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(54) **Turbo machine with improved seal**

Turbomaschine mit verbesserter Dichtung

Turbomachine avec joint amélioré

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Description

TECHNICAL FIELD

[0001] The present invention relates to a rotating machine with an improved seal.

BACKGROUND OF THE INVENTION

[0002] Turbo machines such as gas turbines or steam turbines are provided with a stator (made of a plurality of stator parts) enclosing a rotor (that carries a plurality of rotor parts) rotating within it.

[0003] In a number of places, the stator parts and the rotor parts are usually provided with labyrinth or brush seals, in order to control and limit the leakage between high and low pressure areas.

[0004] These traditional seals (labyrinth or brush seals) generate a controlled fluid flow from the high pressure area to the low pressure area, that dissipates the pressure energy of the fluid, increasing the stator, rotor and fluid temperature.

[0005] This controlled leakage is almost proportional to the smallest clearance between the stator and rotor parts involved, therefore the actual leakage can be hardly controlled according to the particular needs.

[0006] US2005/0058533 and US2006/0133927 disclose a rotating machine with a stator part and a rotor part and obstructions between them.

[0007] US2007/0237627 and US6059530 disclose a blade with a seal at the tip thereof; the seal is defined by an airfoil profile.

[0008] EP 2116692 A2 teaches a turbine blade comprising a seal with a rotor blade row that extends from an annular plate.

SUMMARY OF THE INVENTION

[0009] The technical aim of the present invention is therefore to provide a rotating machine with an improved seal by which the said problems of the known art are eliminated.

[0010] Within the scope of this technical aim, an object of the invention is to provide a rotating machine by which the pressure energy of the fluid is not dissipated and thus wasted. In particular, according to the invention the pressure energy of the fluid is not dissipated as heat.

[0011] Another object of the invention is to provide a rotating machine by which the leakage can be regulated independently from the clearance between the stator and rotor parts.

[0012] The technical aim, together with these and further objects, are attained according to the invention by providing a rotating machine in accordance with the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Further characteristics and advantages of the invention will be more apparent from the description of a preferred but non-exclusive embodiment of the rotating machine according to the invention, illustrated by way of non-limiting example in the accompanying drawings, in which:

Figure 1 is a schematic view of an example of a seal having a guide vane row and defining an axial micro-turbine;

Figures 2 through 4 are schematic views of three different examples of a seal defining an axial turbine having a guide vane row, followed by a rotor blade row; five Figures 5 and 6 are schematic views of two different embodiments of the seal of the invention defining an axial turbine having a guide vane row followed by a rotor blade row;

Figures 7 through 9 are schematic views of three different embodiments of the invention defining a radial turbine having a guide vane row and a rotor blade row;

Figure 10 is a schematic view of an example of a seal having a rotor blade row followed by a guide vane row and defining an axial compressor;

Figure 11 is a schematic view of an example of a seal having a rotor blade row and defining an axial compressor;

Figure 12 is a schematic view of an example of a seal having a rotor blade row and a guide vane row and defining a radial compressor; and

Figure 13 is and example of a micro-turbine .

DETAILED DESCRIPTION OF THE INVENTION

[0014] With particular reference to figure 13, the rotating machine 1 (such as a gas turbine or a steam turbine) with an improved example seal comprises stator parts 2 and rotor parts 3; between the stator parts 2 and rotor parts 3 a gap 4 is defined.

[0015] The gap 4 houses a seal 5 that comprises a guide vane row 6 extending from the stator parts 2 and arranged to guide a fluid flow 7 in the gap 4 and a rotor blade row 14 extending from the rotor part 3 and arranged to exchange mechanical power with the fluid flow 7.

[0016] The guide vane row 6 and rotor blade row 14 maintain the differential pressure between areas at the opposite ends of the seal 5 and prevent the fluid flow 7 from dissipating its pressure energy generating heat.

[0017] Preferably, the seal 5 also comprises an obstruction arranged to limit the fluid flow 7 through the gap 4.

[0018] The obstruction comprises annular plates 9, 11 and, in this respect, a first annular plate 9 extends transversally from a stator part 2, defining an annular passage 10 for the fluid flow 7 having a prefixed thickness.

[0019] In this case, the guide vane row 6 may extend from this stator annular plate 9.

[0020] In addition, a further annular plate 11 extends transversally from a rotor part 3, defining an annular passage 12 for the fluid flow 7 having a prefixed thickness.

[0021] The rotor blade row 14 may extend from the annular plate 11.

[0022] In different embodiments, the seal 5 may define an axial or a radial micro-turbine.

[0023] Advantageously, in these embodiments the pressure energy of the fluid is not dissipated as heat, but is used to provide turbine work thus leading to a decrease of the total temperature of the air (up to 60K per stage). So the rotor and stator temperature are also reduced.

[0024] In particular figure 13 shows an example seal of an axial micro-turbine having the guide vane row 6 followed by the rotor blade row 14, nevertheless in different embodiments the rotor blade row 14 may not be provided; in this case the guide vane row 6 drives the fluid flow 7 towards the main rotor blades 16 of the rotating machine 1.

[0025] In further embodiments, the obstructions may not be provided or may be provided in different positions.

[0026] For example the seal 5 could have one or more annular plates 9 extending from a stator part 2 and/or one or more annular plates 11 extending from the rotor part 3; the plates 9 and 11 may be placed partly or totally upstream of and/or between and/or downstream of the guide vane row 6 and rotor blade row 14.

[0027] In further embodiments, the seal of the invention defines an axial or radial micro-compressor.

[0028] In this case the seal has the rotor blade row 14 followed by the guide vane row 6; nevertheless in different embodiments the guide vane row 6 may not be provided.

[0029] Also in this case the obstructions may not be provided or may be provided in different positions.

[0030] For example (as already described for the micro-turbine) the seal 5 could have one or more annular plates 9 extending from the stator part 2 and/or one or more annular plates 11 extending from the rotor part 3; the plates 9 and 11 may be placed partly or totally upstream of and/or between and/or downstream of the guide vane row 6 and rotor blade row 14.

[0031] Moreover, the micro-turbine and the micro-compressor may have one single stage or multiple stages.

[0032] As an example, the micro-turbine can be implemented in the rim seal, at the rotor heat shield/vane, at the stator heat shield/blade, as a radial or axial seal arrangement or in combination with labyrinth or brush seal.

[0033] As a further example the micro-compressor may be implemented in the bearing areas, (no leakage tolerated), as an axial or radial seal arrangement or in combination with labyrinth or brush seal.

[0034] Naturally also other positions are possible for the micro-turbine and micro-compressor.

[0035] Typically the blades of the guide vane row 6 and/or rotor blade row 14 may have a height of some millimetres, such as less than 10 millimetres, preferably less than 5 millimetres and more preferably less than 3 millimetres.

[0036] The blades can be directly machined on the rotor shaft, rotor disk, blade root, casing, honeycomb at the vane hub, stator heat shield or rotor heat shield. Nevertheless the blades can also be designed on the sealing strips, or be separated attached parts.

[0037] In the following particular examples are described.

[0038] Figure 1 shows an example wherein the seal 5 defines an axial micro-turbine.

[0039] In particular figure 1 shows a stator part 2 from which the main stator blades 18 defining a plurality of guide vanes extend (i.e. the stator blades 18 are those of the gas or steam turbine).

[0040] Figure 1 also shows a rotor part 3 from which the main rotor blades 16 extend (i.e. the rotor blades 16 are those of the gas or steam turbine).

[0041] Between the tip of the stator blades 18 and the rotor part 3 a gap 4 is defined.

[0042] The stator blades 18 have at their tip the guide vane row 6 extending within the gap 4.

[0043] The hot gases pass through the stator blades 18 and rotor blades 16.

[0044] A part of the hot gases (i.e. the fluid flow 7) leaks in the gap 4 and passes through the guide vane row 6 that processes it and drives it towards the main rotor blades 16.

[0045] The mass flow through the gap 4 is defined by the thickness of the gap 4 and the shape of the guide vane row 6 (and naturally also the differential pressure upstream and downstream of the guide vane row 6).

[0046] This example lets further mechanical power be collected by the main rotor blades 16 (the power that in traditional seals is dissipated, in the seal according to this example is collected by the rotor blades 16); thus the local temperatures (in particular those of the air and rotor parts) are reduced with respect to traditional seals, because there is no or less fluid flow pressure energy that is converted into heat.

[0047] Figure 2 through 4 show different examples of axial micro-turbines having a guide vane row 6 and a rotor blade row 14.

[0048] In particular, figure 2 shows an axial micro-turbine having a stator part 2 and a rotor part 3 defining a gap 4; the stator part 2 supports the guide vane row 6 and the rotor part 3 supports the rotor blade row 14.

[0049] In addition upstream of the guide vane row 6 the seal 5 has the annular plate 9.

[0050] During operation, the fluid flow 7 (i.e. the leakage) passes through the passage 10 between the annular plate 9 and the rotor part 3 and passes through the guide vane row 6; then the fluid flow 7 passes through the rotor blade row 14 and delivers mechanical power to the rotor part 3.

[0051] The mass flow of the fluid passing through the gap 4 is defined by the passage 10 (i.e. the annular plate

9) and by the geometry and configuration of the guide vane row 6 and rotor blade row 14.

[0052] In addition, the increase in temperature of the fluid flow and rotor is very limited, because the pressure energy of the fluid is not converted into heat, but is converted into mechanical power collected by the rotor part 3.

[0053] The examples of figures 3 and 4 have substantially the same structure and operation of the example of figure 2 and with the same numbers the same or similar elements are indicated.

[0054] In particular figure 3 shows an example of a seal 5 with two annular plates 9 extending from the stator part 2 respectively one upstream of the guide vane row 6, and the other downstream of the rotor blade row 14.

[0055] Figure 4 shows an example of a seal 5 with an annular plate 11 extending from the rotor part 3 upstream of the guide vane row 6 and a further annular plate 9 extending from the stator part 2 between the guide vane row 6 and the rotor blade row 14.

Figure 5 shows an embodiment of a seal 5 of the invention with a guide vane row 6 extending from the stator part 2 and an annular plate 11 extending from the rotor part 3 downstream of the guide vane row 6 and carrying at its border the rotor blade row 14.

Figure 6 shows an embodiment of a seal 5 of the invention with an annular plate 9 extending from the stator part 2; from the border of the annular plate 9 the guide vane row 6 extends. Downstream of the guide vane row 6, the rotor blade row 14 extends from a rotor part 3. Moreover, a further annular plate 9 extends from the stator part 2 downstream of the rotor blade row 14.

Figures 7 through 9 show three different embodiments of a seal of the invention defining a radial micro-turbine; also in this case the same numbers are used for the same or similar elements.

[0056] In particular, figure 7 shows a stator part 2 carrying the main stator blades 18 and a rotor part 3 carrying the main rotor blades 16.

[0057] Between the stator part 2 and the rotor part 3 the radial gap 4 is defined, housing an annular plate 11 extending from the rotor part 3 and downstream of it (with respect to the direction of the fluid flow 7) a guide vane row 6 extending (in this embodiment) from an annular plate 9.

[0058] During operation a fluid flow 7 of compressed air (purge air) is injected through the gap 4 towards the hot gases path 20.

[0059] This fluid flow 7 passes through the passage 12 between the border of the annular plate 11 and the stator part 2 and then passes through the guide vane row 6 that prepares the fluid flow 7 to pass through the main rotor blades 16 and drives it towards it.

[0060] In this embodiment, the mass flow of the fluid flow 7 is limited by the plate 11 (i.e. the thickness of the passage 12) and the shape and configuration of the guide vane row 6 and annular plate 9.

[0061] Moreover the temperature increase is limited because the amount of energy pressure of the fluid flow converted into heat is limited (this energy is gathered as mechanical power by the main rotor blades 16).

[0062] Figures 8 and 9 show two embodiments of a radial micro-turbine having the guide vane row 6 and the rotor blade row 14.

[0063] In particular figure 8 shows a stator part 2 from which the main stator blades 18 extend and a rotor part 3 from which the main rotor blades 16 extend.

[0064] Between the stator part 2 and the rotor part 3 there is the gap 4.

[0065] In the gap 4 an annular plate 9 extending from the stator part 2 and carrying at its border the guide vane row 6 and downstream of it a rotor blade row 14 extending from the rotor part 3 are housed.

[0066] During operation the fluid flow 7 (compressed air) passes through the guide vane row 6 and then through the rotor blade row 14.

[0067] Mechanical power is gathered on the rotor part 3 (this limits the increase of temperature).

[0068] In this case the mass flow through the seal 5 is defined by the configuration of the guide vane row 6 and rotor blade row 14.

Figure 9 shows a further embodiment similar to those already described. This embodiment has a guide vane row 6 extending from an annular plate 9 connected to a stator part 2, a rotor blade row 11 and a further annular plate 9.

Figures 10 through 12 show three example seals defining a micro-compressor; also in these cases the reference numbers are the same as those already used to indicate the same or similar elements.

[0069] In particular figure 10 shows a seal 5 defining an axial micro-compressor.

[0070] In this respect, figure 10 shows a stator part 2 and a rotor part 3 defining a gap 4.

[0071] The stator part 2 carries a guide vane row 6 and upstream of it (with respect to the fluid flow 7) the rotor part 3 carries a rotor blade row 14.

[0072] Moreover, upstream of the rotor blade row 14, the seal 5 has an annular plate 9 extending from the stator part 2 and a further annular plate 11 extending from the rotor part 3.

[0073] During operation the fluid flow 7 is drawn from a lower pressure area 22 to a higher pressure area 24.

[0074] In particular, the fluid flow 7 (initially in the lower pressure area 22) overcomes the annular plates 11 and 9 and then passes through the rotor blade row 14 and thus through the guide vane row 6 to be supplied to the higher pressure area 24.

[0075] Nevertheless, at the tip of the blades of the rotor blade row 14 a leakage 25 passes, conveying a flow from the higher pressure area 24 to the lower pressure area 22.

[0076] The seal 5 can thus be designed in order to have a desired flow from the higher pressure area 24 towards the lower pressure area 22, or no flow at all (i.e. the leakage 25 from the higher pressure area 24 towards the lower pressure area 22 is fully compensated by the flow 7 from the lower pressure area 22 towards the higher pressure area 24).

[0077] Moreover, the seal 5 can be designed in order to have a reverse flow, i.e. the fluid flow 7 from the lower pressure area 22 towards the higher pressure area 24 is greater than the leakage 25 from the higher pressure area 24 towards the lower pressure area 22.

[0078] In this example the mass flow of the fluid is defined by the annular plates 11 and 9 and by the configuration and shape of the rotor blade row 14 and guide vane row 6.

[0079] In addition, the temperature increase is limited, because the amount of energy pressure converted into heat is limited (on the contrary the fluid pressure energy is increased).

[0080] Figure 11 shows a further example of axial micro-compressor having rotor blade row 14.

[0081] In this example, the rotor part 3 carries the rotor blade row 14 and, upstream of it, an annular plate 11; between the rotor blade row 14 and annular plate 11 the stator part 2 carries an annular plate 9.

[0082] Figure 12 shows an example of radial micro-compressor.

[0083] In this example the stator part 2 carries the main stator blades 18 and a rotor part 3 carries the main rotor blades 16.

[0084] Between the stator part 2 and the rotor part 3 the gap 4 is provided.

[0085] In the gap 4 a rotor blade row 14 extends from the rotor part 3 and a guide vane row 6 extends from the stator part 2.

[0086] This example could be used to reduce or eliminate the purge air, i.e. the air injected in the gap 4 to prevent the hot gases flowing in the hot gases path 20 from entering the gap 4.

[0087] In this respect, the seal 5 could be designed such that a recirculation occurs that keeps the hot gases in the hot gases path 20.

[0088] In this example the mass flow of the fluid is defined by the configuration and shape of the rotor blade row 14 and guide vane row 6.

[0089] In addition, the temperature increase is limited, because the amount of energy pressure converted into heat is limited (the energy of the fluid is increased).

[0090] The rotating machine conceived in this manner is susceptible to numerous modifications and variants, all falling within the scope of the inventive concept; moreover all details can be replaced by technically equivalent elements.

[0091] In practice the materials used and the dimensions can be chosen at will according to requirements and to the state of the art.

REFERENCE NUMBERS

[0092]

1	rotating machine
2	stator part
3	rotor part
4	gap
5	seal
6	guide vane row
7	fluid flow
9	annular plate
10	annular passage
11	annular plate
12	annular passage
14	rotor blade row
16	main rotor blade
18	main stator blade
20	hot gases path
22	lower pressure area
24	higher pressure area
25	leakage

Claims

1. Rotating machine (1) with improved seal comprising stator parts (2) and rotor parts (3) between which a gap (4) housing at least a seal (5) is provided, wherein said seal (5) comprises a guide vane row (6), that extends from a stator part (2) and is arranged to guide a fluid flow, and/or a rotor blade row (14), that extends from a rotor part (3) and is arranged to exchange mechanical power with the fluid flow, said guide vane row (6) and/or rotor blade row (14) maintaining a differential pressure between areas at opposite ends of the seal (5) and preventing the fluid flow from dissipating its pressure energy generating heat, the seal (5) comprising an obstruction (9, 11) arranged to limit the fluid flow (7) through said gap (4), wherein said guide vane row (6) extends from said obstruction (9) and/or said rotor blade row (14) extends from said obstruction (11) **characterised in that** said seal (5) defines an axial or a radial microturbine.

2. Rotating machine (1) with improved seal comprising stator parts (2) and rotor parts (3) between which a gap (4) housing at least a seal (5) is provided, wherein said seal (5) comprises a guide vane row (6), that extends from a stator part (2) and is arranged to guide a fluid flow, and/or a rotor blade row (14), that extends from a rotor part (3) and is arranged to exchange mechanical power with the fluid flow, said guide vane row (6) and/or rotor blade row (14) maintaining a differential pressure between areas at opposite ends of the seal (5) and preventing the fluid flow from dissipating its pressure energy generating heat, the seal (5) comprising an obstruction (9, 11) arranged to limit the fluid flow (7) through said gap (4), wherein said guide vane row (6) extends from said obstruction (9) and/or said rotor blade row (14) extends from said obstruction (11) **characterised in**

that said seal defines an axial or radial micro-compressor.

3. Rotating machine (1) as claimed in claim 1 or 2, **characterised in that** said obstruction (9, 11) comprises an annular plate.

4. Rotating machine (1) as claimed in claim 3, **characterised in that** said annular plate (9) extends transversally from the stator part (2), defining a prefixed annular passage (10) for the fluid flow (7).

5. Rotating machine (1) as claimed in claim 3, **characterised in that** said annular plate (11) extends transversally from the rotor part (3), defining a prefixed annular passage (12) for the fluid flow (7).

6. Rotating machine (1) as claimed in claim 1 or 2, **characterised by** being a gas or steam turbine.

7. Rotating machine (1) as claimed in claim 1 or 2, **characterised in that** the blades of the guide vane row (6) and/or rotor blade row (14) have a height of less than 10 millimetres, preferably less than 5 millimetres and more preferably less than 3 millimetres.

Patentansprüche

1. Rotierende Maschine (1) mit verbesserter Dichtung, wobei die Maschine Statorteile (2) und Rotorteile (3) umfasst, zwischen denen ein Spalt (4), in dem mindestens eine Dichtung (5) untergebracht ist, vorgesehen ist, wobei die Dichtung (5) eine Leitflügelreihe (6), die sich von einem Statorteil (2) aus erstreckt und angeordnet ist, um einen Fluidstrom zu leiten, und/oder eine Rotorblattreihe (14) umfasst, die sich von einem Rotorteil (3) aus erstreckt und angeordnet ist, um mechanische Energie mit dem Fluidstrom auszutauschen, wobei die Leitflügelreihe (6) und/ oder die Rotorblattreihe (14) einen Differenzdruck zwischen Bereichen an gegenüberliegenden Enden der Dichtung (5) aufrechterhalten und verhindern, dass der Fluidstrom seine Druckenergie erzeugende Wärme ableitet, wobei die Dichtung (5) ein Hindernis (9, 11) umfasst, die angeordnet ist, um den Fluidstrom (7) durch den Spalt (4) zu begrenzen, wobei die Leitflügelreihe (6) sich von dem Hindernis (9) aus und/oder die Rotorblattreihe (14) sich von dem Hindernis (11) aus erstrecken, **dadurch gekennzeichnet, dass** die Dichtung (5) eine Axial- oder Radialmikroturbine definiert.

2. Rotierende Maschine (1) mit verbesserter Dichtung, wobei die Maschine Statorteile (2) und Rotorteile (3) umfasst, zwischen denen ein Spalt (4), in dem mindestens eine Dichtung (5) untergebracht ist, vorgesehen ist, wobei die Dichtung (5) eine Leitflügelreihe (6), die sich von einem Statorteil (2) aus erstreckt und angeordnet ist, um einen Fluidstrom zu leiten, und/oder eine Rotorblattreihe (14) umfasst, die sich von einem Rotorteil (3) aus erstreckt und angeordnet ist, um mechanische Energie mit dem Fluidstrom auszutauschen, wobei die Leitflügelreihe (6) und/ oder die Rotorblattreihe (14) einen Differenzdruck zwischen Bereichen an gegenüberliegenden Enden der Dichtung (5) aufrechterhalten und verhindern, dass der Fluidstrom seine Druckenergie erzeugende Wärme ableitet, wobei die Dichtung (5) ein Hindernis (9, 11) umfasst, die angeordnet ist, um den Fluidstrom (7) durch den Spalt (4) zu begrenzen, wobei die Leitflügelreihe (6) sich von dem Hindernis (9) aus und/oder die Rotorblattreihe (14) sich von dem Hindernis (11) aus erstrecken, **dadurch gekennzeichnet, dass** die Dichtung einen Axial- oder Radialmikroverdichter definiert.

3. Rotierende Maschine (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Sperre (9, 11) eine ringförmige Platte umfasst.

4. Rotierende Maschine (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** die ringförmige Platte (9) sich vom Statorteil (2) aus quer erstreckt und einen festgelegten ringförmigen Durchgang (10) für den Fluidstrom (7) definiert.

5. Rotierende Maschine (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** die ringförmige Platte (11) sich vom Rotorteil (3) aus quer erstreckt und einen festgelegten ringförmigen Durchgang (12) für den Fluidstrom (7) definiert.

6. Rotierende Maschine (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** es sich dabei um eine Gas- oder Dampfturbine handelt.

7. Rotierende Maschine (1) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Schaufeln der Leitflügelreihe (6) und/oder der Rotorblattreihe (14) eine Höhe von weniger als 10 mm, vorzugsweise von weniger als 5 mm und noch bevorzugter von weniger als 3 mm haben.

Revendications

1. Machine tournante (1) avec joint amélioré comportant des pièces (2) de stator et des pièces (3) de rotor entre lesquelles est ménagé un interstice (4) renfermant au moins un joint (5), ledit joint (5) comportant une rangée (6) d'aubes de guidage, qui s'étend à partir d'une pièce (2) de stator et est disposé de façon à guider un écoulement de fluide, et / ou une rangée (14) d'aubes de rotor, qui s'étend à partir d'une pièce (3) de rotor et est disposé de façon

à échanger une puissance mécanique avec l'écoulement de fluide, ladite rangée (6) d'aubes de guidage et / ou ladite rangée (14) d'aubes de rotor maintenant une pression différentielle entre des zones situées à des extrémités opposées du joint (5) et empêchant l'écoulement de fluide de dissiper son énergie de pression en générant de la chaleur, le joint (5) comportant un obstacle (9, 11) disposé de façon à limiter l'écoulement de fluide (7) à travers ledit interstice (4), ladite rangée (6) d'aubes de guidage s'étendant à partir dudit obstacle (9) et / ou ladite rangée (14) d'aubes de rotor s'étendant à partir dudit obstacle (11), **caractérisée en ce que** ledit joint (5) définit une micro-turbine axiale ou radiale.

2. Machine tournante (1) avec joint amélioré comportant des pièces (2) de stator et pièces (3) de rotor entre lesquelles est ménagé un interstice (4) renfermant au moins un joint (5), ledit joint (5) comportant une rangée (6) d'aubes de guidage, qui s'étend à partir d'une pièce (2) de stator et est disposé de façon à guider un écoulement de fluide, et / ou une rangée (14) d'aubes de rotor, qui s'étend à partir d'une pièce (3) de rotor et est disposé de façon à échanger une puissance mécanique avec l'écoulement de fluide, ladite rangée (6) d'aubes de guidage et / ou rangée (14) d'aubes de rotor maintenant une pression différentielle entre des zones situées à des extrémités opposées du joint (5) et empêchant l'écoulement de fluide de dissiper son énergie de pression en générant de la chaleur, le joint (5) comportant an obstacle (9, 11) disposé de façon à limiter l'écoulement de fluide (7) à travers ledit interstice (4), ladite rangée (6) d'aubes de guidage s'étend s'étendant à partir dudit obstacle (9) et / ou ladite rangée (14) d'aubes de rotor s'étendant à partir dudit obstacle (11), **caractérisée en ce que** ledit joint définit un micro-compresseur axial ou radial.

3. Machine tournante (1) selon la revendication 1 ou 2, **caractérisé en ce que** ledit obstacle (9, 11) comporte une plaque annulaire.

4. Machine tournante (1) selon la revendication 3, **caractérisé en ce que** ladite plaque annulaire (9) s'étend transversalement à partir de la pièce (2) de stator, définissant un passage annulaire préétabli (10) pour l'écoulement de fluide (7).

5. Machine tournante (1) selon la revendication 3, **caractérisé en ce que** ladite plaque annulaire (11) s'étend transversalement à partir de la pièce (3) de rotor, définissant un passage annulaire préétabli (12) pour l'écoulement de fluide (7).

6. Machine tournante (1) selon la revendication 1 ou 2, **caractérisée en ce qu'**il s'agit d'une turbine à gaz ou à vapeur.

7. Machine tournante (1) selon la revendication 1 ou 2, **caractérisé en ce que** les aubes de la rangée (6) d'aubes de guidage et / ou de la rangée (14) d'aubes de rotor présentent une hauteur inférieure à 10 millimètres, de préférence inférieure à 5 millimètres et de façon plus préférable inférieure à 3 millimètres.

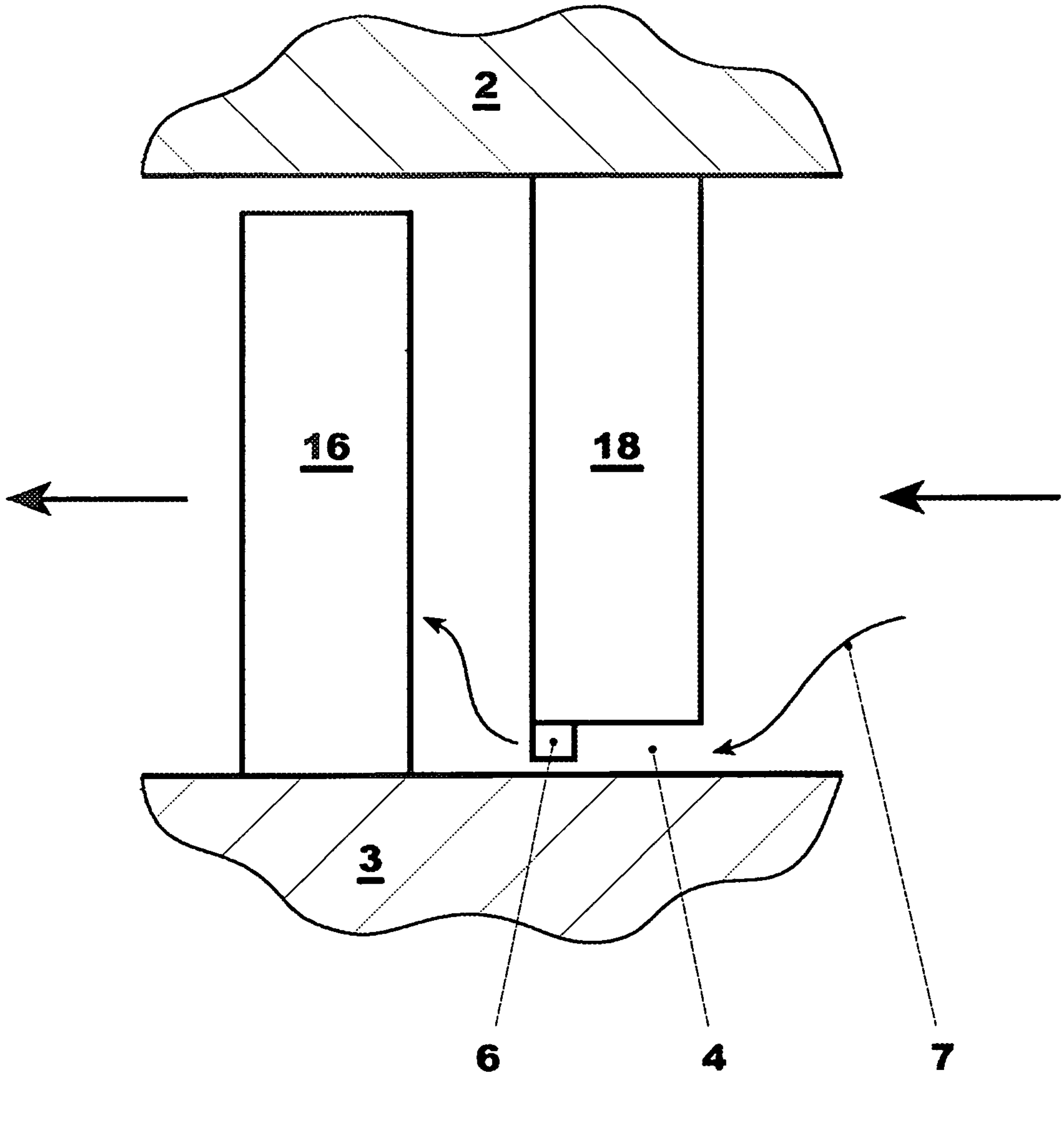

FIG. 1

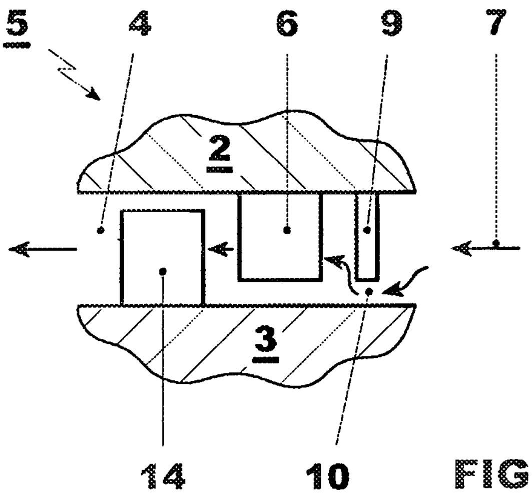

FIG. 2

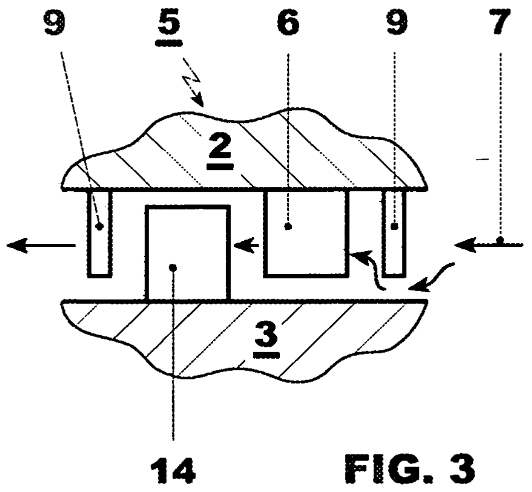

FIG. 3

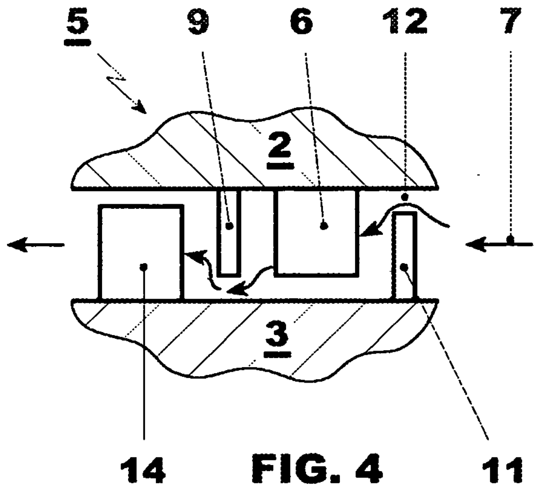

FIG. 4

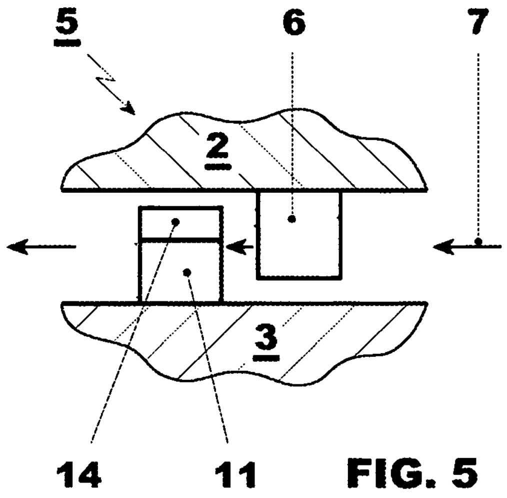

FIG. 5

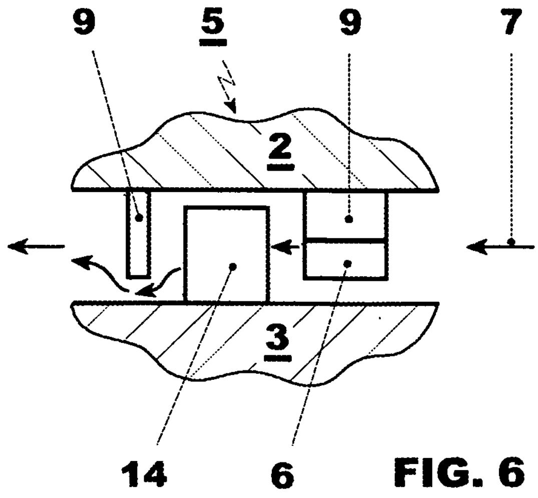

FIG. 6

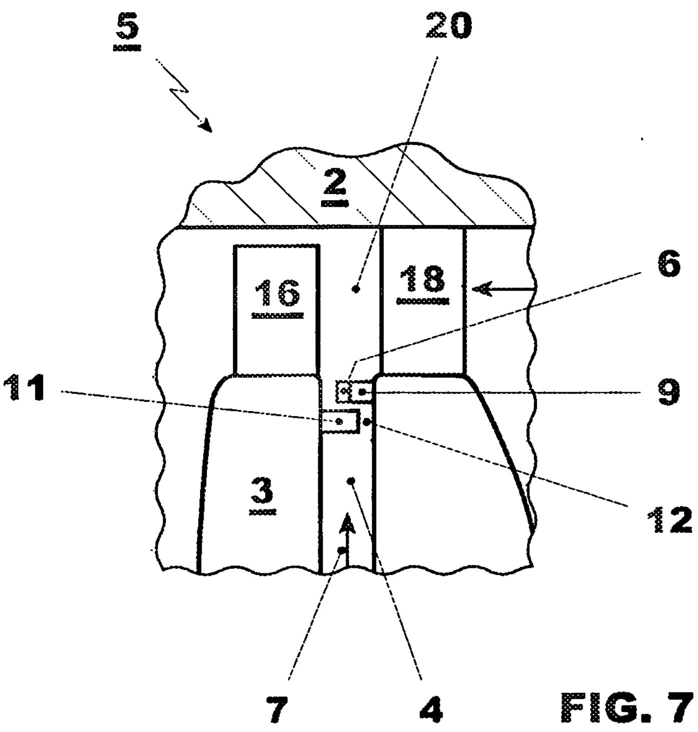

FIG. 7

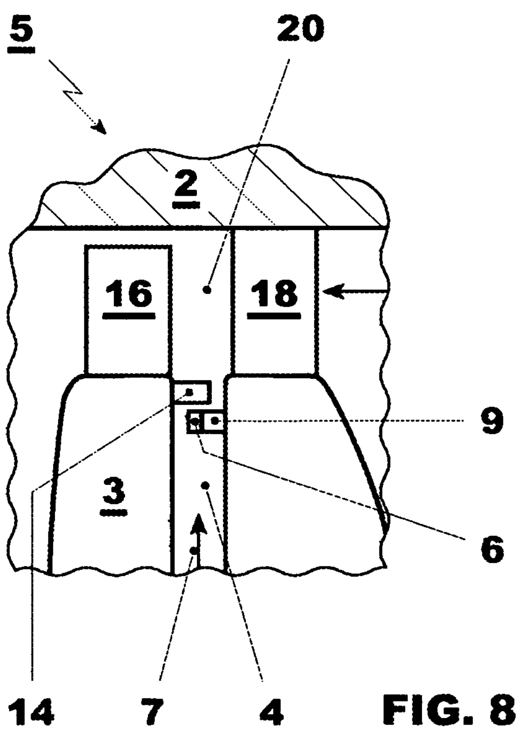

FIG. 8

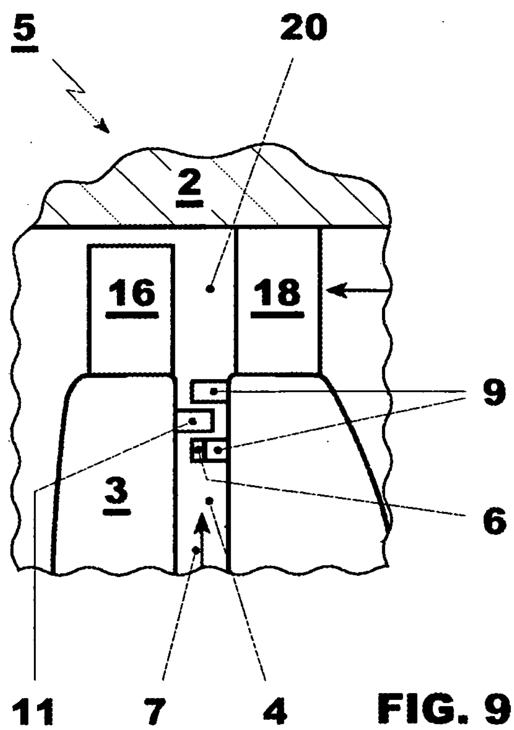

FIG. 9

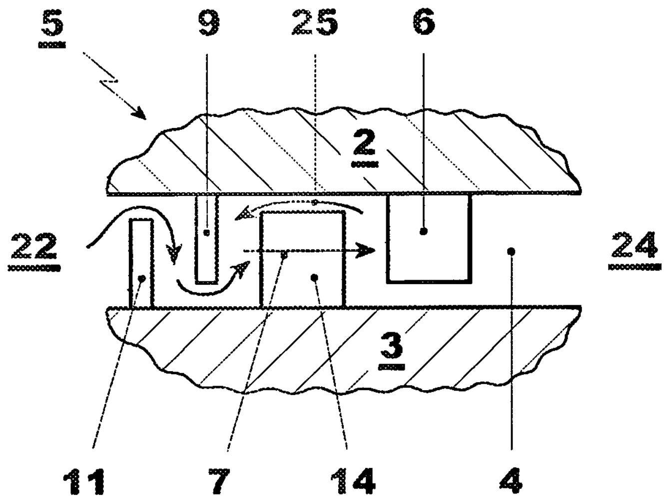

FIG. 10

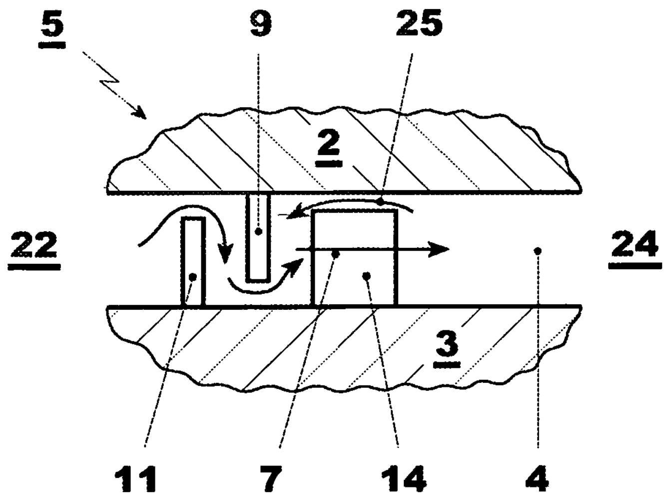

FIG. 11

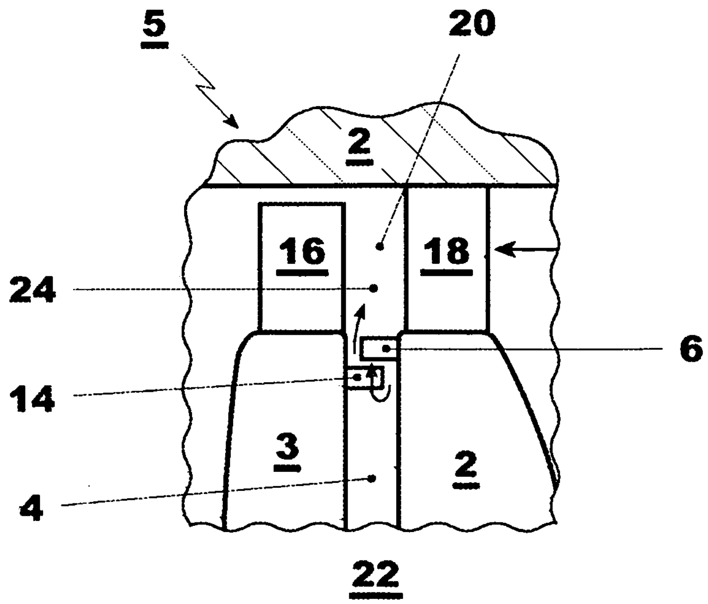

FIG. 12

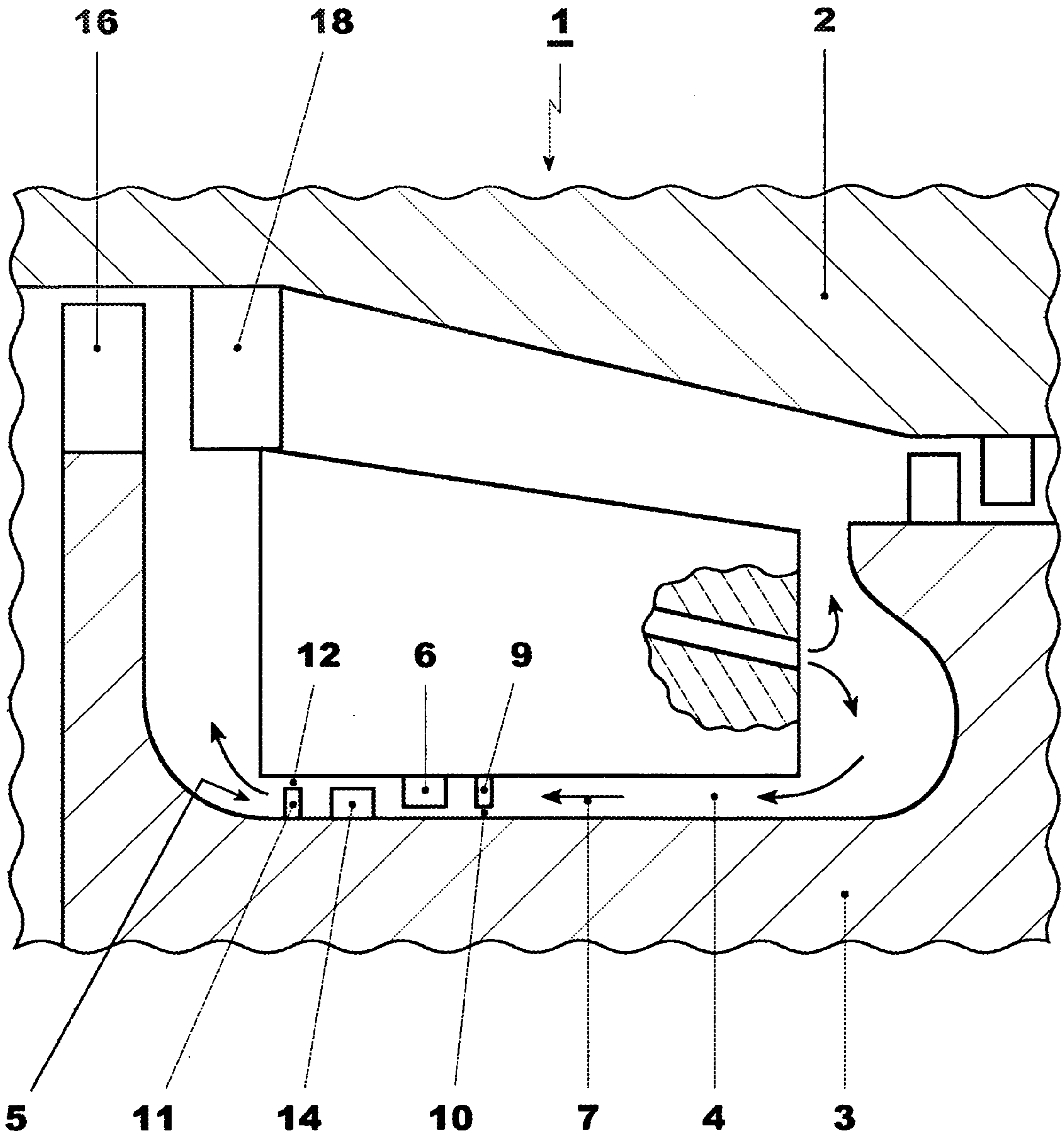

FIG. 13

REFERENCES CITED IN THE DESCRIPTION

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