CLAIMS

1. A motor comprising stationary elements and rotary elements rotatable relative to the stationary elements, the stationary elements comprising a housing and a motor stator disposed within the housing, and the rotary elements comprising a shaft supported by bearings, and a motor rotor located on the shaft for rotation relative to the motor stator; and a lubricant supply for supplying a lubricant for lubricating the bearings; characterised in that one of the stationary elements defines with one of the rotary elements an annular channel for receiving lubricant from the lubricant supply to form a heat conduction path between stationary and rotary elements of the motor.

2. A motor according to Claim 1, wherein the annular channel is defined by the motor stator and the motor rotor.

3. A motor according to Claim 2, wherein the lubricant supply is arranged to supply lubricant into the housing to partially submerge the motor rotor.

4. A motor according to Claim 2 or Claim 3, wherein the lubricant supply is arranged to supply lubricant directly into the housing.

5. A motor according to Claim 3 or Claim 4, comprising means for controlling the amount of lubricant contained within the housing.

6. A motor according to Claim 5, wherein the means for controlling the amount of lubricant contained within the housing comprises a drain having an inlet located radially between the annular channel and the shaft for draining lubricant from the housing.

7. A motor according to any of Claims 3 to 6, wherein the bearings are positioned to receive lubricant thrown by the motor rotor with rotation of the shaft.

8. A motor according to Claim 1, wherein the annular channel is defined by the housing and the shaft.

9. A motor according to Claim 8, wherein the motor rotor is located between two said annular channels.

10. A motor according to Claim 8, wherein each annular channel is located axially between the motor rotor and a respective bearing.

11. A motor according to any of Claims 8 to 10, wherein the lubricant supply is configured to supply lubricant directly into the or each annular channel.

12. A motor according to any of Claims 8 to 11, wherein an additional annular channel is defined by the motor rotor and the motor stator.

13. A motor according to Claim 12, wherein the additional annular channel is arranged to receive lubricant supplied by the lubricant supply.

14. A motor according to any of Claims 8 to 13, comprising means for draining lubricant from the housing.

15. A motor according to Claim 14 when dependent from Claim 12, wherein the means for draining lubricant from the housing has an inlet located radially between the additional annular channel and the shaft.

16. A motor according to any preceding claim, comprising means for cooling the housing.

17. A motor according to Claim 16, wherein the cooling means comprises means for conveying a coolant about the motor stator.

18. A vacuum pump comprising a motor according to any preceding claim.

19. A vacuum pump according to Claim 18, comprising a gearbox, and wherein the lubricant supply is configured to supply lubricant to the motor from the gearbox.

20. A method of removing heat from a motor rotor located within a sub-atmospheric pressure environment during use of a motor comprising stationary elements and rotary elements rotatable relative to the stationary elements, the stationary elements comprising a housing and a motor stator disposed within the housing, and the rotary elements comprising a shaft supported by bearings, and said motor rotor located on the shaft for rotation relative to the motor stator, the method comprising supplying to the housing a lubricant for lubricating the bearings and for filling an annular channel defined between one of the stationary elements and one of the rotary elements to form a heat conduction path between stationary and rotary elements of the motor; and cooling one of the stationary elements to remove from the motor heat that has been conducted across said path.

21. A method according to Claim 20, wherein the lubricant is supplied to the housing to fill an annular channel defined by the motor stator and the motor rotor.

22. A method according to Claim 21, wherein the lubricant is supplied into the housing to partially submerge the motor rotor.

23. A method according to Claim 21 or Claim 22, wherein the lubricant is supplied directly into the housing.

24. A method according to Claim 22 or Claim 23, wherein the amount of lubricant contained within the housing is controlled.

25. A method according to Claim 24, wherein lubricant is drained from the housing by a drain having an inlet located radially between the annular channel and the shaft.

26. A method according to any of Claims 22 to 25, wherein the bearings are positioned to receive lubricant thrown by the motor rotor with rotation of the shaft.

27. A method according to Claim 20, wherein the lubricant is supplied to the housing to fill an annular channel defined by the housing and the shaft.

28. A method according to Claim 27, wherein the lubricant is supplied to the housing to fill two said annular channels, the motor rotor being located between said annular channels.

29. A method according to Claim 28, wherein each annular channel is located axially between the motor rotor and a respective bearing.

30. A method according to any of Claims 27 to 29, wherein the lubricant is supplied directly into the annular channel.

31. A method according to any of Claims 27 to 30, wherein the lubricant is supplied to the housing to fill an additional annular channel defined by the motor stator and the motor rotor.

32. A method according to Claim 31, wherein lubricant is drained from the housing by a drain having an inlet located radially between the additional annular channel and the shaft.

33. A method according to any of Claims 20 to 32, wherein the housing is cooled.

34. A method according to Claim 33, wherein the housing is cooled by a coolant conveyed about the motor stator.

CLAIMS

1. A motor for a vacuum pump comprising stationary elements and rotary elements rotatable relative to the stationary elements, the stationary elements comprising a housing and a motor stator disposed within the housing, and the rotary elements comprising a shaft supported by bearings, and a motor rotor located on the shaft for rotation relative to the motor stator; and a lubricant supply for supplying a lubricant for lubricating the bearings; wherein the motor is integrable into a vacuum pump, so that during use of the pump, the housing is exposed to sub-atmospheric pressure; characterised in that
the motor rotor comprises a plurality of radial fins for generating a flow of air within the housing, so that with the air present in the housing, heat is drawn from the radial fins; and in that
one of the stationary elements defines with one of the rotary elements an annular channel for receiving lubricant from the lubricant supply to form a heat conduction path for transferring heat by conduction from the rotary elements of the motor into the housing at both atmospheric and sub-atmospheric pressures within the housing.

2. A motor according to Claim 1, wherein the annular channel is defined either by the motor stator and the motor rotor or by the housing and the shaft.

3. A motor according to Claim 2, wherein when the annular channel is defined by the housing and the shaft, an additional annular channel is defined by the motor rotor and the motor stator.

4. A motor according to Claim 2, wherein the bearings are positioned to receive lubricant thrown by the motor rotor with rotation of the shaft.

5. A motor according to Claim 3, wherein the motor rotor is located between two said annular channels.

6. A motor according to Claim 3, wherein each annular channel is located axially between the motor rotor and a respective bearing.

7. A motor according to any of Claims 2 to 6, wherein the lubricant supply is configured to supply lubricant either directly into the or each annular channel, or into the housing to partially submerge the motor rotor.

8. A motor according to Claim 7, wherein the additional annular channel is arranged to receive lubricant supplied by the lubricant supply.

9. A motor according to Claim 7 or Claim 8, comprising means for controlling the amount of lubricant contained within the housing.

10. A motor according to Claim 9, wherein the means for controlling the amount of lubricant contained within the housing comprises a drain having an inlet located radially between the annular channel and the shaft for draining lubricant from the housing.

11. A motor according to Claim 3, wherein a means for draining lubricant from the housing has an inlet located radially between the additional annular channel and the shaft.

12. A motor according to any preceding Claim, comprising means for cooling the housing.

13. A vacuum pump comprising a motor according to any preceding Claim.

14. A vacuum pump according to Claim 13, in which a sub-atmospheric pressure is generated within the housing during use of the pump.

15. A vacuum pump according to Claim 13 or Claim 14, comprising a gearbox, and wherein the lubricant supply is configured to supply lubricant to the motor from the gearbox.