumping.

[0026] The plurality of turbomolecular rotor elements 214 are intermeshed with the plurality of turbomolecular stator elements 222 to form the bladed turbomolecular pumping stage 100. The physical mechanism behind how the bladed turbomolecular pumping stage 100 works is well known and has been briefly described above with reference to Figure 1.

[0027] The plurality of Holweck rotor elements 216 are intermeshed with the plurality of Holweck stator elements 224 to form a plurality of Holweck drag pumping stages (also known as a "Holweck pack"). Specifically, the first Holweck rotor element 216a and the first Holweck stator element 224a together form a first Holweck drag pumping stage. The first Holweck rotor element 216a and a first side of the second Holweck stator element 224b together form a second Holweck drag pumping stage. The second Holweck rotor element 216b and a second side of the second Holweck stator element 224b opposite the first side together form a third Holweck drag pumping stage. The second Holweck rotor element 216b and the third Holweck stator element 224c together form a fourth Holweck drag pumping stage. The physical mechanism behind how Holweck drag pumping stages work is well understood and will not be described here for brevity.

[0028] The drag generation structure 240 is the inventive additional drag generating structure which is separate to the Holweck drag pumping stages described above. The drag generation structure 240 is configured to generate additional drag to supplement the drag pumping performed by the Holweck drag pumping stages.

[0029] According to the invention, this drag generation structure 240 is disposed on the motor 230 (specifically on an axial end of the motor 230) and is located in the space between the motor 230 and the connecting member 218 of the impeller 210. The drag generation structure 240 is integrally formed with the part of the motor 230 on which it is disposed. The drag generation structure can be formed from the same type of material (e.g epoxy) as the part of the motor 230 with which it is integrally formed. Integrally forming the drag generation structure 240 with part of the motor 230 using the same type of material tends to enable the drag generation structure 240 to be manufactured more easily, since the drag generation structure 240 can simply be formed out of the same block of material as the part of the motor 230 on which it is disposed.

[0030] When the impeller 210 rotates, gas is pumped into the space between the drag generation structure 240 and the connecting member 218, where the gas interacts with the drag generation structure 240 to generate drag for drag pumping. Thus, the drag generation structure 240 and the connecting member 218 together form an additional drag pumping stage separate to the Holweck drag pumping stages. Specifically, the drag generation structure 240 is a stator element of the additional drag

pumping stage and the connecting member 218 is a rotor element of the additional drag pumping stage. The Holweck drag pumping stages and this additional drag pumping stage together constitute the drag pumping mechanism 200 described above with reference to Figure 1. The precise structure and operation of the drag generation structure 240 will now be described in more detail below with reference to Figure 4.

[0031] Figure 3 is a schematic illustration (not to scale) showing the flow path of gas being pumped through the turbomolecular pump 10 of Figure 2.

[0032] Specifically, arrows 300 in Figure 3 show the direction of travel of the gas pumped through the turbomolecular pump 10. In more detail, referring back to the elements described with reference to Figure 2, during operation, the turbomolecular pump 10 receives gas at the inlet 250 and conveys the received gas to the bladed turbomolecular pumping stage 100, where the gas is pumped by the bladed turbomolecular pumping stage 100 towards the first Holweck drag pumping stage. The first Holweck drag pumping stage receives the pumped gas from the bladed turbomolecular pumping stage 100 and drag pumps the received gas towards the second Holweck drag pumping stage. The second Holweck drag pumping stage receives the pumped gas from the first Holweck drag pumping stage and drag pumps the received gas towards the third Holweck drag pumping stage. The third Holweck drag pumping stage receives the pumped gas from the second Holweck drag pumping stage and drag pumps the received gas towards the fourth Holweck drag pumping stage. The fourth Holweck drag pumping stage receives the pumped gas from the third Holweck drag pumping stage and drag pumps the received gas towards the additional drag pumping stage (i.e. the one formed by the drag generation structure 240 and the connecting member 218). The additional drag pumping stage receives the pumped gas from the fourth Holweck drag pumping stage and drag pumps the received gas towards the outlet. The outlet receives the pumped gas from the additional drag pumping stage and outputs the pumped gas out of the turbomolecular pump 10.

[0033] Thus, in this embodiment, the bladed turbomolecular pumping stage 100 is located downstream of the inlet 250, the first Holweck drag pumping stage is located downstream of the bladed turbomolecular pumping stage 100, the second Holweck drag pumping stage is located downstream of the first Holweck drag pumping stage, the third Holweck drag pumping stage is located downstream of the second Holweck drag pumping stage, the fourth Holweck drag pumping stage is located downstream of the third Holweck drag pumping stage, the additional drag pumping stage is located downstream of the fourth Holweck drag pumping stage, and the outlet of the turbomolecular pump 10 is located downstream of the additional drag pumping stage.

[0034] Figure 4 is a schematic illustration (not to scale) showing a perspective view of a section of the drag gen-

eration structure 240.

[0035] In this embodiment, the drag generation structure 240 comprises an annular body 400 comprising a frustoconical surface 410, and a plurality of walls or ridges 420 (also known as "seals") extending from the frustoconical surface 410. In this embodiment, the plurality of walls 420 all extend by substantially the same distance from the frustoconical surface 410 (i.e. the plurality of walls 420 are all substantially the same height). The plurality of walls 420 define therebetween a plurality of channels or grooves 430. In this embodiment, the bottoms of the plurality of channels 430 are flat. However, in other embodiments, the bottoms of the plurality of channels 430 are curved instead. In this embodiment, the annular body 400 and the plurality of walls 420 are integrally formed with each other and are formed from the same material. Also, in this embodiment, each of the plurality of walls 420 is curved along its length and thus each of the plurality of channels 430 defined between the plurality of walls 420 is also curved along its length. Specifically, each channel 430 is spirally shaped along its length and extends from an outer periphery of the annular body 400 to a central aperture defined by the annular body 400. In this embodiment, each of the plurality of walls 420 extends perpendicularly from the frustoconical surface 410.

[0036] In this embodiment, the annular body 400 has a generally triangular cross-section. Specifically, the cross-section is generally that of a right-angled triangle with the hypotenuse of the triangle defining the frustoconical surface 410.

[0037] Referring back to elements described above with reference to Figure 2, the drag generation structure 240 is located between the motor 230 and a surface of the impeller 210 which is facing the frustoconical surface 410. Specifically, the surface which is facing the frustoconical surface 410 is a surface of the connecting member 218 of the impeller 210. The surface of the connecting member 218 facing the frustoconical surface 410 of drag generation structure 240 is also a frustoconical surface. Both the frustoconical surface 410 and the surface of the connecting member 218 are inclined relative to the longitudinal direction defined by the impeller shaft 212 centre line. The annular body 400 of the drag generation structure 240 extends around the impeller shaft 212. Specifically, the annular body 400 extends all the way around the impeller shaft 212 in the circumferential direction such that the impeller shaft 212 passes through the central aperture defined by the annular body 400. Thus, the frustoconical surface 410 extends all the way around the impeller shaft 212 in the circumferential direction.

[0038] During operation of the drag pumping mechanism 200, rotation of the impeller 210 relative to the drag generation structure 240 forces gas through the plurality of channels 430 of the drag generation structure 240 in order to generate drag for pumping. Specifically, the gas is forced into the space between the frustoconical surface 410 and the parallel facing surface of the connecting member 218, which in turn forces the gas into the plurality

of channels 430 at an outer periphery of the annular body 400. The gas then travels in a curved path radially inwards and longitudinally downwards along the channels 430 to the central aperture defined by the annular body 400, where the gas leaves the channels 430.

[0039] Thus, a drag pumping mechanism for a turbomolecular pump is provided.

[0040] Advantageously, by including the above-described additional drag pumping stage, the drag pumping mechanism tends to be able to generate additional drag for drag pumping on top of the drag already generated by the Holweck drag pumping stages. Thus, the drag pumping mechanism tends to be able to perform drag pumping more effectively.

[0041] The provision of a drag generating structure with a frustoconical surface in the location described above tends to provide a drag generating shape which is half-way between a Siegbahn type shape and a Holweck type shape (i.e. inclined with respect to the longitudinal direction, rather than perpendicular or parallel to the longitudinal direction). For example, the shape of the drag generating structure can be said to be a conical Siegbahn shape. This shape tends help to enable as much of the available space within the turbomolecular pump to be used for drag generation as possible. This shape also tends to provide a balance between the advantages and disadvantages between Siegbahn type shapes and Holweck type shapes.

[0042] Advantageously, the provision of a drag generating structure with a frustoconical surface tends to enable a better fit for the drag generating structure within the drag pumping mechanism when used with impeller structures with a surface which is inclined with respect to the longitudinal direction, since the inclination of the frustoconical surface may be matched with the inclination of the impeller surface.

[0043] In the above embodiments, the drag generation structure is integrally formed with the part of the motor on which it is disposed.

[0044] In the above embodiments, the drag generation structure is formed from the same type of material as the part of the motor on which it is disposed. However, in other embodiments, the drag generation structure is formed from a different type of material to the part of the motor on which it is disposed.

[0045] In the above embodiments, the drag generation structure is formed from epoxy. However, in other embodiments, the drag generation structure is formed from a different type of material, e.g. a metal or a different type of polymer material.

[0046] In the above embodiments, the plurality of walls extend perpendicularly from the frustoconical surface. However, in other embodiments, one or more (or all) of the plurality of walls are inclined relative to the frustoconical surface.

[0047] In the above embodiments, the drag pumping mechanism comprises four Holweck drag pumping stages. However, in general, the drag pumping mechanism

may comprise any number of any appropriate type of drag pumping stages. For example, in other embodiments, the drag pumping mechanism comprises a different number of Holweck drag pumping stages, e.g. only one or more than two. In yet other embodiments, the drag pumping mechanism comprises one or more Siegbahn drag pumping stages and no Holweck drag pumping stages. In yet other embodiments, the drag pumping mechanism comprises one or more Holweck drag pumping stages and one or more Siegbahn drag pumping stages.

[0048] In some embodiments, the drag pumping mechanism additionally comprises one or more Holweck and/or Siegbahn drag pumping stages downstream of the drag generation structure.

REFERENCE NUMERAL LIST

[0049]

10: turbomolecular pump
 100: bladed turbomolecular pumping stage
 200: drag pumping mechanism
 210: impeller
 212: impeller shaft
 214: turbomolecular rotor elements
 214a: first turbomolecular rotor element
 214b: second turbomolecular rotor element
 216: Holweck rotor elements
 216a: first Holweck rotor element
 216b: second Holweck rotor element
 218: connecting member
 220: stator
 222: turbomolecular rotor elements
 222a: first turbomolecular stator element
 222b: second turbomolecular stator element
 224: Holweck stator elements
 224a: first Holweck stator element
 224b: second Holweck stator element
 230: motor
 240: drag generation structure
 250: inlet
 260: arrow pointing direction to outlet
 300: arrows depicting gas flow
 400: annular body
 410: frustoconical surface
 420: walls
 430: channels

Claims

1. A drag pumping mechanism (200) for a turbomolecular pump (10), the drag pumping mechanism comprising:
 an impeller (210) comprising an impeller shaft (212) defining a rotation axis of the impeller;

a motor (230) configured to drive the rotation of the impeller; and
a drag generation structure (240), the drag generation structure comprising:

an annular body (400) extending around the impeller shaft, the annular body comprising a frustoconical surface (410),
and
a plurality of walls (420) extending from the frustoconical surface the plurality of walls defining a plurality of channels (430) therebetween wherein the impeller is configured to rotate relative to the drag generation structure about the rotation axis to pump gas through the plurality of channels of the drag generation structure,

characterised in that

the drag generation structure is disposed on the motor, and **in that** the drag generation structure is integrally formed with a part of the motor.

2. The drag pumping mechanism of claim 1, wherein the drag generation structure is formed from the same type of material as the part of the motor with which it is integrally formed.
3. The drag pumping mechanism of claim 2, wherein the type of material is epoxy.
4. The drag pumping mechanism of any preceding claim, wherein the plurality of walls all extend by substantially the same distance from the frustoconical surface.
5. The drag pumping mechanism of any preceding claim, further comprising:
a stator (220),
one or more Holweck and/or Siegbahn drag pumping stages (222) formed by the impeller and the stator.
6. The drag pumping mechanism of claim 5, wherein the drag generation structure is located downstream of the one or more Holweck and/or Siegbahn drag pumping stages.
7. The drag pumping mechanism of any preceding claim, further comprising one or more Holweck and/or Siegbahn drag pumping stages located downstream of the drag generation structure.
8. The drag pumping mechanism of any of the preceding claims, wherein the plurality of channels of the drag generation structure are curved.

9. The drag pumping mechanism of any of the preceding claims, wherein the plurality of walls of the drag generation structure are integrally formed with the annular body of the drag generation structure.

10. The drag pumping mechanism of any preceding claim, wherein the bottoms of the plurality channels are flat.

11. The drag pumping mechanism of any preceding claim, wherein the bottoms of the plurality of channels are curved.

12. A turbomolecular pump comprising the drag pumping mechanism of any one of the preceding claims.

Patentansprüche

1. Drag-Pumpmechanismus (200) für eine Turbomolekularpumpe (10), wobei der Drag-Pumpmechanismus aufweist:

ein Flügelrad (210) mit einer Flügelradwelle (212), die eine Rotationsachse des Flügelrads definiert;
einen Motor (230), der zum Antreiben der Rotation des Flügelrads ausgebildet ist; und
eine Widerstandserzeugungsstruktur (240), wobei die Widerstandserzeugungsstruktur aufweist:

einen ringförmigen Körper (400), der sich um die Flügelradwelle erstreckt, wobei der ringförmige Körper eine kegelformförmige Oberfläche (410) aufweist, und
eine Mehrzahl von Wänden (420), die sich von der kegelformförmigen Oberfläche erstrecken, wobei die Mehrzahl der Wände eine Mehrzahl von Kanälen (430) dazwischen definiert,

wobei das Flügelrad dazu ausgebildet ist, sich relativ zu der Widerstandserzeugungsstruktur um die Rotationsachse zu drehen, um Gas durch die Mehrzahl der Kanäle der Widerstandserzeugungsstruktur zu pumpen,
dadurch gekennzeichnet, dass
die Widerstandserzeugungsstruktur an dem Motor angeordnet ist und dass
die Widerstandserzeugungsstruktur integral mit einem Teil des Motors gebildet ist.

2. Drag-Pumpmechanismus nach Anspruch 1, wobei die Widerstandserzeugungsstruktur aus Material der gleichen Art wie der Teil des Motors gebildet ist, mit dem sie integral gebildet ist.

3. Drag-Pumpmechanismus nach Anspruch 2, wobei die Materialart Epoxidharz ist.
4. Drag-Pumpmechanismus nach einem der vorstehenden Ansprüche, wobei die Mehrzahl der Wände sich alle um im Wesentlichen dieselbe Distanz von der kegelstumpfförmigen Oberfläche erstrecken. 5
5. Drag-Pumpmechanismus nach einem der vorstehenden Ansprüche, der ferner aufweist: 10
 - einen Stator (220),
 - eine oder mehrere Holweck- und/oder Siegbahn-Drag-Pumpstufen (222), die durch das Flügelrad und den Stator gebildet sind. 15
6. Drag-Pumpmechanismus nach Anspruch 5, wobei die Widerstandserzeugungsstruktur zu der einen oder den mehreren Holweck- und/oder Siegbahn-Drag-Pumpstufen nachgelagert ist. 20
7. Drag-Pumpmechanismus nach einem der vorstehenden Ansprüche, der ferner eine oder mehrere Holweck- und/oder Siegbahn-Drag-Pumpstufen aufweist, die zu der Widerstandserzeugungsstruktur nachgelagert sind. 25
8. Drag-Pumpmechanismus nach einem der vorstehenden Ansprüche, wobei die Mehrzahl der Kanäle der Widerstandserzeugungsstruktur gekrümmt ist. 30
9. Drag-Pumpmechanismus nach einem der vorstehenden Ansprüche, wobei die Mehrzahl der Wände der Widerstandserzeugungsstruktur integral mit dem ringförmigen Körper der Widerstandserzeugungsstruktur gebildet ist. 35
10. Drag-Pumpmechanismus nach einem der vorstehenden Ansprüche, wobei die Böden der Mehrzahl von Kanälen flach sind. 40
11. Drag-Pumpmechanismus nach einem der vorstehenden Ansprüche, wobei die Böden der Mehrzahl der Kanäle gekrümmt sind. 45
12. Turbomolekularpumpe, die den Drag-Pumpmechanismus nach einem der vorstehenden Ansprüche aufweist. 50

Revendications

1. Mécanisme de pompage à traînée (200) destiné à une pompe turbomoléculaire (10), le mécanisme de pompage à traînée comprenant : 55
 - un rotor (210) comprenant un arbre de rotor (212) définissant un axe de rotation du rotor ;

un moteur (230) configuré pour entraîner la rotation du rotor ; et
 une structure de génération de traînée (240), la structure de génération de traînée comprenant :

un corps annulaire (400) s'étendant autour de l'axe de rotor, le corps annulaire comprenant une surface tronconique (410), et une pluralité de parois (420) s'étendant à partir de la surface tronconique, les parois de la pluralité de parois délimitant entre elles une pluralité de canaux (430), dans lequel le rotor est configuré pour tourner par rapport à la structure de génération de traînée autour de l'axe de rotation de façon à pomper le gaz à travers les canaux de la pluralité de canaux de la structure de génération de traînée,

caractérisé en ce que

la structure de génération de traînée est disposée sur le moteur, et **en ce que** la structure de génération de traînée est formée d'un seul tenant avec une partie du moteur.

2. Mécanisme de pompage à traînée selon la revendication 1, dans lequel la structure de génération de traînée est formée à partir du même type de matériau que celui de la partie du moteur avec laquelle elle est formée d'un seul tenant.
3. Mécanisme de pompage à traînée selon la revendication 2, dans lequel le type de matériau est de la résine époxy.
4. Mécanisme de pompage à traînée selon l'une quelconque des revendications précédentes, dans lequel les parois de la pluralité de parois s'étendent toutes sensiblement la même distance par rapport à la surface tronconique.
5. Mécanisme de pompage à traînée selon l'une quelconque des revendications précédentes, comprenant en outre :
 - un stator (220),
 - un ou plusieurs étages de pompage à traînée de Holweck et/ou de Siegbahn (222) formés par le rotor et le stator.
6. Mécanisme de pompage à traînée selon la revendication 5, dans lequel la structure de génération de traînée est située en aval du ou des étages de pompage à traînée de Holweck et/ou de Siegbahn.
7. Mécanisme de pompage à traînée selon l'une quelconque des revendications précédentes, comprenant en outre un ou plusieurs étages de pompage à

traînée de Holweck et/ou de Siegbahn situés en aval de la structure de génération de traînée.

8. Mécanisme de pompage à traînée selon l'une quelconque des revendications précédentes, dans lequel les canaux de la pluralité de canaux de la structure de génération de traînée sont courbés. 5
9. Mécanisme de pompage à traînée selon l'une quelconque des revendications précédentes, dans lequel les parois de la pluralité de parois de la structure de génération de traînée sont formées d'un seul tenant avec le corps annulaire de la structure de génération de traînée. 10
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10. Mécanisme de pompage à traînée selon l'une quelconque des revendications précédentes, dans lequel les fonds des canaux de la pluralité de canaux sont plats. 20
11. Mécanisme de pompage à traînée selon l'une quelconque des revendications précédentes, dans lequel les fonds des canaux de la pluralité de canaux sont courbés. 25
12. Pompe turbomoléculaire comprenant le mécanisme de pompage à traînée selon l'une quelconque des revendications précédentes. 30
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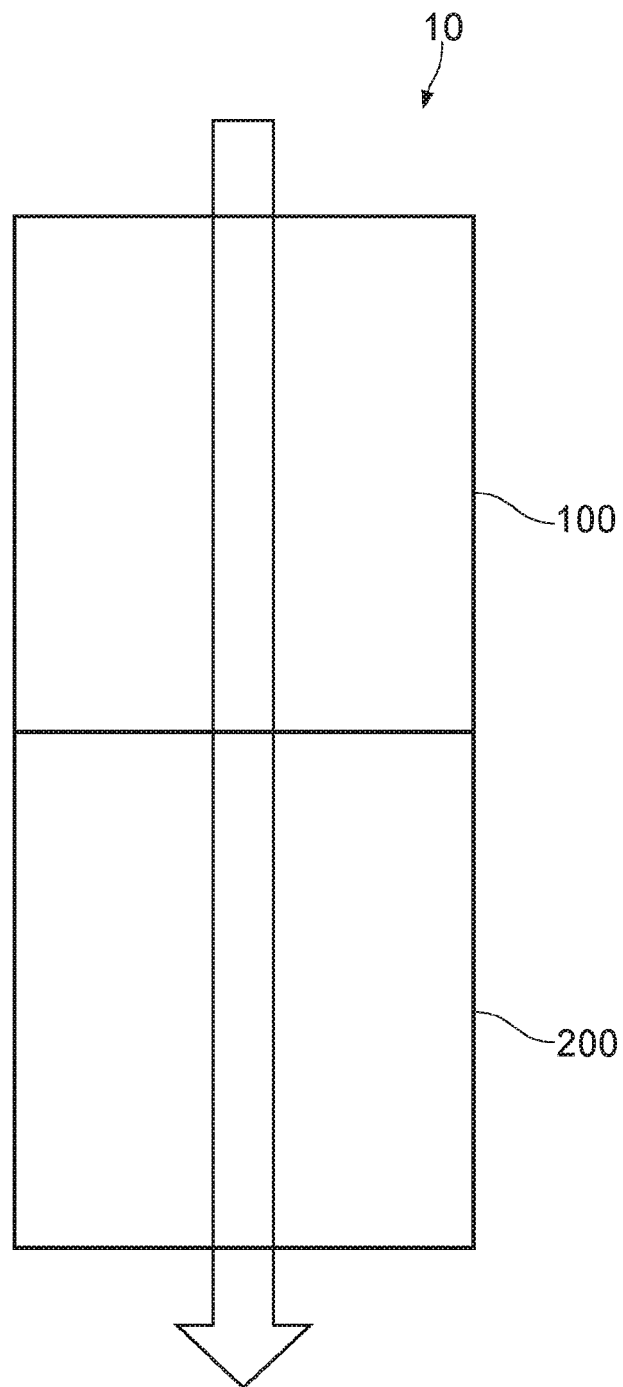


FIG. 1

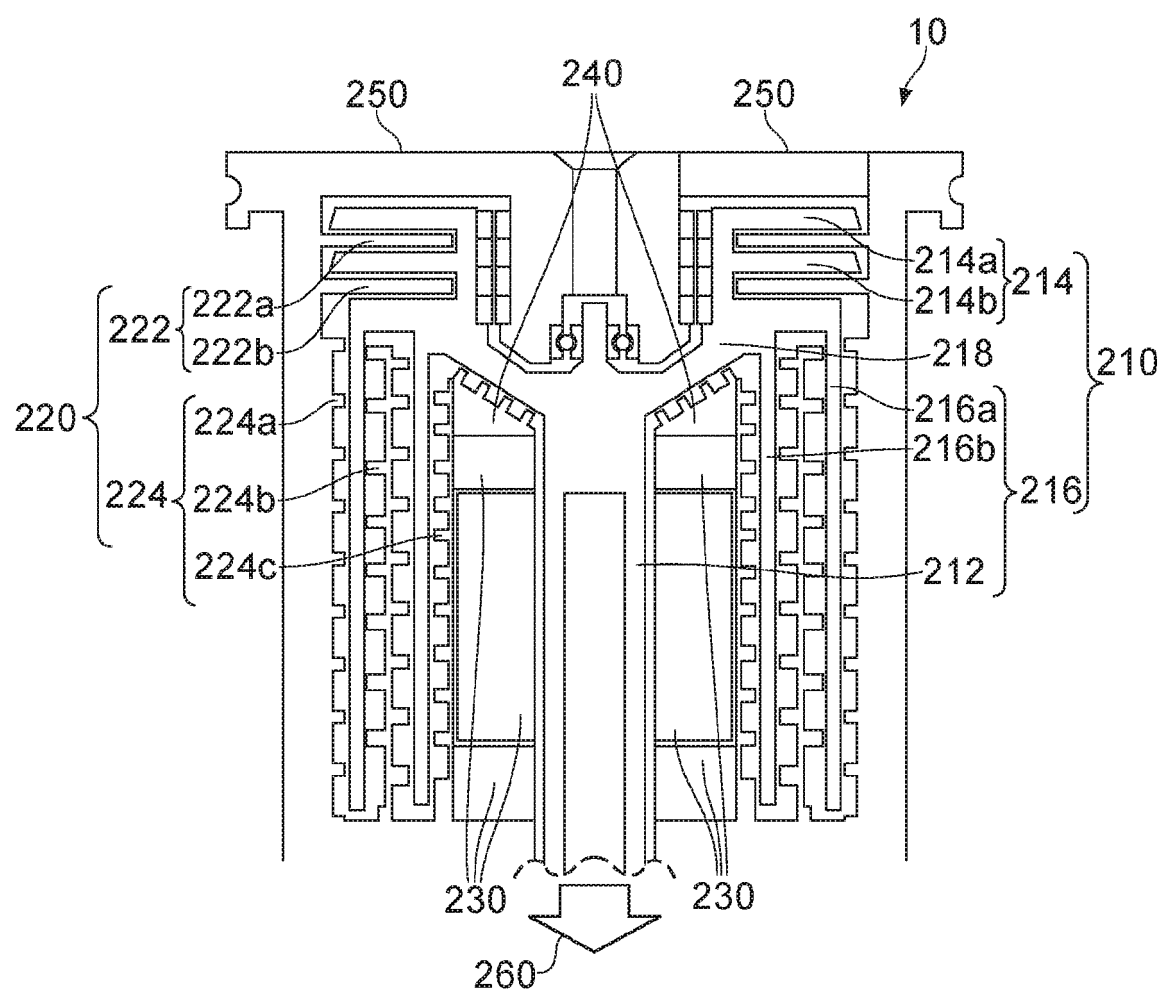


FIG. 2

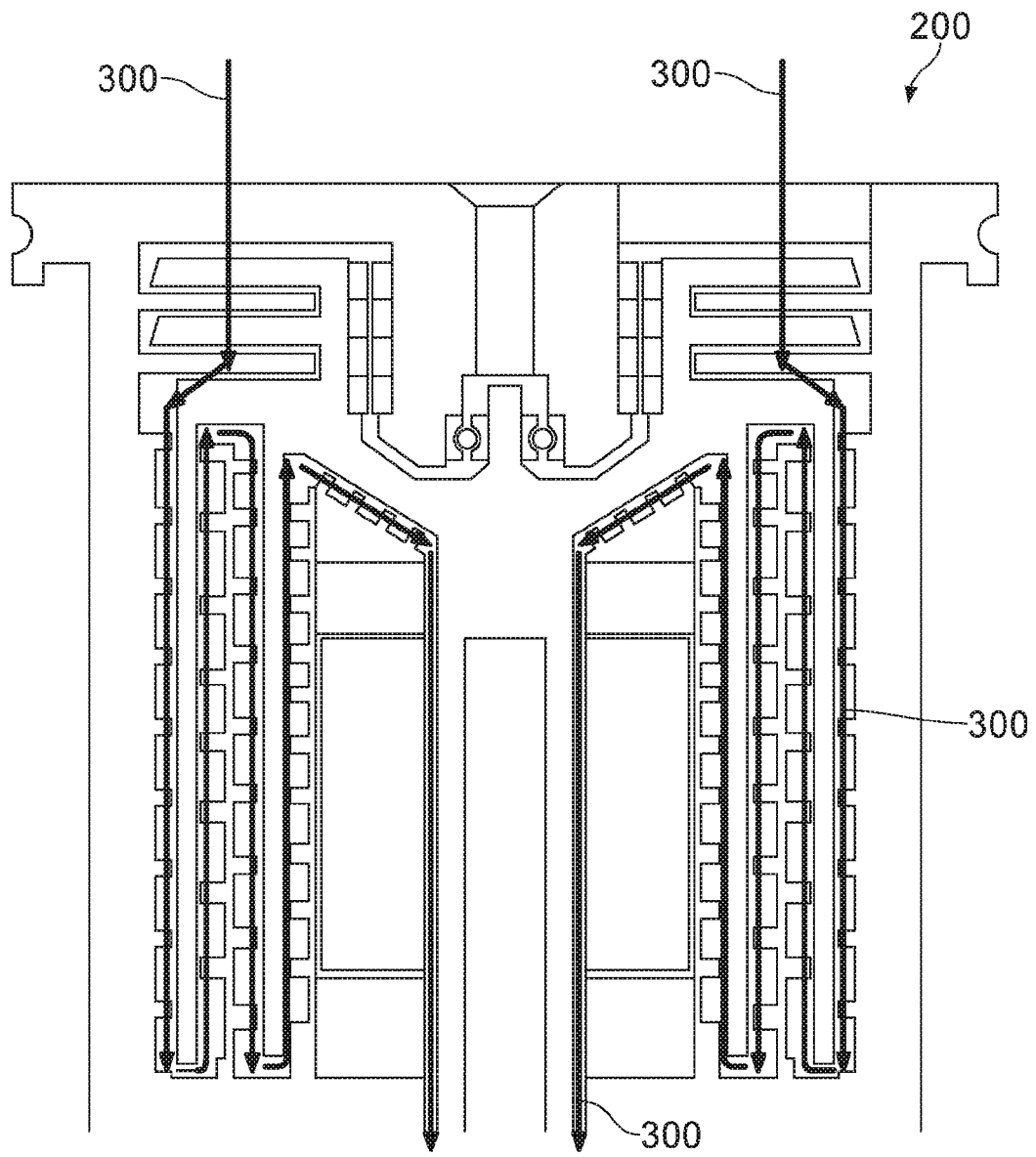


FIG. 3

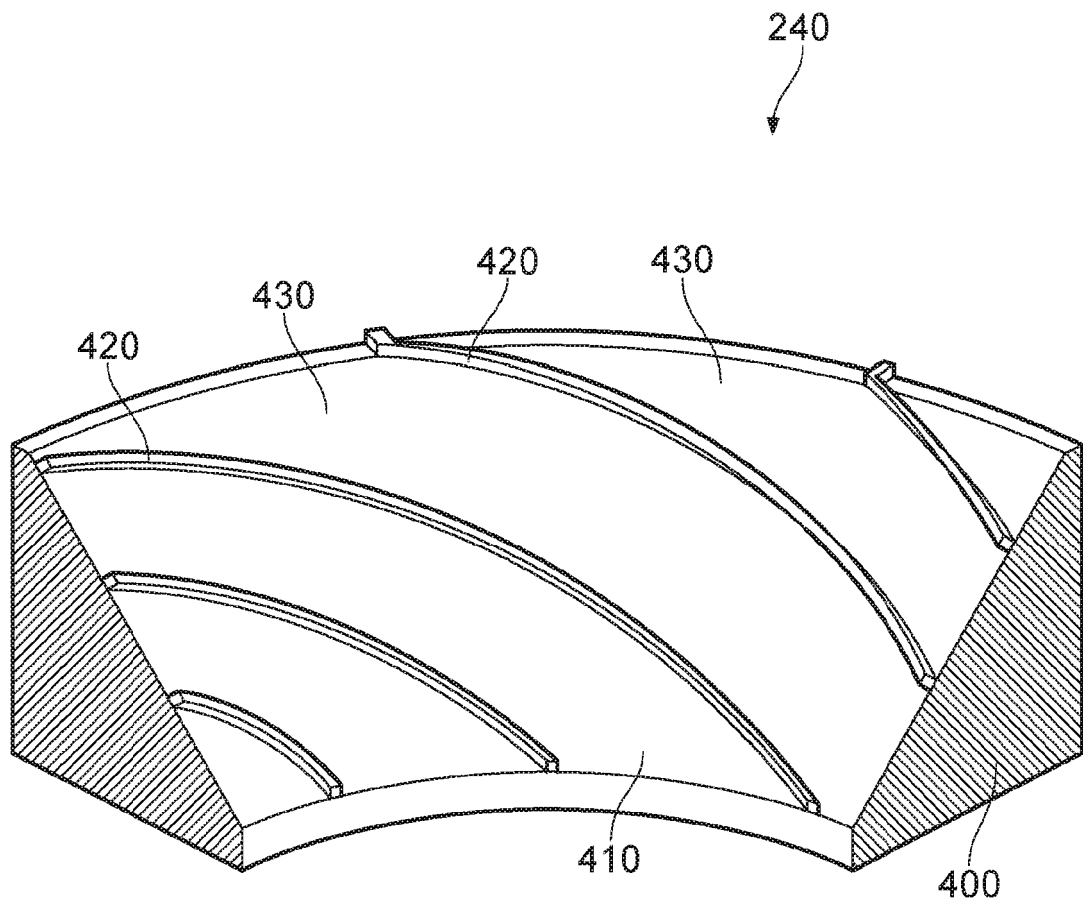


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 3670924 A1 [0004]