

P a t e n t c l a i m s

1.

A bearing system for a rotor in rotating machines, such as compressors, pumps, turbines
5 and expanders, the rotor being provided with at least two bearings and associated seals,
c h a r a c t e r i s e d i n t h a t each bearing and sealing point for the
rotor (16) is in the form of a bearing and seal combination (17) which is formed of a
stator (18) located within a rotating machine housing (15) and surrounding the rotor
10 (16), that the stator (18) is formed with a bore (19), whereby an annular clearance is
formed between the stator and rotor, and that the bore (19) has a gradually increasing
sectional area in the direction of higher pressure (P2) within the rotating machine.

2.

A bearing system according to claim 1, c h a r a c t e r i s e d i n
15 t h a t the bearing and seal combination (17) is an axial bearing formed as a cylin-
drical disc on the rotor (16) which bears against an associated portion of the stator (18),
whereby a gas film may be formed with rigidity and damping according to the same
principle as in a radial bearing having desired dynamic rigidity and damping.

20 3.

A bearing system according to claim 1, c h a r a c t e r i s e d i n
t h a t the axial bearing is formed according to the hydrostatic principle which en-
tails a flow restriction before and after its bearing surface as to obtain rigidity with ac-
companying damping.

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4.

A bearing system according to claim 2 or 3, c h a r a c t e r i s e d i n
t h a t the axial bearing is formed as a combination of the radial bearing with gas
film and the hydrostatic principle with flow restriction before and after the bearing sur-
30 face.

5.

A bearing system according to any one of the preceding claims, c h a r a c -
t e r i s e d i n t h a t the stator (18) is provided with means (a, b, c, d)
35 adapted for damping of gas rotation in the annular clearance.

6.

A bearing system according to claim 5, characterised in that the rotating damping means are respectively in the form of an axial rib(a), a brush (b), an inclined hole-pattern, and a guide apparatus (d), such as guide blades.

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7.

A bearing system according to any one of the preceding claims, characterised in that the bore (19) is formed having an uneven surface structure.

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A bearing system according to any one of the preceding claims, characterised in that the bore (19) is formed having a honeycomb structure or pattern of holes (20).

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9.

A bearing system according to any one of the preceding claims, characterised in that the surface structure (21) of the bore (19) has an outer zone consisting of an external radial pattern of holes and an internal pattern of channels, but so positioned relative to each other as to allow gas exchange to take place in the direction of the higher pressure (P2).

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10.

A bearing system according to any one of the preceding claims, characterised in that at the start-up or the run-down of the rotating machine the higher pressure (P2) is provided by means of an accumulator (6) which contains gas at such a pressure, and which is in communication with each individual bearing and seal combination (17).

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11.

A bearing system according to any one of the preceding claims, characterised in that the system comprises at least two support bearings (7) arranged in connection with the respective bearing and seal combination (17), and which are of a type suitable for withstanding contact for a brief period during start-up or run-down.

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12.

A bearing system according to any one of the preceding claims, c h a r a c -
t e r i s e d i n t h a t the system comprises a control means (7) such as a
regulating valve, so as to adjust the geometry of the respective bearing and seal combi-
5 nation (17) by means of applied pressure forces.

13:

A bearing system according to any one of the preceding claims, c h a r a c -
t e r i s e d i n t h a t the motor (22) and the compressor (23) are located in
10 the same housing (24).

14.

A bearing system according to any one of the preceding claims, c h a r a c -
t e r i s e d i n t h a t a passive permanent magnetic bearing for support of
15 the rotor (16) at start-up or shut-down is arranged integrated in the bearing and seal
combination (17) or separately adjacent thereto.