CLAIMS

What is claimed is:

1. A bearing for a downhole tool, comprising:

a first bearing member comprising an outer contact surface defining an outer diameter; and

a second bearing member comprising an inner contact surface defining an inner diameter, the inner diameter of the second bearing member being larger than the outer diameter of the first bearing member and the inner contact surface of the second bearing member being in sliding contact with the outer contact surface of the first bearing member at an interface;

wherein at least one of the first and second bearing members comprises at least one channel formed in a portion of the at least one of the first and second bearing members.

2. The bearing for a downhole tool of claim 1, wherein the at least one channel comprises a plurality of channels.

3. The bearing for a downhole tool of claim 2, wherein some of the plurality of channels extend helically in a first direction and others of the plurality of channels extend helically in a second, transverse direction to define a cross-hatch pattern.

4. The bearing for a downhole tool of claim 1, wherein the first bearing member and the second bearing member are of generally cylindrical configuration, each having a central axis transverse to respective opposing side surfaces, and the at least one channel comprises at least one at least substantially linear, axially oriented groove extending into at least one of the outer contact surface of the first bearing member and the inner contact surface of the second bearing member.

5. The bearing for a downhole tool of claim 1, wherein the at least one channel comprises at least one at least substantially helical groove in at least one of the outer contact surface of the first bearing member and the inner contact surface of the second bearing member.

6. The bearing for a downhole tool of claim 1, wherein the at least one channel is positioned in an interior wall of the at least one of the first and second bearing members and opens at the opposing side surfaces thereof.

7. The bearing for a downhole tool of claim 1, wherein the at least one channel comprises at least one notch in the outer contact surface of the first bearing member or the inner contact surface of the second bearing member.

8. The bearing for a downhole tool of claim 1, wherein the at least one channel comprises a groove defining a closed flow path extending around at least one of the outer contact surface of the first bearing member and the inner contact surface of the second bearing member.

9. A bearing for a downhole tool, comprising:

a first bearing member comprising a lower contact surface; and

a second bearing member comprising an upper contact surface, wherein the first bearing member abuts against the second bearing member at an interface between the lower contact surface and the upper contact surface, the first and second bearing members being configured to rotate slidably relative to one another,

at least one of the first and second bearing members comprising at least one channel extending and configured to provide a fluid pathway across at least one of the first and second bearing members.

10. The bearing for a downhole tool of claim 9, wherein the at least one channel comprises a plurality of channels.

11. The bearing for a downhole tool of claim 9, wherein the at least one channel extends through an interior of the at least one of the first and second bearing members and has openings at a side surface thereof.

12. The bearing for a downhole tool of claim 9, wherein the at least one channel is formed in one of the lower contact surface of the first bearing member and the upper contact surface of the second bearing member and has openings in a side surface and an inner surface of one of the first bearing member and the second bearing member.

13. A bearing for a downhole tool, comprising:

a first bearing member comprising a generally cylindrical portion and a generally annular portion connected to the generally cylindrical portion and extending radially outward at an end of the cylindrical portion, wherein the generally cylindrical portion comprises an outer contact surface defining an intermediate outer diameter of the first bearing member and wherein the generally annular portion comprises a generally annular lower contact surface, the lower contact surface intersecting the outer contact surface and the lower and outer contact surfaces forming a substantially continuous surface;

a second bearing member comprising a generally cylindrical portion and a generally annular portion connected to the generally cylindrical portion and extending radially outward at an end of the cylindrical portion, wherein the generally cylindrical portion comprises an inner contact surface defining an inner diameter of the second bearing member and wherein the generally annular portion comprises a generally annular upper contact surface, the upper contact surface intersecting the inner contact surface and the upper and inner contact surfaces forming a substantially continuous surface abutting the substantially continuous surface formed by the lower and outer contact surfaces of the first bearing member; and

at least one channel formed in one of the first bearing member and the second bearing member.

14. The bearing for a downhole tool of claim 13, wherein the lower contact surface is transverse to the outer contact surface and the upper contact surface is transverse to the inner contact surface.

15. The bearing for a downhole tool of claim 14, wherein a chamfer or a smooth curve provides a transition between the lower contact surface and the outer contract surface and between the upper contact surface and the inner contact surface.

16. The bearing for a downhole tool of claim 13, wherein the at least one channel comprises at least one groove formed in at least one of the substantially continuous surface formed by the inner and upper contact surfaces and the substantially continuous surface formed by the outer and lower contact surfaces.

17. A method of cooling a bearing of a downhole tool, comprising:
flowing a fluid within a channel formed in at least one bearing member;
transferring heat from at least the at least one bearing member to the fluid; and
flowing the fluid away from the at least one bearing member.

18. The method of claim 17, wherein flowing the fluid within the channel formed in the at least one bearing member comprises flowing the fluid along an interface between the at least one bearing member and at least another bearing member.

19. The method of claim 18, further comprising removing at least one abrasive particle from the interface between the at least one bearing member and the at least another bearing member.

20. The method of claim 18, wherein flowing the fluid within the channel comprises flowing the fluid within a groove defining a closed flow path in a surface of the at least one bearing member.

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What is claimed is:

1. A bearing for a downhole tool, comprising:

a first bearing member comprising an outer contact surface defining an outer diameter; and

a second bearing member comprising an inner contact surface defining an inner diameter, the inner diameter of the second bearing member being larger than the outer diameter of the first bearing member and the inner contact surface of the second bearing member being in sliding contact with the outer contact surface of the first bearing member at an interface;

wherein the first bearing member comprises a channel formed in the outer contact surface of the first bearing member, the channel comprising a notch defining a flat surface interrupting an otherwise circular cross-sectional shape of the outer contact surface; and

wherein the second bearing member comprises at least another channel formed in the inner contact surface of the second bearing member.

2. The bearing for a downhole tool of claim 1, wherein the at least another channel comprises a first plurality of channels extending helically in a first direction and a second plurality of channels extending helically in a second, transverse direction to define a cross-hatch pattern.

3. The bearing for a downhole tool of claim 1, wherein the first bearing member and the second bearing member are of generally cylindrical configuration, each having a central axis transverse to respective opposing side surfaces, and the at least another channel comprises at least one at least substantially linear, axially oriented groove extending into the inner contact surface of the second bearing member.

4. The bearing for a downhole tool of claim 1, wherein the at least another channel comprises at least one at least substantially helical groove in the inner contact surface of the second bearing member.

5. The bearing for a downhole tool of claim 3, wherein the at least another channel is positioned in an interior wall of the second bearing member and opens at the opposing side surfaces thereof.

6. The bearing for a downhole tool of claim 1, wherein the at least another channel comprises a groove defining a closed flow path extending around the inner contact surface of the second bearing member.

7. A bearing for a downhole tool, comprising:

a first bearing member comprising a generally cylindrical portion and a generally annular portion connected to the generally cylindrical portion and extending radially outward at an end of the cylindrical portion, wherein the generally cylindrical portion comprises an outer contact surface defining an intermediate outer diameter of the first bearing member and wherein the generally annular portion comprises a generally annular lower contact surface, the lower contact surface intersecting the outer contact surface and the lower and outer contact surfaces forming a substantially continuous surface;

a second bearing member comprising a generally cylindrical portion and a generally annular portion connected to the generally cylindrical portion and extending radially outward at an end of the cylindrical portion, wherein the generally cylindrical portion comprises an inner contact surface defining an inner diameter of the second bearing member, the inner diameter being larger than the intermediate outer diameter, and wherein the generally annular portion comprises a generally annular upper contact surface, the upper contact surface intersecting the inner contact surface and the upper and inner contact surfaces forming a substantially continuous surface in sliding contact with the substantially continuous surface foamed by the lower and outer contact surfaces of the first bearing member at an interface;

a channel formed in at least the outer contact surface of the first bearing member, the channel comprising a notch defining a flat surface interrupting an otherwise circular cross-sectional shape of the outer contact surface; and

at least another channel formed in at least the inner contact surface of the second bearing member.

8. The bearing for a downhole tool of claim 7, wherein the lower contact surface is transverse to the outer contact surface and the upper contact surface is transverse to the inner contact surface.

9. The bearing for a downhole tool of claim 8, wherein a chamfer or a smooth curve provides a transition between the lower contact surface and the outer contract surface and between the upper contact surface and the inner contact surface.

10. The bearing for a downhole tool of claim 7, wherein the at least another channel is further formed in the upper contact surface of the second bearing member.

11. A method of cooling a bearing of a downhole tool, comprising:

flowing a fluid within a channel formed in a first bearing member comprising an outer contact surface defining an outer diameter, the first bearing member being located within a second bearing member comprising an inner contact surface defining an inner diameter, the inner diameter of the second bearing member being larger than the outer diameter of the first bearing member and the inner contact surface of the second bearing member being in sliding contact with the outer contact surface of the first bearing member at an interface, the channel comprising a notch defining a flat surface interrupting an otherwise circular cross-sectional shape of the outer contact surface;

flowing the fluid within at least another channel formed in the inner contact surface of the second bearing member; transferring heat from the first bearing member and the second bearing member to the fluid; and

flowing the fluid away from the first bearing member and the second bearing member.

12. The method of claim 11, further comprising removing at least one abrasive particle from the interface between the first bearing member and the second bearing member.

13. The method of claim 11, flowing the fluid within the at least another channel comprises flowing the fluid within a groove defining a closed flow path in the inner contact surface of the second bearing member.