

SIMPLE GAS SHAFT SEALING DEVICE WITH FLEXIBLE ROTOR

ABSTRACT OF THE INVENTION

This invention relates to a lubricating film type gas seal having a stationary sealing ring (stator) with a radially extending sealing face and a rotating mating seal component (mating rotor) with a radially extending sealing face. The present seal has a reduced number of components and is greatly simplified from working seals described in prior art. The mating rotor is deliberately flexible, and hence it may distort (tilt) throughout an angular range during hydrostatic and hydrodynamic operation and is dependent on rotational speed, pressure, temperature and is also a function of its material and geometric properties. The stationary ring sealing face complies to and follows the angular distortion (tilting) of the mating rotor sealing face in a converging or diverging manner throughout the hydrostatic and hydrodynamic operational range. The flexibility of the stator is a function of its geometric and material properties. Mating rotor and stator flexibility is preferably matched (e.g. using Finite Element Analysis (FEA) techniques) to provide a system flexibility which produces optimum sealing performance. The mating rotor may possess multiple radial sealing surfaces as well as one or more cylindrical sealing surfaces. Initial mating rotor and/or stator seal face angular deflection may be introduced by applying stress and producing subsequent deformation of the structure by a mechanical means.

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